



## Chevron U.S.A. Products Company

2410 Camino Ramon, San Ramon, California • Phone (510) 842-9500  
Mail Address: PO Box 5004, San Ramon, CA 94583-0804

April 29, 1993

Mr. Barney Chan  
Alameda County Health Care Services  
Department of Environmental Health  
80 Swan Way, Room 200  
Oakland, CA 94621

**Re: Chevron Service Station #9-0076  
4265 Foothill Boulevard, Oakland, CA**

Dear Mr. Chan:

Chevron has received your letter dated March 26, 1993, requesting a work plan for remediation and additional assessment work at the above referenced site. Enclosed is the Work Plan for Ground Water Remediation dated April 16, 1993, prepared by our consultant Weiss Associates.

After our meeting of January 19, 1993, I met with Chevron's consultant, Weiss Associates, who designed and installed the existing ground water extraction system at this site. Several technical issues were discussed which greatly affected the remedial approach John Randall and I had discussed with you and the proposed remediation work plan presented here. It appears that during quarterly monitoring and sampling events, the recharge rates observed in the monitor wells are extremely low. Additionally, well yield tests conducted during the design phase of the ground water extraction system predicted extraction rates of up to 0.07 gpm or 100 gallons per day under the best possible circumstances. This data indicated that ground water extraction would be a very difficult technology to implement at this site.

However, acting under self-direction, Chevron installed a ground water extraction system to begin removing hydrocarbon impacted ground water in November of 1991. Performance records indicate that siltation was a significant problem. Four months after startup the extraction well required redeveloping and a new pump with better silt handling capabilities was also installed. Records show that since the pump replacement, the system has treated approximately 5,300 gallons of ground water. It is apparent from data gathered during the design and operation of the existing ground water extraction system that flow rates and hydrocarbon removal rates are extremely low due to the tight lithology and high silt content found in soils beneath the site.

Due to the above mentioned technical limitations, Chevron proposes utilizing an alternate remedial approach. The enclosed work plan presents an enhanced in-situ bioremediation remedial approach for the removal of dissolved hydrocarbons from monitor well C-2. The approach involves injecting air at low flow rates to increase the amount of oxygen available for aerobic biodegradation. Monitoring of wells C-2, C-3, and C-4 for TPH-G, BTEX, dissolved oxygen, pH, temperature, conductivity, hydrogen utilizing bacteria count, standard plate count, nitrogen, and phosphorous will be conducted to evaluate effectiveness of the approach.

It is clear that additional assessment is warranted downgradient of monitor wells C-6 and C-7, however it remains unclear as to the responsibility for hydrocarbon constituents currently observed in these wells. Clearly, the Shell site located at 4411 Foothill Boulevard has been identified as a

*May need to evaluate more alternatives*

Page 2  
April 29, 1993  
Chevron SS#9-0076

potential upgradient source just as the Chevron site has. I understand Shell is currently installing two monitor wells at that site to further define impacts to ground water. As we agreed in our meeting, it would be prudent to allow Shell to conduct further investigative work to determine the magnitude and extent of their impacts to ground water before a significant amount of resources are expended by Chevron in remediating contamination we may have no responsibility for. Any information your office can provide in relation to investigation work currently being conducted at the Shell site would greatly assist.

As you have requested, TPH-G and benzene isoconcentration maps have been generated based upon data obtained during the January 8, 1993 sampling event. Here again, any additional data Alameda County could provide in relation to Shell's investigation would be helpful in depicting a more accurate representation of dissolved hydrocarbon constituents in the ground water.

Chevron proposes to utilize the enhanced in-situ bioremediation approach for a trial period of six months. This length of time will be necessary to evaluate the effectiveness of the approach and will also allow Shell to conduct additional site assessment as required by Alameda County. Once the additional site assessment data is available, a more comprehensive plan for remediation can be developed.

Chevron will implement the work plan following your review and formal concurrence. In conjunction with active remediation, Chevron will continue to monitor and sample all wells at this site on a quarterly basis.

If you have any questions or comments, please do not hesitate to contact me at (510) 842-8134.

Very truly yours,  
CHEVRON U.S.A. PRODUCTS COMPANY



Mark A. Miller  
Site Assessment and Remediation Engineer

Enclosure

cc: Mr. Rich Hiatt, RWQCB - Bay Area  
Mr. Mike Cooke, Weiss Associates  
Mr. S.A. Willer  
File (9-0076 WP1)



April 16, 1993

Mark Miller  
Chevron U.S.A. Products Company  
P.O. Box 5004  
San Ramon, CA 94583-0804

Re: Chevron Service Station #9-0076  
4265 Foothill Boulevard  
Oakland, California  
WA Job #4-668-89

Dear Mr. Miller:

As you requested and is required by Alameda County Health Care Services, this letter presents Weiss Associates (WA) proposed work plan for ground water remediation at the above-referenced site. WA proposes to replace the existing ground water extraction system with an air injection system to enhance in situ biochemical oxidation of hydrocarbons in ground water beneath this site. The site background and the proposed new remedial approach are discussed in the following sections.

#### SITE BACKGROUND

The site is located in a mixed residential and commercial area on the southwest corner of Foothill Boulevard and High Street in Oakland, California (Figure 1). On May 21, 1987, three steel gasoline and one fiberglass waste oil tank were removed from the site. Immediately following the tank removal, Blaine Tech Services (BTS) of San Jose, California, collected ten soil samples from directly beneath the former tanks and from the excavated soil stockpiled on site. Up to 21 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPH-G) were detected in two of the six samples from beneath the gasoline tanks. Trace concentrations of benzene, toluene and xylenes were detected in three of the six samples. 63 ppm TPH as waste oil and 100 ppm total oil and grease were detected in one of two soil samples collected from

beneath the waste oil tank. Soil samples from the stockpiled soil contained up to 870 ppm TPH-G, 17 ppm benzene, 32 ppm toluene and 29 ppm xylene<sup>1</sup>.

On June 4, 1987, three 10,000-gallon double-wall fiberglass tanks were installed in the same location as the previously removed tanks. The waste oil tank was not replaced and its excavation was backfilled and compacted<sup>2</sup>.

On July 8, 1987, a gasoline odor and small amount of water with a product sheen was detected in an 11 ft deep sign footing on the Foothill Boulevard side of the site. No water or petroleum odors were detected in any other site excavation<sup>3</sup>.

### Previous Investigations

On August 13, 1987, Pacific Environmental Group, Inc. (PEG) of Santa Clara, California, drilled five exploratory soil borings and installed ground water monitoring wells in four of the borings. The remaining boring was backfilled with concrete. Three of five soil borings contained TPH-G between 500 and 3,600 ppm with the highest concentration detected in backfilled boring C-A. Dissolved hydrocarbons were detected in ground water from all sampled monitoring wells. Well C-2 was not sampled because it contained over two feet of floating hydrocarbons. Dissolved gasoline concentrations ranged from 250 to 22,000 parts per billion (ppb) in the three sampled wells<sup>4</sup>.

Between July 31 and November 1, 1990, WA drilled four soil borings and installed ground water monitoring wells in each boring. TPH-G was detected at 54 ppm and 42 ppm in the soil

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<sup>1</sup> Blaine Tech Services, Inc., 1987, Sampling Report, Chevron #9-0076, 4265 Foothill Boulevard, Oakland, California, consultant's report prepared for Chevron USA, Inc., June 4, 1987, 3 p. and 2 attachments.

<sup>2</sup> Huffman, Kay, 1987, letter from Kay Huffman, Chevron environmental engineer, to Ted Gerow, Alameda County Environmental Health department, August 14, 1987, 2 p.

<sup>3</sup> Huffman, Kay, 1987, letter from Kay Huffman, Chevron environmental engineer, to Ted Gerow, Alameda County Environmental Health Department, August 14, 1987, 2pp.

<sup>4</sup> Pacific Environmental Group, Inc., 1987, Soil and Groundwater Investigation, Chevron USA Station #9-0076, 4625 Foothill Boulevard at High Street, Oakland, California, consultant's report prepared for Gettler-Ryan, Inc., September 23, 1987, 12 p. and 2 appendices.

samples from 11 ft depth from boring BH-E and 31 ft depth from boring BH-F, respectively. Lower BETX concentrations were detected in other soil samples<sup>5</sup>.

On January 8, 1993, Groundwater Technology, Inc. of Concord, California collected ground water samples from monitoring wells C-1 through C-8 as part of the quarterly monitoring program at the site (Attachment A)<sup>6</sup>. Floating hydrocarbons were detected only in well C-2, which contained a hydrocarbon sheen. Ground water samples from wells C-2, C-4, C-6 and C-7 contained TPH-G and benzene concentrations over 1,000 ppb. TPH-G and benzene were not detected in samples from wells C-3, C-5 and C-8.

### Ground Water Remediation

Presently, WA operates and maintains a ground water extraction system at the site. The system consists of a total fluids pump installed in well C-2, underground double contained pump air and discharge tubing, 1 horse power air compressor, air filters for the pump controls, pump controller and a 1,500-gallon high density polyethylene (HDPE) storage tank. Storage tank ancillary equipment includes a 1,760-gallon HDPE secondary containment basin, high water level shut-off switch, flame arrestor and a 200-pound granular activated carbon (GAC) vapor emissions control drum.

Ground water extraction from well C-2 began November 1991. To date, the system has removed about 5,800 gallons of hydrocarbon bearing ground water. Due to the high silt content of soils beneath the site, ground water yields have not exceeded 80 gallons-per-day and frequent pump fouling is a problem. Redeveloping well C-2 has been ineffective at increasing ground water yields and reducing siltation.

To increase ground water pumping effectiveness, WA evaluated pumping from well C-4 and installing a well specifically designed for ground water extraction. Review of well logs, well development data and recovery rates after purging, indicate that well C-4 will yield less ground water than C-2. Installing an extraction well with a high flow screen and fine sand

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<sup>5</sup> Weiss Associates, 1990, Subsurface Investigation, Chevron Service Station #9-0076, 4265 Foothill Boulevard, Oakland, California, consultant's report prepared for Chevron USA, December 18, 1990, 24 p. and 3 appendices.

<sup>6</sup> Groundwater Technology, Inc., 1993, Groundwater Monitoring and Sampling Activity Report, Chevron #9-0076, 4265 Foothill Boulevard, Oakland, California; consultant's report prepared for Mr. Mark Miller of Chevron U.S.A. Products Company; 1 page, 3 attachments.

filter pack is not expected to increase pumping rates or prevent silts from plugging the well and fouling extraction pumps.

#### PROPOSED REMEDIATION

Because of the very low ground water yields, high silt content of subsurface soils and the inadequately defined hydrocarbon distribution and ground water gradient at adjacent underground tank sites, ground water extraction may not be the most effective remedial approach at this time. To increase hydrocarbon degradation beneath the site WA proposes using in-situ biochemical oxidation.

Ground water remediation using in-situ biochemical oxidation takes advantage of a variety of biochemical oxidation mechanisms to naturally degrade hydrocarbons. These mechanisms work to some degree in all natural soil and ground water systems. Four key factors are quantified to evaluate natural biodegradation feasibility: oxygen availability, indigenous bacterial populations, presence of nutrients and absence of chemical and toxic interferences. Oxygen deficiency is usually the limiting factor for biochemically oxidizing hydrocarbons in ground water. However, oxygen can usually be added using aeration wells or hydrogen peroxide injection. The advantages of enhanced in-situ biochemical oxidation over ground water extraction include less environmental impact and lower installation and annual operating costs and enhanced clean up for sites with low ground water yields.

Because petroleum hydrocarbons are amenable to biodegradation, in-situ biochemical oxidation may be a viable remediation technology for this site. The two remaining factors which could influence the effectiveness of this technology are nutrient availability and interference from naturally-occurring inorganic chemicals present in soil and ground water. If these factors become problematic, nutrients or interference-sequestering chemicals can be added to the ground water.

WA proposes to remediate ground water beneath the site by injecting air at a low flow rate (less than 1.0 cubic feet per minute) into monitoring well C-2. The injected air will provide oxygen to enhance hydrocarbon biodegradation. Air will be supplied by an air compressor to a diffuser in well C-2. The air injection system will be sealed, and any offgas from well C-2 will be routed to a vapor-phase, granular activated carbon (GAC) vessel for treatment. All of the primary components of the proposed system are part of the previous

*Should also consider  
air injection into  
mw C-4.*

Mark Miller  
April 16, 1993

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ground water extraction system and are currently available on site. Therefore, equipment procurement and system installation time will be minimal.

Ground Water Monitoring Plan

Before beginning air injection into well C-2, WA will collect baseline samples from wells C-2, C-3 and C-4. In addition to TPH-G and BETX, WA will monitor dissolved oxygen levels, pH, temperature and conductivity and collect additional ground water samples to determine hydrogen utilizing bacteria count, standard plate count, and nitrogen and phosphorous concentrations. After beginning air injection, we will monitor wells C-2, C-3 and C-4 quarterly to evaluate air injection system effectiveness for enhancing in-situ biochemical oxidation.

Weiss Associates appreciates the opportunity to provide engineering and hydrogeologic services to Chevron USA Products Company. We trust that this new remedial approach will meet your objectives. Please call Mike Cooke at (510) 450-6000 if you have questions or comments.

Sincerely,  
Weiss Associates



Kimberly Ohara  
Staff Engineer



Michael Cooke  
Project Geologist

MC:kao

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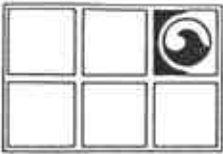
Attachments: Figure 1 - Site Location Map

A - First Quarter 1993, Groundwater Monitoring and Sampling Activities  
Report





**ATTACHMENT A**  
**FIRST QUARTER 1993**  
**GROUNDWATER MONITORING AND SAMPLING ACTIVITIES REPORT**



# GROUNDWATER TECHNOLOGY, INC.

4057 Port Chicago Highway, Concord, CA 94520 (415) 671-2387

FAX: (415) 685-9148

February 4, 1993

Job No. 020302227

Mr. Mark Miller  
Chevron U.S.A. Products Company  
2410 Camino Ramon  
San Ramon, CA 94583-0804

**SUBJECT: GROUNDWATER MONITORING AND SAMPLING ACTIVITIES  
CHEVRON SERVICE STATION NO. 9-0076  
4265 FOOTHILL BLVD., OAKLAND, CALIFORNIA**

Dear Mr. Miller:


Groundwater Technology, Inc. presents the attached quarterly groundwater monitoring and sampling data collected on January 8, 1993. Eight groundwater monitoring wells at this site were gauged to determine depth to groundwater (DTW) and to check for separate-phase hydrocarbons. A separate-phase hydrocarbon sheen was detected in groundwater monitoring well C-2. A potentiometric surface map (Figure 1) and a summary of groundwater monitoring data (Table 1) are presented in Attachments A and B, respectively. After measuring the DTW, each monitoring well was purged and sampled. The groundwater samples were analyzed for benzene, toluene, ethylbenzene, xylenes (BTEX), and total petroleum hydrocarbons (TPH)-as-gasoline. Results of the chemical analyses are summarized in Table 1. The laboratory report and chain-of-custody record are included in Attachment C. Monitoring well purge water was transported by Groundwater Technology, Inc. to the Chevron terminal in Richmond, California for recycling.

Groundwater Technology is pleased to assist Chevron on this project. If you have any questions or comments, please call our Concord, California office at (510) 671-2387.

Sincerely,  
Groundwater Technology, Inc.  
Written/Submitted by

  
SANDRA L. LINDSEY  
Project Manager

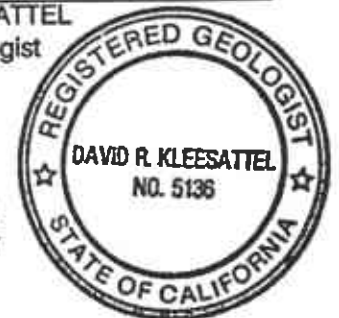
Groundwater Technology, Inc.  
Reviewed/Approved by

  
DAVID R. KLEESATTEL  
Registered Geologist  
No. 5136

Attachments: Attachment A - Figure 1  
Attachment B - Table 1  
Attachment C - Laboratory Report

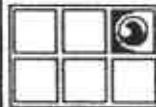
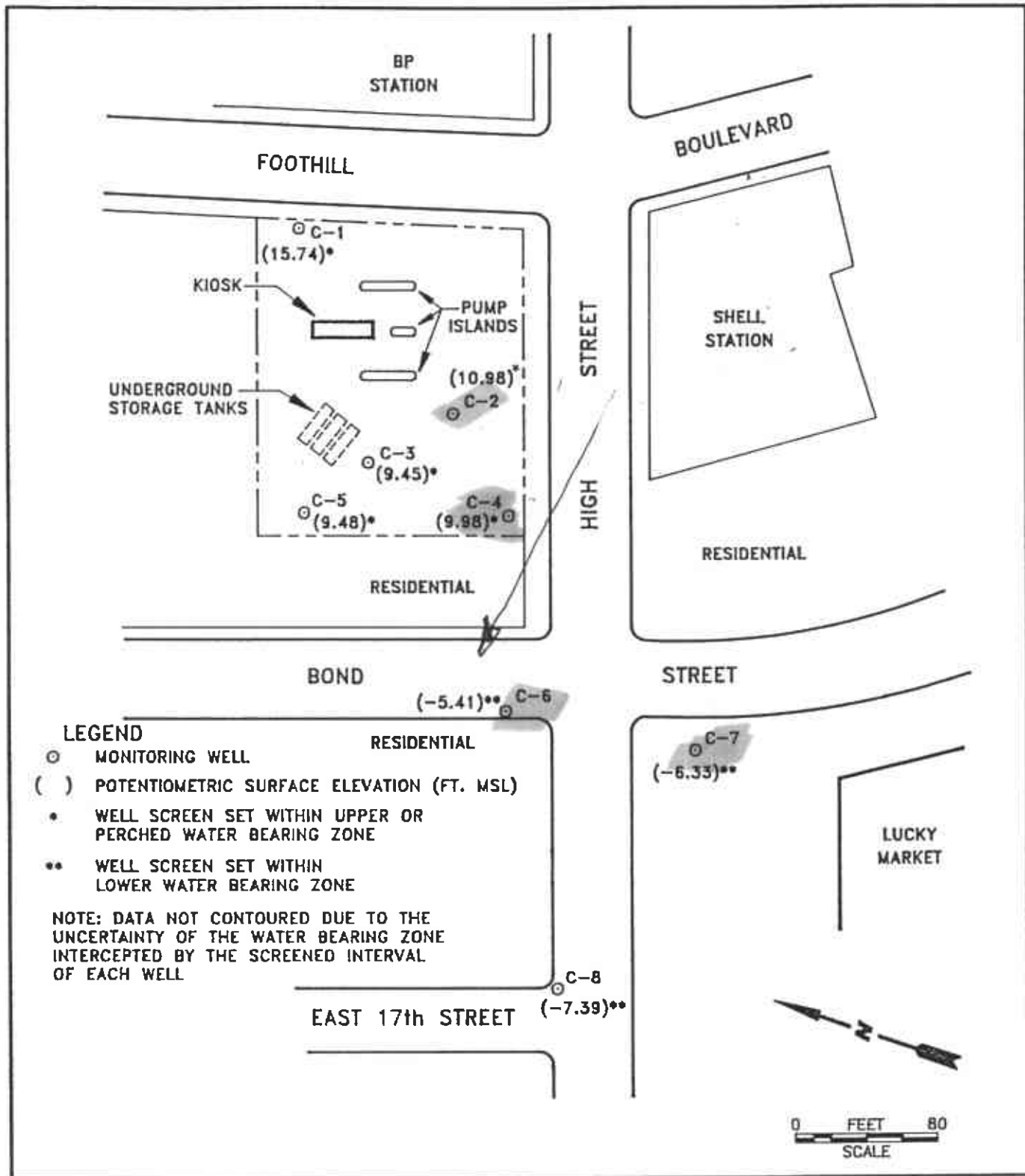
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For:  
John Gaines V.P.  
General Manager  
West Region



**ATTACHMENT A**

**FIGURE 1**



**GROUNDWATER TECHNOLOGY**  
 4057 PORT CHICAGO HWY  
 CONCORD, CA 94520  
 (510) 671-2387

**POTENTIOMETRIC SURFACE MAP  
 (1/8/93)**

CLIENT: <b>CHEVRON U.S.A. PRODUCTS Co. SERVICE STATION No. 9-0076</b>		LOCATION: <b>4265 FOOTHILL BLVD. OAKLAND, CALIFORNIA</b>		REV. NO.: <b>0</b>	DATE: <b>2/8/93</b>
PM <i>JAW</i>	PE/RG <i>DRK</i>	DESIGNED <b>TW</b>	DETAILED <b>ML</b>	ACAD FILE: <b>PSM1893/SP392</b>	PROJECT NO.: <b>020302227</b>
					FIGURE: <b>1</b>

**ATTACHMENT B**

**TABLE 1**

**TABLE 1**  
**HISTORICAL GROUNDWATER ANALYTICAL RESULTS AND MONITORING DATA**  
**CHEVRON SERVICE STATION NO. 9-0076**  
**4265 FOOTHILL BOULEVARD, OAKLAND, CALIFORNIA**

WELL ID/ ELEV	DATE	TPH-AS- GASOLINE	BENZENE	TOLUENE	ETHYL- BENZENE	XYLENE S	DTW (m)	SPT (m)	WTE- (m)
C-1  35.42	04/28/89a	940	30	1.3	11	13	20.05	0.00	15.37
	08/08/89a	820	45	2	13	13	24.07	0.00	11.35
	12/21/89	—	—	—	—	—	22.81	0.00	12.61
	08/27/90	440	15	1	6	13	22.12	0.00	13.30
	11/04/90	—	—	—	—	—	25.58	0.00	9.88
	06/18/91	74	5.6	0.6	1.9	1.3	21.84	0.00	13.78
	09/19/91	150	7.1	<0.5	2.3	3	24.58	0.00	10.84
	12/20/91	250	10	<0.5	3.7	1.6	26.17	0.00	9.25
	03/18/92	190	16	<0.5	8.5	2.9	18.25	0.00	17.17
	07/14/92	20,000	480	2,200	510	2,900	27.61	0.00	7.81
	10/08/92	360	34	4.6	19	12	24.44	0.00	10.98
	01/08/93	120	9.1	0.5	5.1	1.8	19.68	0.00	15.74
	C-2  35.18	04/28/89a	120,000	30,000	22,000	3,000	17,000	26.44	0.00
08/08/89a		—	—	—	—	—	29.90	0.01	5.29
12/21/89		—	—	—	—	—	29.32	0.00	5.86
08/27/90		—	—	—	—	—	29.55	0.17	5.77
11/04/90		—	—	—	—	—	30.47	0.00	4.71
06/18/91		—	—	—	—	—	28.33	0.06	6.90
09/19/91		—	—	—	—	—	29.39	0.06	5.84
12/20/91		170,000	20,000	10,000	2,800	19,000	29.23	0.00	5.95
03/18/92		—	—	—	—	—	13.60	0.09	21.58
07/14/92		—	—	—	—	—	—	—	—
10/08/92		—	—	—	—	—	—	—	—
01/08/93		79,000	14,000	7,200	3,500	16,000	24.20	SHEEN	10.98

**TABLE 1**  
**HISTORICAL GROUNDWATER ANALYTICAL RESULTS AND MONITORING DATA**  
**CHEVRON SERVICE STATION NO. 9-0076**  
**4265 FOOTHILL BOULEVARD, OAKLAND, CALIFORNIA**

WELL ID/ ELEV	DATE	TPH-AS- GASOLINE	BENZENE	TOLUENE	ETHYL- BENZENE	XYLENE S	DTW (ft)	SPT (ft)	WTE (ft)
C-3	04/28/89a	<500	1.7	<0.5	<0.5	<0.5	28.00	0.00	7.28
	08/08/89a	<500	1	<0.5	<0.5	<0.5	30.00	0.00	5.28
35.28	12/21/89	—	—	—	—	—	30.53	0.00	4.75
	08/27/90	<50	<0.3	<0.3	<0.3	<0.6	29.88	0.00	5.60
35.30	11/04/90	—	—	—	—	—	30.36	0.00	4.94
	06/18/91	52	1.1	<0.5	<0.5	1.2	28.48	0.00	6.84
	09/19/91	73	1.2	<0.5	<0.5	<0.5	29.33	0.00	5.97
	12/20/91	<50	0.7	<0.5	<0.5	<0.5	29.77	0.00	5.53
	03/18/92	<50	<0.5	<0.5	<0.5	<0.5	25.75	0.00	8.55
	07/14/92	<50	<0.5	<0.5	<0.5	<0.5	27.87	0.00	7.43
	10/08/92	<50	<0.5	<0.5	<0.5	0.5	28.55	0.00	6.75
	01/08/93	<50	<0.5	<0.5	<0.5	<0.5	25.85	0.00	8.45
C-4	01/12/89a	—	—	—	—	—	29.49	0.00	3.96
	04/12/89a	—	—	—	—	—	27.44	0.00	6.01
33.45	04/28/89	20,000	6,300	550	230	1,500	29.49	0.00	3.98
	08/08/89a	8,000	7,500	340	88	1,000	29.55	0.00	3.90
33.48	12/21/89	—	—	—	—	—	30.02	0.00	3.43
	08/27/90	26,000	10,000	280	410	1,400	29.02	0.00	4.48
	11/04/90	—	—	—	—	—	29.81	0.00	3.87
	06/18/91	34,000	14,000	410	450	1,300	27.45	0.00	6.03
	09/19/91	16,000	7,400	80	110	460	28.85	0.00	4.83
	12/20/91	24,000	12,000	120	260	740	28.84	0.00	4.84
	03/18/92	48,000	6,000	1,300	1,300	2,400	24.43	0.00	11.05
	07/14/92	40,000	14,000	920	550	2,400	26.89	0.00	8.59
10/08/92	29,000	13,000	190	110	1,400	27.79	0.00	5.69	
01/08/93	25,000	—	630	860	1,800	23.50	0.00	9.98	

**TABLE 1**  
**HISTORICAL GROUNDWATER ANALYTICAL RESULTS AND MONITORING DATA**  
**CHEVRON SERVICE STATION NO. 9-0076**  
**4265 FOOTHILL BOULEVARD, OAKLAND, CALIFORNIA**

WELL ID/ ELEV	DATE	TPH-AS- GASOLINE	BENZENE	TOLUENE	ETHYL- BENZENE	XYLENE S	DTW (m)	SPT (m)	WTE (m)
C-5  35.50	08/27/90	<50	<0.3	<0.3	<0.3	<0.6	29.83	0.00	5.87
	11/14/90	—	—	—	—	—	30.56	0.00	4.94
	06/18/91	<50	<0.5	<0.5	<0.5	<0.5	28.52	0.00	6.98
	09/19/91	<50	<0.5	<0.5	<0.5	<0.5	29.51	0.00	5.99
	12/20/91	<50	<0.5	<0.5	<0.5	<0.5	29.96	0.00	5.54
	03/18/92	<50	<0.5	<0.5	<0.5	<0.5	25.92	0.00	9.58
	07/14/92	<50	<0.5	<0.5	<0.5	<0.5	28.00	0.00	7.50
	10/08/92	<50	<0.5	<0.5	<0.5	<0.5	28.85	0.00	6.85
	01/08/93	<50	<0.5	<0.5	<0.5	<0.5	26.02	0.00	9.48
C-6  32.40	08/27/90	7,200	2,100	8	41	300	44.11	0.00	-11.71
	11/14/90	—	—	—	—	—	44.03	0.00	-11.83
	06/18/91	4,400	2,500	18	160	77	43.49	0.00	-11.09
	09/19/91	3,100	1,600	8.3	73	8	34.32	0.00	-1.92
	12/20/91	4,400	1,300	3.2	74	10	41.35	0.00	-8.95
	03/18/92	9,800	3,200	34	250	500	40.89	0.00	-8.29
	07/14/92	6,500	2,200	100	96	240	38.89	0.00	-6.49
	10/08/92	1,800	1,000	3.1	15	41	38.87	0.00	-8.27
	01/08/93	1,800	1,000	6.8	63	120	37.81	0.00	-5.41
C-7  32.17	08/27/90	110	26	0.8	4	6	44.23	0.00	-12.06
	11/14/90	—	—	—	—	—	44.11	0.00	-11.94
	06/18/91	23,000	5,700	420	1,000	2,800	42.05	0.00	-9.88
	09/19/91	26,000	4,600	330	970	2,400	41.72	0.00	-9.55
	12/20/91	33,000	5,500	270	1,000	2,100	41.67	0.00	-9.50
	03/18/92	27,000	5,800	410	1,300	3,300	41.20	0.00	-9.03
	07/14/92	46,000	12,000	720	1,700	4,600	39.77	0.00	-7.60
	10/08/92	22,000	6,800	370	1,300	3,200	39.14	0.00	-6.97
	01/08/93	36,000	7,600	540	1,700	4,200	38.50	0.00	-6.33



**TABLE 1**  
**HISTORICAL GROUNDWATER ANALYTICAL RESULTS AND MONITORING DATA**  
**CHEVRON SERVICE STATION NO. 9-0076**  
**4265 FOOTHILL BOULEVARD, OAKLAND, CALIFORNIA**

WELL ID/ ELEV	DATE	TPH-AS- GASOLINE	BENZENE	TOLUENE	ETHYL- BENZENE	XYLENE S	DTW (m)	SPT (m)	WTE (m)
C-8  30.68	11/14/90	<50	<0.3	<0.3	<0.3	<0.6	43.29	0.00	-12.61
	06/18/91	<50	<0.5	<0.5	<0.5	<0.5	42.62	0.00	-11.94
	09/19/91	<50	<0.5	<0.5	<0.5	<0.5	41.72	0.00	-11.04
	12/20/91	<50	<0.5	<0.5	<0.5	<0.5	40.98	0.00	-10.30
	03/18/92	<50	<0.5	<0.5	<0.5	<0.5	40.02	0.00	-9.34
	07/14/92	<50	<0.5	<0.5	<0.5	<0.5	39.02	0.00	-8.34
	10/08/92	<50	<0.5	<0.5	<0.5	1.1	38.68	0.00	-8.00
	01/08/93	<50	<0.5	<0.5	<0.5	<0.5	38.07	0.00	-7.39
TRIP BLANK	04/28/89	<500	<0.5	<0.5	<0.5	<0.5	--	--	--
	08/08/89	<500	<0.5	<0.5	<0.5	<0.5	--	--	--
	08/27/90	<50	<0.3	<0.3	<0.3	<0.6	--	--	--
	11/14/90	<50	<0.3	<0.3	<0.3	<0.6	--	--	--
	06/18/91	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
	09/19/91	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
	12/20/91	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
	03/18/92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
	07/14/92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
	10/08/92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
01/08/93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	

- = Not applicable, not sampled, not measured  
DTW = Depth to groundwater  
SPT = Separate-phase hydrocarbon thickness  
WTE = Water table elevation  
a = Water elevations measured to grade

All elevations are given as feet above mean sea level.  
Analytical results in micrograms per liter  $\mu\text{L}$ , or parts per billion  
Top of casing surveyed 1/03/90 and 08/21/90  
Data from 4/28/89 through 12/20/91 taken from Fourth Quarter 1991 Ground Water Monitoring Report dated January 30, 1992, (Weiss Associates).

**ATTACHMENT C**  
**LABORATORY ANALYTICAL REPORT**



# Superior Precision Analytical, Inc.

825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

GROUNDWATER TECHNOLOGY, INC.  
Attn: Sandra Lindsey

Project 02030-2227  
Reported 01/18/93  
Revised 02/04/93

## TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed Matrix
87582- 1	TBLB	01/08/93	01/14/93 Water
87582- 2	RBC5	01/08/93	01/14/93 Water
87582- 3	C5	01/08/93	01/13/93 Water
87582- 5	C8	01/08/93	01/13/93 Water
87582- 7	C3	01/08/93	01/13/93 Water
87582- 9	C1	01/08/93	01/13/93 Water
87582-11	C6	01/08/93	01/14/93 Water
87582-13	C4	01/08/93	01/13/93 Water
87582-15	C7	01/08/93	01/13/93 Water
87582-16	C2	01/08/93	01/13/93 Water

## RESULTS OF ANALYSIS

Laboratory Number: 87582- 1 87582- 2 87582- 3 87582- 5 87582- 7

Gasoline:	ND<50	ND<50	ND<50	ND<50	ND<50
Benzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Toluene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Ethyl Benzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Xylenes:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5

Concentration: ug/L ug/L ug/L ug/L ug/L

Laboratory Number: 87582- 9 87582-11 87582-13 87582-15 87582-16

Gasoline:	120	5200	25000	36000	79000
Benzene:	9.1	1600	7000	7600	14000
Toluene:	0.5	6.8	630	540	7200
Ethyl Benzene:	5.1	63	860	1700	3500
Xylenes:	1.8	120	1800	4200	16000

Concentration: ug/L ug/L ug/L ug/L ug/L



# Superior Precision Analytical, Inc.

825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

## C E R T I F I C A T E   O F   A N A L Y S I S

### ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

Page 2 of 2  
QA/QC INFORMATION  
SET: 87582

NA = ANALYSIS NOT REQUESTED  
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT  
ug/L = parts per billion (ppb)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:  
Minimum Detection Limit in Water: 5000ug/L

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:  
Minimum Quantitation Limit for Diesel in Water: 50ug/L

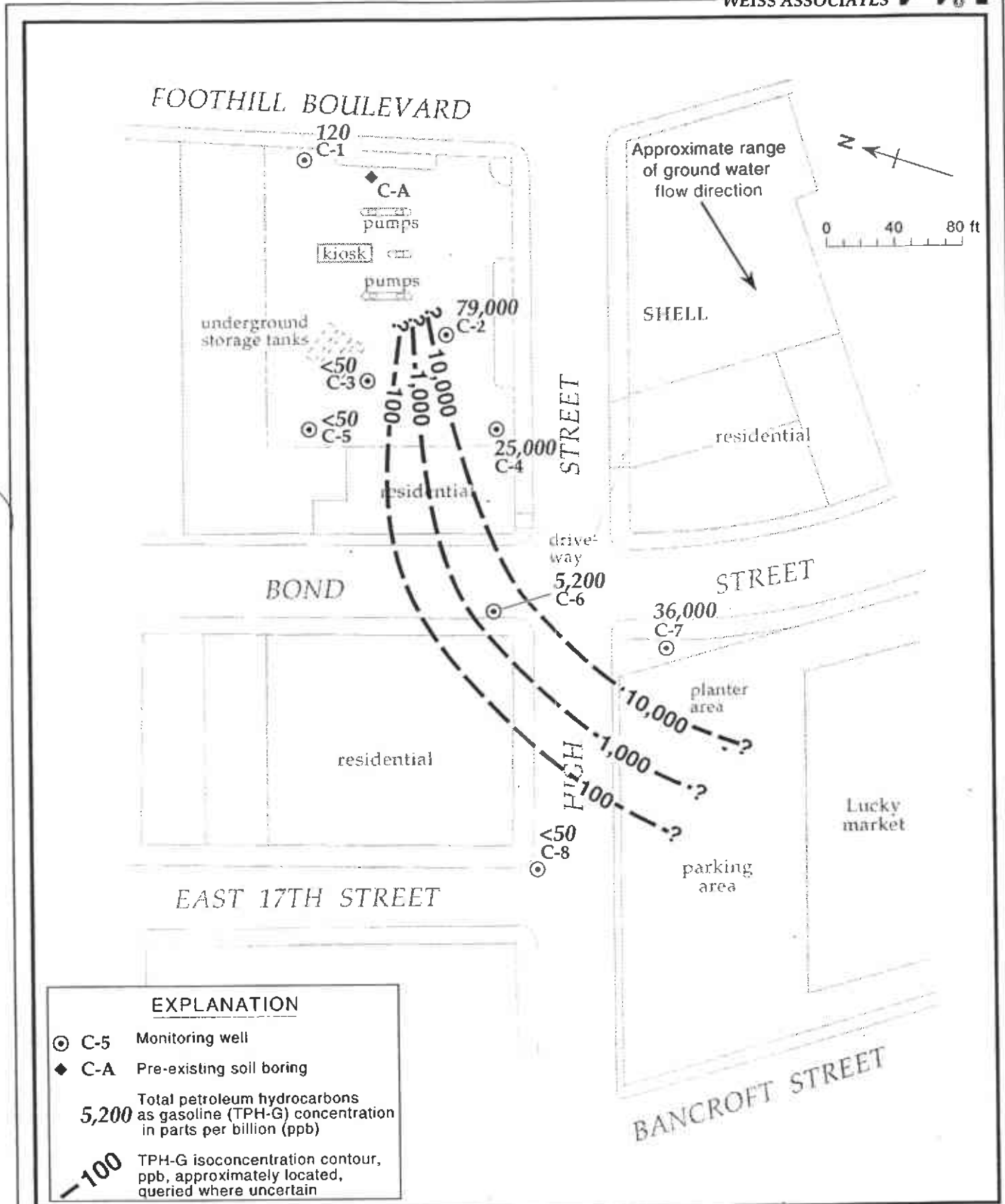
EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:  
Minimum Quantitation Limit for Gasoline in Water: 50ug/L

EPA SW-846 Method 8020/BTXE  
Minimum Quantitation Limit in Water: 0.5ug/L

ANALYTE	SPIKE LEVEL	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Gasoline:	200 ng	99/100	1	70-130
Benzene:	200 ng	86/87	1	70-130
Toluene:	200 ng	94/95	1	70-130
Ethyl Benzene:	200 ng	101/102	1	70-130
Xylenes:	600 ng	99/100	2	70-130

Richard Srna, Ph.D.  
*Nancy A. Nelson for*  
Laboratory Director





**EXPLANATION**

- ⊙ C-5 Monitoring well
- ◆ C-A Pre-existing soil boring
- 5,200 Total petroleum hydrocarbons as gasoline (TPH-G) concentration in parts per billion (ppb)
- 100 TPH-G isoconcentration contour, ppb, approximately located, queried where uncertain

Figure 2. TPH-G Isoconcentration Map - January 8, 1993 - Chevron Service Station #9-0076, 4265 Foothill Boulevard, Oakland, California

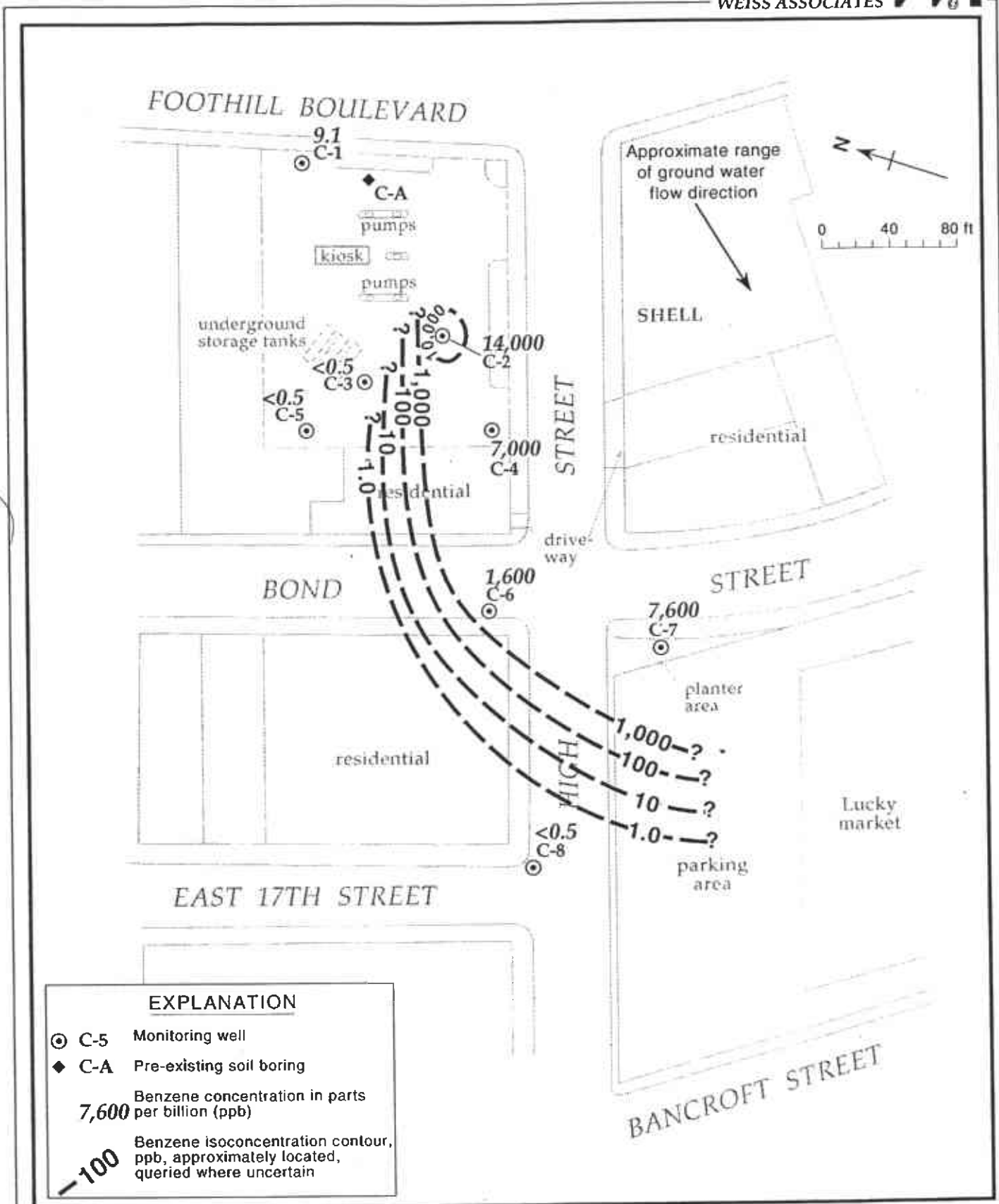


Figure 3. Benzene Isoconcentration Map - January 8, 1993 - Chevron Service Station #9-0076, 4265 Foothill Boulevard, Oakland, California