



**Chevron U.S.A. Products Company**

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Mail Address: P.O. Box 5004, San Ramon, CA 94583-0804

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2725

Marketing Department

February 12, 1992

Mr. Paul Smith

Alameda County Health Care Services  
80 Swan Way, Room 200  
Oakland, CA 94621

**Re: Former Chevron Service Station #9-4816  
301 14th Street, Oakland**

Dear Mr. Smith:

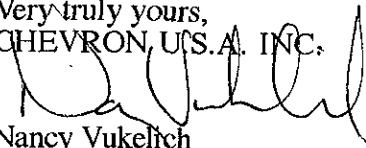
Enclosed we are forwarding the Corrective Action Work Plan dated February 10, 1992, prepared by our consultant Weiss Associates (Weiss) for the above referenced site. This work plan proposes to install a VR Systems ICE (Internal Combustion Engine) at the referenced site to remediate all remaining petroleum hydrocarbons in the subsurface soils and the separate-phase hydrocarbons floating on the ground water. A Bay Area Air Quality Management District (BAAQMD) permit application was prepared and submitted to the BAAQMD on December 6, 1991, for permission to operate the ICE at the site. While the soil vapor extraction system operates, we will continue to evaluate the ground water conditions beneath the site for additional appropriate remedial efforts. It will be interesting to see what positive effect the soil vapor extraction will have on removal of ground water contaminants.

Chevron has contracted with VR Systems to install the ICE as soon as the BAAQMD air permit is obtained. In addition, all other necessary permits with the City of Oakland are currently being pursued. We would appreciate your review and formal concurrence prior to implementation of this work plan.

Chevron will continue to examine all monitor wells for the presence of separate phase hydrocarbons on a weekly basis and perform quarterly chemical analysis. Purging of the separate-phase hydrocarbons will continue until the dedicated recovery system is installed.

If you have any questions or comments, please do not hesitate to contact me at (510) 842-9581.

Very truly yours,  
CHEVRON U.S.A. INC.

  
Nancy Vukelich  
Environmental Engineer

Enclosure

cc: Mr. Eddy So, RWQCB  
Ms B.C. Owen  
File (9-4816W1)

Ms. Beth Castleberry  
WARE & FREIDENRICH  
400 Hamilton Avenue  
Palo Alto, CA 94301

0910 11 01 1992



February 10, 1992

Ms. Nancy Vukelich  
Chevron USA, Inc.  
P.O. Box 5004  
San Ramon, CA 94583-0804

Re: Corrective Action Work Plan  
Chevron Service Station #9-4816  
301 14th Street  
Oakland, California  
WA Job #4-582-08

Dear Ms. Vukelich:

As requested, this letter presents Weiss Associates' (WA) corrective action work plan for the former Chevron service station referenced above. About 2.5 ft of floating hydrocarbons have been measured in three on-site monitoring wells. The site background and WA's proposed floating hydrocarbon remediation approach are discussed below.

## BACKGROUND

Chevron Service Station #9-4816 is a vacant lot surrounded by residential and commercial buildings at the western corner of 14th and Harrison streets in downtown Oakland. The closest surface waters are Lake Merritt located about one quarter-mile east and Oakland Inner Harbor located about one half-mile southwest of the site (Figure 1). In April and May 1988, integrity tests of the underground storage tanks and piping indicated a fuel leak in the unleaded gasoline system.

In June 1990, GeoStrategies Inc. (GSI) of Hayward, California drilled soil borings C-A through C-D and C-1 through C-4 and completed the latter four borings as ground water monitoring wells C-1 through C-4 (Figure 2). Ground water was measured about 22 ft below ground surface or about 9 ft above mean sea level during this investigation (Table 1). At that time, more than 3 ft of floating hydrocarbons were observed in well C-3. Total petroleum



hydrocarbons as gasoline (TPH-G) were in water samples collected from monitoring wells C-1, C-2 and C-4 with up to 26,000 parts per billion (ppb) in samples from well C-1 (Table 2). Analytic results of soil samples collected during drilling indicated TPH-G and benzene in six of the eight borings. The highest TPH-G and benzene concentrations were 1,900 parts per million (ppm) and 12 ppm, respectively, in a soil sample collected from 20 ft deep in boring C-B. All other high TPH-G concentrations were in soil samples collected from the 20 ft depth (Table 3)<sup>1</sup>.

In October 1990, GSI installed ground water monitoring well C-5 and recovery well CR-1. Up to 1,200 ppm TPH-G and 9.5 ppm benzene were detected in a soil sample collected from 20.5 ft deep in boring CR-1. TPH-G and benzene were in all water samples collected from the six wells. Up to 67,000 ppb TPH-G and 6,700 ppb benzene were in a sample from monitoring well C-1 at that time. About 2.5 ft of floating hydrocarbons were measured in monitoring well C-3 and recovery well CR-1<sup>2</sup>.

In February 1991, R.W. Johnston and Co. of Oakland, California removed three underground storage tanks and associated piping and excavated, aerated, and replaced approximately 800 cubic yards of soil. Analysis of composite soil samples collected before replacing aerated soil indicated TPH-G concentrations were below 10 ppm<sup>3</sup>.

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In May 1991, GSI drilled four soil borings and completed them as monitoring wells C-6 through C-9 in the suspected down gradient direction to further assess the extent of hydrocarbons. One soil sample collected from 25.5 ft deep in boring C-8 contained 10 ppm TPH-G. No TPH-G and benzene were in any other soil samples for these borings. Analysis of ground water collected from well C-8 indicated 5,000 ppb TPH-G. No other ground water samples from the new wells contained TPH-G or benzene. Ground water collected from monitoring well C-1 at that time contained 59,000 ppb TPH-G. Floating hydrocarbons were measured at a thickness of 2.0 ft in monitoring well C-5. Wells C-3 and CR-1 were not sampled

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<sup>1</sup> GeoStrategies Inc., 1990, August 9. Soil Boring and Well Installation Report for Chevron Service Station #9-4816, 301 14th Street, Oakland, California, Consultant's report prepared for Chevron USA. 13 pages, 5 attachments.

<sup>2</sup> GeoStrategies Inc., 1990, December 5. Well Installation Report for Chevron Service Station #9-4816, 301 14th Street, Oakland, California, Consultant's report prepared for Chevron USA. 14 pages, 6 attachments.

<sup>3</sup> GeoStrategies Inc., 1991, July 24. Tank Removal Observation Report, Chevron Service Station #9-4816, 301 14th Street, Oakland, California, Consultant's report prepared for Chevron USA. 8 pages, 1 attachment.

due to station demolition activities at the site<sup>4</sup>.

Since January 1991, Alton Geoscience of Concord, California has performed monthly bailing of floating hydrocarbons from monitoring wells C-3 and C-5 and extraction well CR-1. No information is available regarding the amount of floating hydrocarbons that has been bailed.

Lake Merritt, located one quarter mile east of the site, is a tidally influenced estuary. A high capacity pumping system and inlet control gates allow hydraulic control of the lake for flood control and recreational boating purposes. The ground water gradient beneath the site may be influenced at times by changes in the lake level. Whether or not tidally influenced, the site ground water gradient is very slight.

#### FLOATING HYDROCARBON REMOVAL

WA proposes installing a soil vapor extraction system to remediate hydrocarbons in soil and ground water beneath the site. While waiting for issuance of an air discharge permit from the Bay Area Air Quality Management District (BAAQMD), Chevron will increase floating hydrocarbon bailing from monitoring wells C-3 and C-5 and extraction well CR-1 from monthly to weekly<sup>5</sup>.

Since the site is underlain primarily by high estimated permeability sediments<sup>1,2</sup>, soil vapor extraction should be effective at volatilizing and removing floating hydrocarbons. WA will install and operate a vapor extraction system to remove floating hydrocarbons from beneath the site. After extracting all recoverable hydrocarbons, WA will evaluate site conditions and provide further remediation recommendations. At such time, further assessment of the extent of hydrocarbons may be necessary before recommending the next appropriate remediation activities.

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<sup>4</sup> GeoStrategies Inc., 1991, June 13. Well Installation Report for Chevron Service Station #9-4816, 301 14th Street, Oakland, California, Consultant's report prepared for Chevron USA. 13 pages, 4 attachments.

<sup>5</sup> Vukelich, Nancy, 1991, November 21. Personal conversation between Nancy Vukelich of Chevron USA and Fatima Lelic and Jim Carmody of Weiss Associates.



WA will install and operate a VR Systems internal combustion engine (ICE) vapor extraction and treatment unit to remove floating hydrocarbons from beneath the site. The ICE will serve both as a vacuum pump and an oxidizer as hydrocarbon vapors are extracted and burned in the engine. We will install a vapor knock-out drum on the influent side of the ICE to remove entrained moisture. To prevent hydrocarbon discharge, the ICE will be equipped with emission control equipment including a catalytic converter, exhaust gas recirculation, and positive crankcase ventilation. The engine will require either natural gas or propane as a supplemental fuel to sustain combustion and facilitate vapor extraction.

We will extract vapors from 6-inch diameter extraction well CR-1 and 2-inch diameter monitoring well C-5 which each contain about 2.5 ft of floating hydrocarbons. Both wells are screened from 18 ft below ground surface to about 33 ft below ground surface. Ground water is currently about 22.5 ft below ground surface.

For security, WA will install the ICE inside a slatted chain link fence (Figure 3). For safety and security, we will install the vapor extraction piping in trenches from the extraction wells to the fenced enclosure. Pacific Gas & Electric will install a natural gas line if a gas main is readily accessible and their installation schedule will not unduly delay the project (Figure 3). If natural gas is not used, the ICE will be supplementally fueled with propane. As shown in Figure 4, the propane tank will be installed in the fenced enclosure. The ICE is equipped with a computer control system that monitors and records engine operating parameters. An optional lower explosive limit (LEL) meter capable of engine shut-down if explosive vapors are sensed within the engine enclosure can be installed if required by local authorities or at your request. Because the ICE has an internal inverter, outside electrical power is not necessary.

WA prepared and submitted an application for an "Authority to Construct/Permit to Operate" air discharge permit from the BAAQMD on December 6, 1991. WA will apply for required City of Oakland building permits covering fence installation, trenching and any requirements of the City of Oakland Fire Department. WA will obtain required permits before installing the system.

WA plans to install the SVE system and begin remediation by April 1992, pending issuance of the air discharge and building permits. Removal of floating hydrocarbons by bailing in the interim period will decrease the required duration of the vapor extraction.

Ms. Nancy Vukelich  
February 10, 1992

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SUMMARY

WA will install a VR Systems ICE to extract and oxidize hydrocarbons from beneath the site. The computer controlled ICE automatically adjusts supplemental fuel and dilution air to maintain a stoichiometric air/fuel ratio. System emission control equipment will prevent hydrocarbon discharge to the atmosphere. Further activity after removal of floating hydrocarbons will involve evaluating the need for a ground water remediation system.

WA is pleased to provide remediation services to Chevron USA. Please call if you have any questions or comments.



Sincerely,  
Weiss Associates

Everett Sorensen, E.I.T.  
Environmental Engineer

Fatima Lelic, P.E., D.E.E.  
Principal Engineer

EAS/FL:jn

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Attachments: Figures and Tables

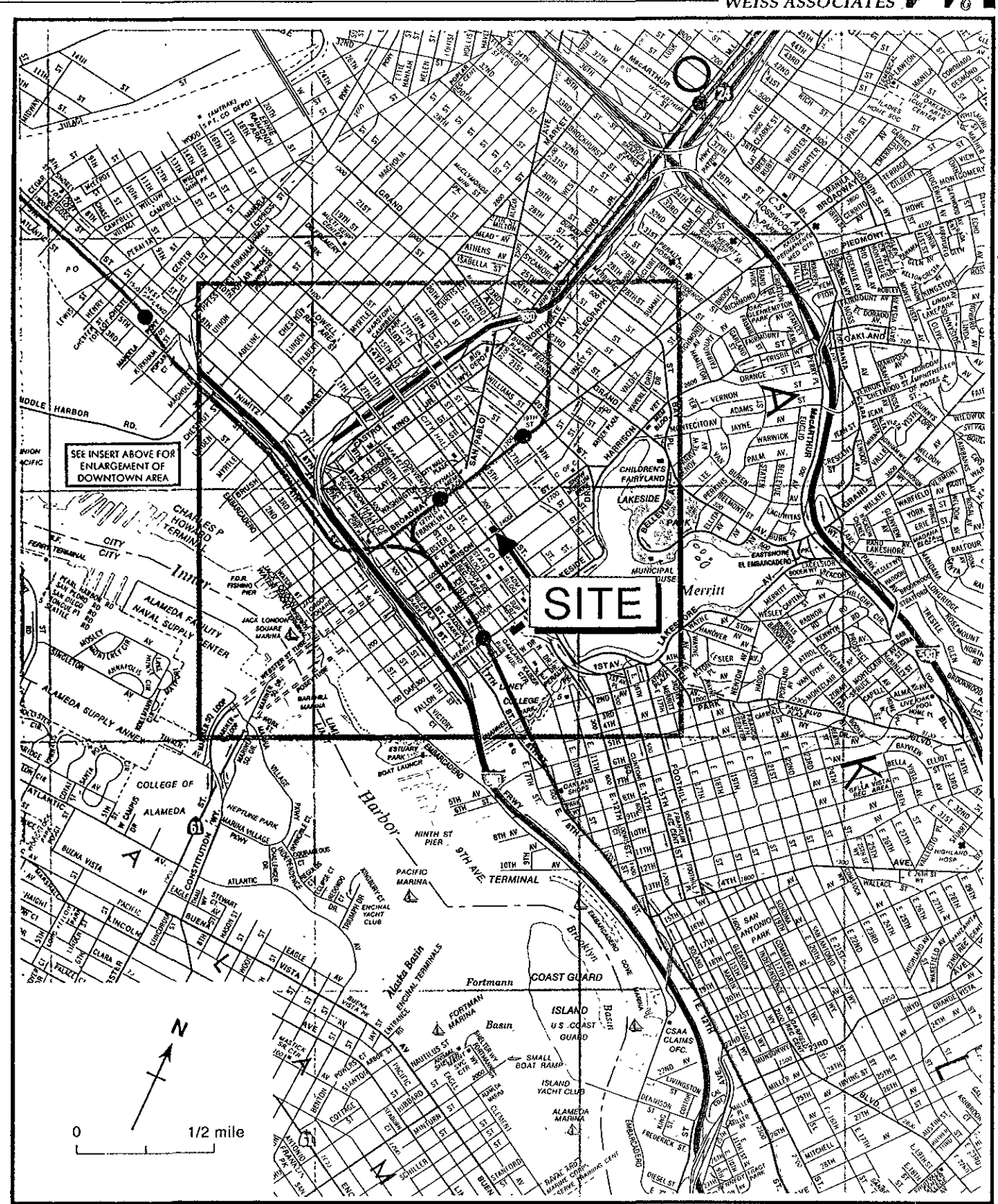


Figure 1. Site Location Map - Former Chevron Service Station #9-4816, 301 14th Street, Oakland, California





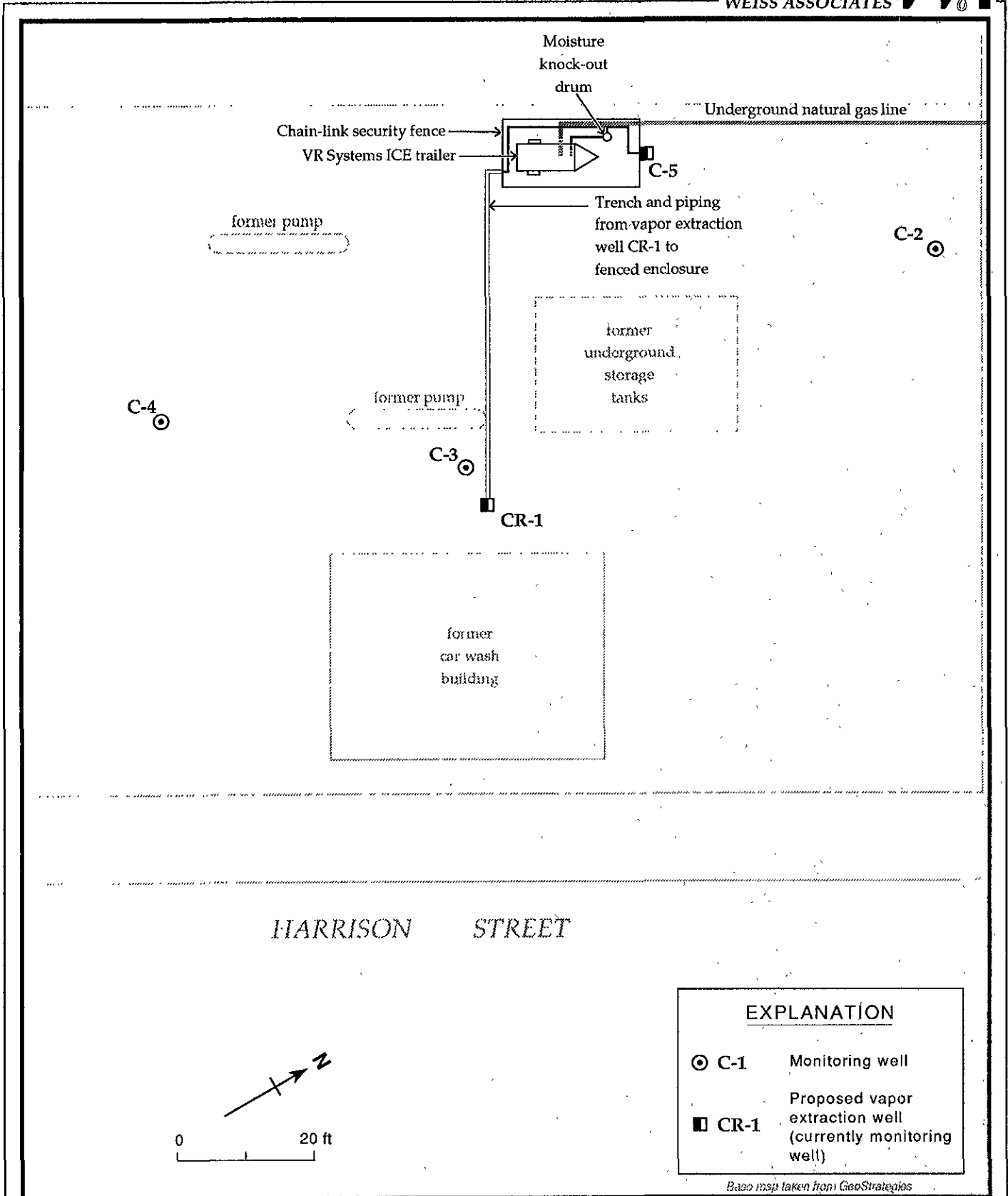
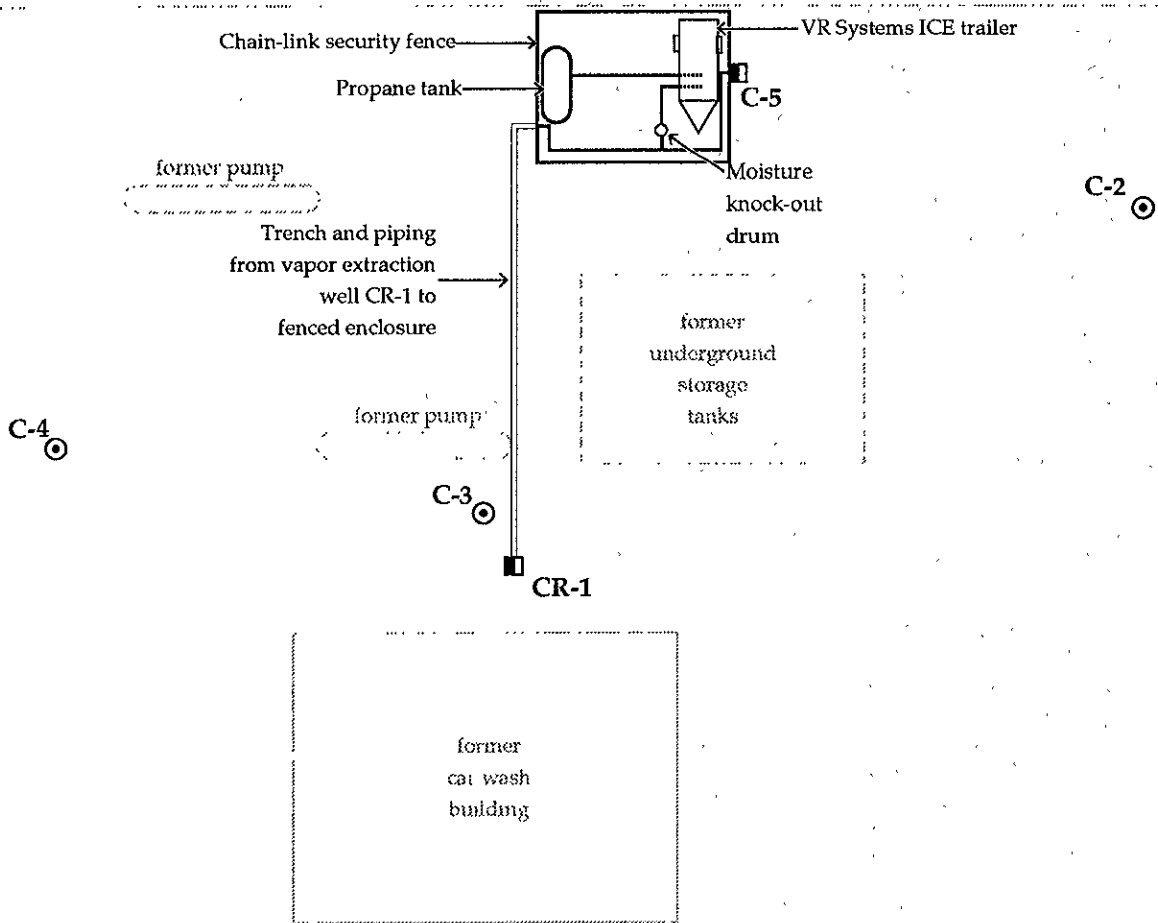
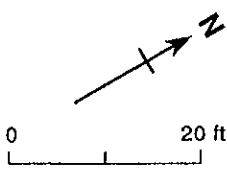


Figure 3. Proposed Location of Internal Combustion Engine Vapor Extraction System (Natural Gas Option) - Former Chevron Service Station #9-4816, 301 14th Street, Oakland, California



HARRISON STREET



EXPLANATION	
⊙ C-1	Monitoring well
■ CR-1	Proposed vapor extraction well (currently monitoring well)

*Base map taken from GeoStrategies*

Figure 4. Proposed Location of Internal Combustion Engine Vapor Extraction System (Propane Option) - Former Chevron Service Station #9-4816, 301 14th Street, Oakland, California

TABLE 1. Water Level Data and Well Construction Details, Former Chevron Service Station #9-4816  
301 14th Street, Oakland, California

WELL ID	DATE MEASURED	DEPTH TO WATER (ft)	TOP OF CASING (ft)	GROUND WATER ELEVATION (ft)	PRODUCT THICKNES (ft)	SCREEN INTERVAL	SAND PACK INTERVAL	BENTONITE/GROUT INTERVAL
						<-----feet below grade----->		
C-1	06/13/90	21.97	30.82	8.85	-	18.5-33.5	16.5-33.5	0-16.5
	10/30/90	21.72	30.82	9.10	-	-	-	-
	01/04/91	21.84	30.82	8.98	-	-	-	-
	01/07/91	21.95	30.82	8.87	-	-	-	-
	01/11/91	21.99	30.82	8.83	-	-	-	-
	02/15/91	22.12	30.82	8.70	-	-	-	-
	05/02/91	22.06	30.82	8.76	-	-	-	-
	05/30/91	22.04	30.82	8.78	-	-	-	-
	06/13/91	21.80	30.82	9.02	-	-	-	-
	07/12/91	22.01	30.82	8.81	-	-	-	-
C-2	06/13/90	22.08	30.91	8.83	-	18-23	16-33	0-16
	10/30/90	21.81	30.91	9.10	-	-	-	-
	01/04/91	21.90	30.91	9.01	-	-	-	-
	01/07/91	22.03	30.91	8.88	-	-	-	-
	01/11/91	22.13	30.91	8.78	-	-	-	-
	02/15/91	22.36	30.91	8.55	-	-	-	-
	05/02/91	22.44	30.91	8.47	-	-	-	-
	05/30/91	22.44	30.91	8.47	-	-	-	-
	06/13/91	-	30.91	-	-	-	-	-
	07/12/91	22.57	30.91	8.35	0.01	-	-	-
08/07/91	-	30.91	-	0.11	-	-	-	
C-3	06/13/90	24.75	31.02	6.27	3.00	18-30	16-33	0-16
	10/30/90	23.81	31.02	7.21	2.50	-	-	-
	01/04/91	24.15	-	-	2.70	-	-	-
	01/07/91	24.13	31.02	6.89	2.50	-	-	-
	01/11/91	24.35	-	-	2.66	-	-	-

--Table 1 continues next page--

TABLE 1. Water Level Data and Well Construction Details, Former Chevron Service Station #9-4816  
301 14th Street, Oakland, California (continued)

WELL ID	DATE MEASURED	DEPTH TO WATER (ft)	TOP OF CASING (ft)	GROUND WATER ELEVATION (ft)	PRODUCT THICKNESS (ft)	SCREEN INTERVAL	SAND PACK INTERVAL	BENTONITE/GROUT INTERVAL
						<-----feet below grade----->		
C-4	06/13/90	22.73	31.42	8.69	-	18-33	16-33	0-16
	10/30/90	22.48	31.42	8.94	-	-	-	-
	01/04/91	22.64	31.42	8.78	-	-	-	-
	01/07/91	22.74	31.42	8.68	-	-	-	-
	01/11/91	22.81	31.42	8.61	-	-	-	-
	02/15/91	22.55	31.42	8.87	-	-	-	-
	05/02/91	22.54	31.42	8.88	-	-	-	-
	05/30/91	22.55	31.42	8.87	-	-	-	-
C-5	10/30/90	22.11	31.25	9.14	-	18-34	16-34	0-16
	01/04/91	22.55	31.25	8.70	0.31	-	-	-
	01/07/91	22.36	31.25	8.89	0.04	-	-	-
	01/11/91	23.08	31.25	8.17	0.73	-	-	-
	02/15/91	24.70	31.25	6.55	2.74	-	-	-
	05/02/91	22.02	31.25	9.23	2.00	-	-	-
	05/30/91	24.78	31.25	6.47	2.70	-	-	-
	06/13/91	24.70	31.25	6.55	2.77	-	-	-
	07/12/91	25.10	31.25	6.15	2.72	-	-	-
08/07/91	-	31.25	-	2.69	-	-	-	
C-6	05/02/91	21.84	30.41	8.57	-	14.25-29.5	12.5-30	0-12.5
	07/12/91	22.86	30.41	7.55	-	-	-	-

--Table 1 continues next page--

TABLE 1. Water Level Data and Well Construction Details, Former Chevron Service Station #9-4816  
301 14th Street, Oakland, California (continued)

WELL ID	DATE MEASURED	DEPTH TO WATER (ft)	TOP OF CASING (ft)	GROUND WATER ELEVATION (ft)	PRODUCT THICKNESS (ft)	SCREEN INTERVAL <-----feet below grade----->	SAND PACK INTERVAL	BENTONITE/GROUT INTERVAL
C-7	05/02/91	21.81	30.56	8.75	-	15-35	13-35.5	0-13
	07/12/91	22.15	30.56	8.41	-	-	-	-
C-8	05/02/91	21.24	30.12	8.88	-	15-35	13-35.5	0-13
C-9	05/02/91	21.27	30.15	8.88	-	15-34	13-35.5	0-13
	07/12/91	21.57	30.15	8.58	-	-	-	-
CR-1	10/30/90	23.81	30.52	6.71	2.50	18-32	16-32	14-16
	01/04/91	24.08	-	-	2.70	-	-	-
	01/07/91	23.30	30.52	7.22	3.00	-	-	-
	01/11/91	24.24	-	-	2.64	-	-	-
	02/15/91	24.72	-	-	2.92	-	-	-
	05/02/91	-	-	-	-	-	-	-
	05/30/91	23.07	-	-	2.42	-	-	-
	08/07/91	-	-	-	2.69	-	-	-



TABLE 2. Analytic Results for Ground Water, Former Chevron Service Station #9-4816  
301 14th Street, Oakland, California

WELL ID	DATE SAMPLED	ANALYTIC LAB	TPH(G)	B	E	T	X
			-----parts per billion----->				
C-1	06/13/90	SAL	26,000	2,800	400	5,100	2,600
	10/30/90	SAL	67,000	6,700	900	8,700	5,000
	01/07/91	SAL	100,000	12,000	1,600	20,000	11,000
	05/02/91	SAL	59,000	5,600	700	7,700	5,200
	08/07/91	SAL	7,900	2,000	240	150	330
C-2	06/13/90	SAL	15,000	1,100	260	1,900	1,700
	10/30/90	SAL	13,000	2,800	240	1,900	1,000
	01/07/91	SAL	15,000	3,400	340	2,500	1,400
	05/02/91	SAL	19,000	4,500	660	3,200	2,900
C-4	06/13/90	SAL	440	47	3.0	47	61
	10/30/90	SAL	210	72	1.0	13	11
	01/07/91	SAL	890	100	15	130	88
	05/02/91	SAL	330	140	2.0	11	9.0
	08/07/91	SAL	1,500	400	13	79	61
C-5	10/30/90	SAL	20,000	2,500	320	3,300	2,200
C-6	05/02/91	SAL	<50	<50	<50	<50	<50
				<50	<50	<50	<50
C-7	05/02/91	SAL	<50	<50	<50	<50	<50
	08/07/91	SAL	<50	<50	<50	<50	<50
C-8	05/02/91	SAL	5000	<50	140	17	470
	08/07/91	SAL	6300	<50	100	28	120

--Table 2 continues next page--



TABLE 2. Analytic Results for Ground Water, Former Chevron Service Station #9-4816  
301 14th Street, Oakland, California (continued)

WELL ID	DATE SAMPLED	ANALYTIC LAB	TPH(G) <-----parts per billion----->	B	E	T	X
C-9	05/02/91	SAL	<50	<50	<50	<50	0.80
	08/07/91	SAL	<50	<50	<50	<50	<50

Explanation:

TPH-G = Total Petroleum Hydrocarbons as Gasoline  
by Modified EPA Method 8015  
B = Benzene by EPA Method 8020  
E = Ethylbenzene by EPA Method 8020  
T = Toluene by EPA Method 8020  
X = Xylenes by EPA Method 8020  
<n = Not detected at detection limit of n ppb

Analytic Laboratories:

SAL = Superior Analytical  
Laboratory of San Francisco/  
Martinez, California



TABLE 3. Analytic Results for Soil, Former Chevron Service Station #9-4816  
301 14th Street, Oakland, California

WELL ID	DATE SAMPLED	ANALYTIC LAB	DEPTH TO SAMPLE (ft)	TPH(G)	B	E	T	X
				----- parts per million ----->				
C-1	06/04/90	SAL	15	1.0	0.05	<0.05	<0.05	<0.05
	06/04/90	SAL	20	800	3.6	32	13	77
	06/04/90	SAL	25	<1.0	<0.05	<0.05	<0.05	<0.05
C-2	06/04/90	SAL	10	<1.0	<0.05	<0.05	<0.05	<0.05
	06/04/90	SAL	15	<1.0	<0.05	<0.05	<0.05	<0.05
	06/04/90	SAL	22	11	1.1	0.15	1.7	0.87
C-3	06/04/90	SAL	5	<1.0	<0.05	<0.05	<0.05	<0.05
	06/04/90	SAL	10	<1.0	0.13	<0.05	<0.05	<0.05
	06/04/90	SAL	15	<1.0	<0.05	<0.05	<0.05	<0.05
	06/04/90	SAL	20	840	0.93	9.0	15	63
	06/04/90	SAL	25	3.0	0.07	<0.05	0.05	0.19
C-4	06/04/90	SAL	20	<1.0	<0.05	<0.05	<0.05	<0.05
	06/04/90	SAL	25	<1.0	<0.05	<0.05	<0.05	<0.05
C-5	10/18/91	SAL	15.5	6.0	0.088	0.094	0.30	0.56
	10/18/91	SAL	20.5	3.0	0.17	0.071	0.49	0.51
C-6	04/25/91	SAL	15.5	<1.0	<.005	<.005	<.005	<.005
			22.5	<1.0	<.005	<.005	<.005	<.005
			25.5	<1.0	<.005	<.005	<.005	<.005
C-7	04/23/91	SAL	15.5	<1.0	<.005	<.005	<.005	<.005
			20.5	<1.0	<.005	<.005	<.005	<.005
			24.5	<1.0	<.005	<.005	<.005	<.005
C-8	04/24/91	SAL	15.5	<1.0	<.005	<.005	<.005	<.005
			22.5	<1.0	<.005	<.005	<.005	<.005
			25.5	10	<.005	0.04	0.03	0.10
C-9	04/30/91	SAL	15.5	<1.0	<.005	<.005	<.005	<.005
			20.5	<1.0	<.005	<.005	<.005	<.005
			23.5	<1.0	<.005	<.005	<.005	<.005

--Table 3 continues next page--



TABLE 3. Analytic Results for Soil, Former Chevron Service Station #9-4816  
301 14th Street, Oakland, California (continued)

WELL ID	DATE SAMPLED	ANALYTIC LAB	DEPTH TO SAMPLE (ft)	TPH(G)	B	E	T	X
				----- parts per million ----->				
CR-1	10/18/91	SAL	15.5	1.0	0.54	0.059	0.17	0.11
			20.5	1,200	9.5	18	56	110
C-A	06/04/90	SAL	10	<1.0	<.05	<.05	<.05	<.05
	06/04/90	SAL	15	2.0	<.05	<.05	<.05	0.10
	06/04/90	SAL	20	1,200	5.6	18	43	120
	06/04/90	SAL	25	2.0	0.1	<.05	0.06	0.09
C-B	06/05/90	SAL	10	<1.0	<.05	<.05	<.05	<.05
	06/05/90	SAL	15	<1.0	<.05	<.05	<.05	<.05
	06/05/90	SAL	20	1,900	12	26	80	150
	06/05/90	SAL	25	9.0	1.3	0.05	0.83	0.31
C-C	06/05/90	SAL	10	<1.0	<.05	<.05	<.05	<.05
	06/05/90	SAL	15	<1.0	0.22	<.05	<.05	<.05
	06/05/90	SAL	20	360	0.75	4.8	9.9	30
	06/05/90	SAL	25	290	1.5	3.1	8.0	19
C-D	06/05/90	SAL	5	<1.0	<.05	<.05	<.05	<.05
	06/05/90	SAL	10	<1.0	<.05	<.05	<.05	<.05
	06/05/90	SAL	15	<1.0	<.05	<.05	<.05	<.05
	06/05/90	SAL	20	3.0	0.32	<.05	0.32	0.15
	06/05/90	SAL	25	<1.0	<.05	<.05	<.05	<.05

Explanation:

TPH-G = Total Petroleum Hydrocarbons as Gasoline  
by Modified EPA Method 8015  
B = Benzene by EPA Method 8020  
E = Ethylbenzene by EPA Method 8020  
T = Toluene by EPA Method 8020  
X = Xylenes by EPA Method 8020  
<n = Not detected at detection limit of n ppb

Analytic Laboratories:

SAL = Superior Analytical  
Laboratory of San Francisco/  
Martinez, California