Chevron U.S.A. Products Company
2410 Camino Ramon, San Ramon, California • Phone (510) 842-9500
Mail Address: P.O. Box 5004, San Ramon, CA 94583-0804

Marketing Department

Rec'd 8-21-92

August 17, 1992

#478

Ms. Jennifer Eberle
Alameda County Health Care Services
80 Swan Way, Room 200
Oakland, CA 94621

Re: Former Chevron Service Station #9-4816
301 14th Street, Oakland 94612

Dear Ms. Eberle:

Enclosed we are forwarding the Bimonthly Progress Report dated August 10, 1992, prepared by our consultant Weiss Associates for the above referenced site. This report presents an evaluation of the soil vapor extraction and treatment system operating at the referenced site during the period of May 12, 1992 to July 30, 1992. The system did not operate for 35 days during this period due to a number of mechanical problems associated with the ICE Engine. However, all repairs have been made and the system has been continuously operating since July 30, 1992. During this period approximately 2,623 lbs of hydrocarbons have been removed. Cumulative to date, approximately 7,173 lbs. of hydrocarbons have been removed. Weiss measured vacuum influence in all monitor wells. The results indicated that vacuum influence of at least 1" H20 extends over about 75% of the site.

During this period two (2) additional vapor extraction wells were installed. The installation of these wells was documented in the Environmental Assessment Report submitted to you on August 10, 1992. The flow rates have increased five times higher since the connection of these wells.

Chevron will continue to submit bimonthly progress reports on the soil vapor extraction system until system shutdown.

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. PRODUCTS COMPANY

Nancy Vukelich
Site Assessment and Remediation Engineer

Enclosure

cc: Mr. Rich Hiett, RWQCB
Mr. R.W. Cosby, 225/1936
Ms B.C. Owen
File (9-4816-3)

Ms. Beth D. Castleberry
Ware & Freidenrich
400 Hamilton Avenue
Palo Alto, CA 94301-1825

Weiss Associates
Environmental and Geologic Services
5500 Shellmound Street, Emeryville, CA 94608-2411 Fax: 510-547-5043 Phone: 510-547-5420

August 10, 1992

Nancy Vukelich
Chevron U.S.A. Products Company
P.O. Box 5004
San Ramon CA 94583-0804

Re: Bi-monthly Progress Report
Mid-May through July 1992
Chevron Service Station #9-4816
301-14th Street
Oakland, California
WA Job #4-582-51

Dear Ms. Vukelich,

As you requested, Weiss Associates (WA) presents the following bi-monthly report for the soil vapor extraction (SVE) and treatment system operating at the above referenced site (Figure 1). The SVE and treatment system consists of an internal combustion engine (ICE) which extracts vapors from wells CR-1 and C-5 (Figure 2). ICE operation is permitted by the Bay Area Air Quality Management District (BAAQMD) under Permit to Operate #8272.

In accordance with BAAQMD requirements, WA monitors the influent and effluent vapor stream monthly. Samples are collected in Tedlar bags for submittal to a state-certified analytical laboratory. Additionally, field measurements are taken with a flame ionization detector (FID). Table 1 presents analytic results and FID measurements. Table 1 also summarizes the system's hours of operation and calculated emission rates and destruction efficiencies since system start-up. Table 2 presents calculated hydrocarbon removal rates and total pounds of hydrocarbons removed. Figure 3 illustrates total pounds of hydrocarbons removed from the site via SVE versus time. We estimate that as of July 20, 1992, about 7,173 lbs of hydrocarbons have been removed from soil and ground water beneath the site. Influent concentrations have declined as illustrated on Figure 4. The analytical reports and chain-of-custody forms are included as Attachment A. A sample emissions calculation based on the BAAMQD Manual of Procedures for Soil Vapor Extraction dated July 12, 1991, is presented as Attachment B.

Data collected during the May 12, 1992 site visit indicated that the ICE destruction efficiencies were lower than specified in the BAAQMD Permit to Operate. The decreased destruction efficiencies resulted from a system adjustment by the supplier which lowered the engine speed and temperature to conserve supplementary fuel. We promptly notified the

BAAQMD of the situation, and Mr. Alex Saschin recommended that WA perform system adjustments and verification sampling. On May 20, the system operation parameters were adjusted to match previous parameters which resulted in satisfactory destruction efficiencies. Confirmatory FID measurements taken on May 26 indicated satisfactory performance. The system was in compliance with BAAQMD requirements throughout June and July.

On June 11, 1992, two 2-inch vadose zone wells were installed to a depth of about 20 ft below ground surface by Groundwater Technologies of Milpitas, California (Figure 2). WA connected these new wells to the system June 19, 1992. The average well gas flow rate since June 19 is 28.3 standard cubic feet per minute (scfm), which is over five times higher than the rate obtained from wells C-5 and CR-1 alone. This increase indicates that soil vapor flow from wells C-5 and CR-1 is probably limited by the length of well screen in the vadose zone. As discussed in the June 1, 1992 bi-monthly report, vacuum generated by the ICE may cause water or product mounding near C-5 and CR-1, obstructing well screen in the vadose zone.

On June 30, 1992, WA measured vacuum influence in all onsite and offsite wells. Results indicate that vacuum influence of at least 1" H_2O extends over about 75% of the site (Figure 5).

In conjunction with vapor stream monitoring, WA measured separate phase hydrocarbon thicknesses in onsite wells. The greatest hydrocarbon thicknesses are measured in wells CR-1 and C-3. These measurements are presented in Table 3. Between June and July, separate phase hydrocarbon thicknesses decreased from over 2 ft to about 0.5 ft in well C-3 and from 0.85 ft to 0 ft in well C-5 but remained over 3 ft in well CR-1. This fluctuation most likely reflects both the separate phase hydrocarbon removal via SVE and a vacuum distribution alteration due to the two new vadose zone wells.

During this two month period the ICE did not operate for 35 days due to a number of mechanical problems, the most serious of which occurred following the June 30 vacuum influence test. The system shut down automatically due to high engine temperature and could not be restarted. Similarly, the next day, several attempts to restart the system were aborted by the computer system due to high engine temperature. However, there were no visible indications that the engine was overheating. On July 1, the system's computer panel was disconnected and shipped to the manufacturer, VR Systems, for repair. The computer panel was reinstalled on July 13. During attempts to restart the engine, the automatic fire

extinguisher activated and the system start up was aborted. On July 14, Gordon Davis of VR Systems inspected the system and attempted to restart it. After the fire extinguisher activated again, Mr. Davis took the entire ICE back to the VR Systems office in Anaheim, California for repair. The engine was successfully restarted on July 17.

The engine also shut down twice due a lack of supplementary fuel. In both instances, the propane supplier, Proflame, had site access problems and was unable to fill the propane tank as scheduled.

Since the July 30 site visit, the engine has been operating continuously. The system vacuum sensor and carburetor valve are scheduled to be replaced during the first week in August.

Please call if you have any questions or require additional information.

Sincerely,
Weiss Associates

Kimberly Ohara
Staff Engineer

Thomas R. Berry
Project Geologist

KAO:kao
C:\KAO\582L1JY2.WP

Attachments:
Figure 1 - Site Location Map
Figure 2 - Monitoring and Extraction Well Locations
Figure 3 - Total Hydrocarbon Removal
Figure 4 - Influent Concentrations
Figure 5 - Isobarometric Contours for Soil Vapor Extraction
Table 1 - System Performance and Analytic Results
Table 2 - Total Hydrocarbon Removal
Table 3 - Free Product Thickness
Attachment A - Analytical Reports and Chain-of-Custody Forms
Attachment B - Sample Emission Calculations

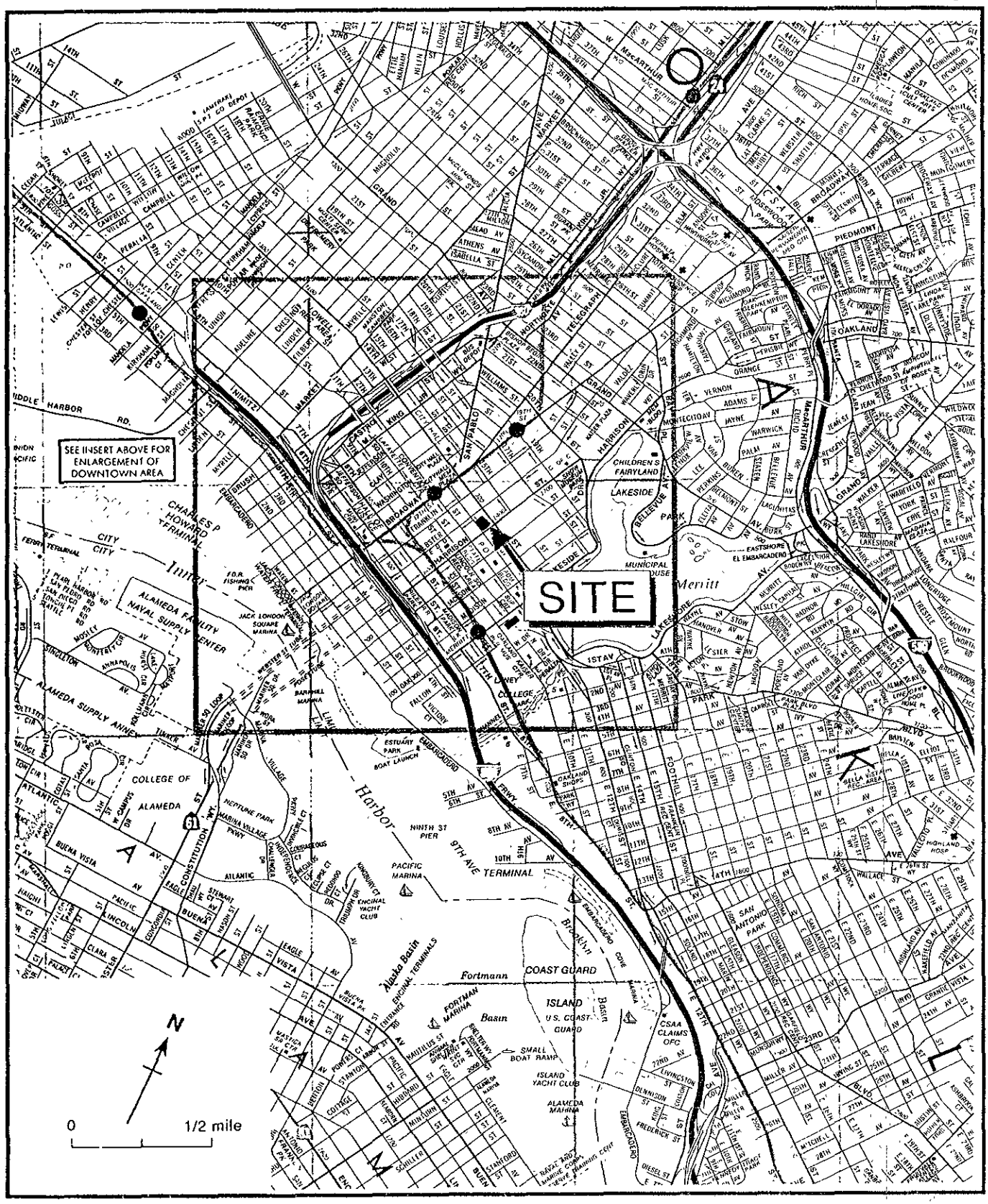


Figure 1. Site Location Map - Former Chevron Service Station #9-4816, 301 14th Street, Oakland, California

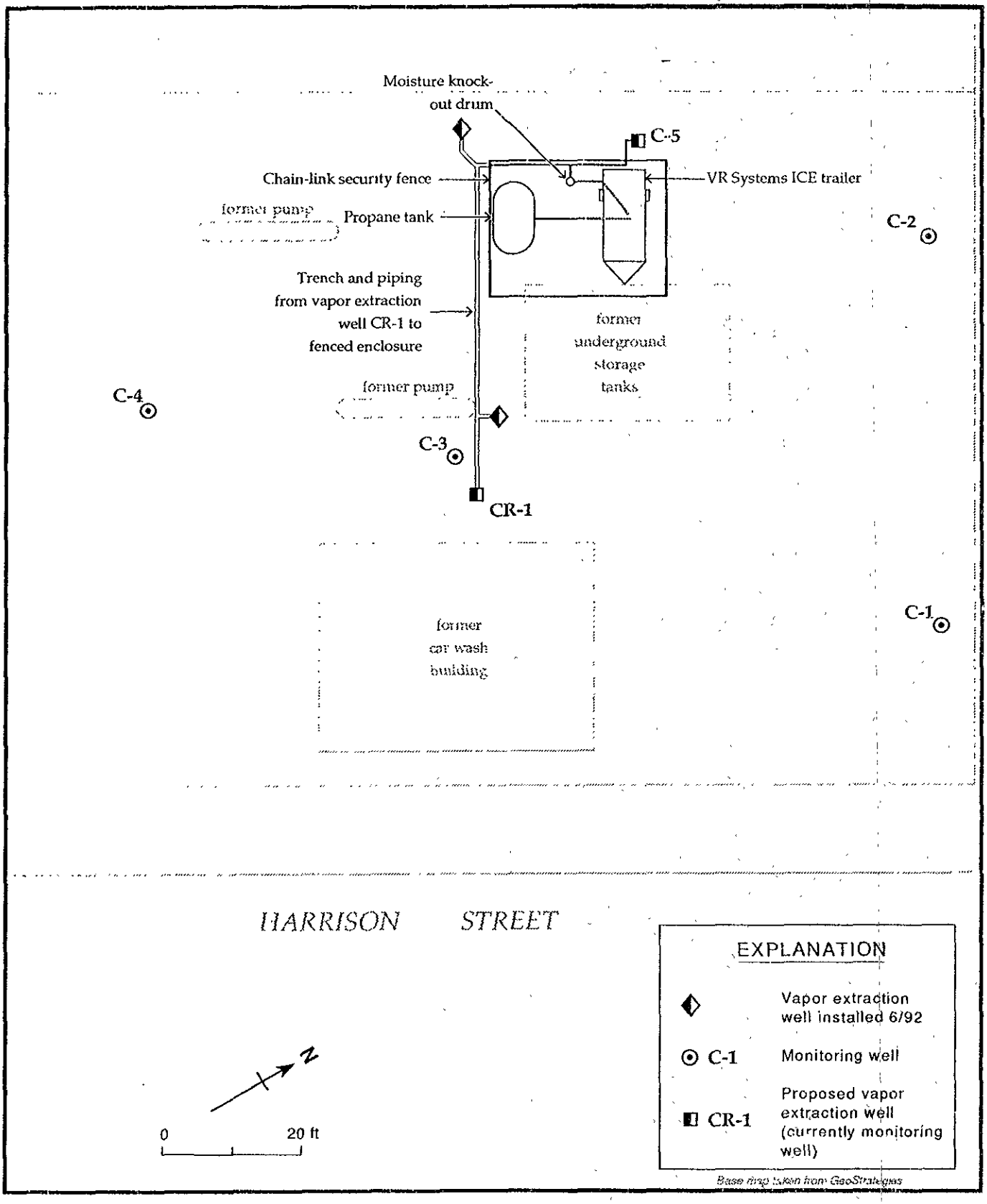
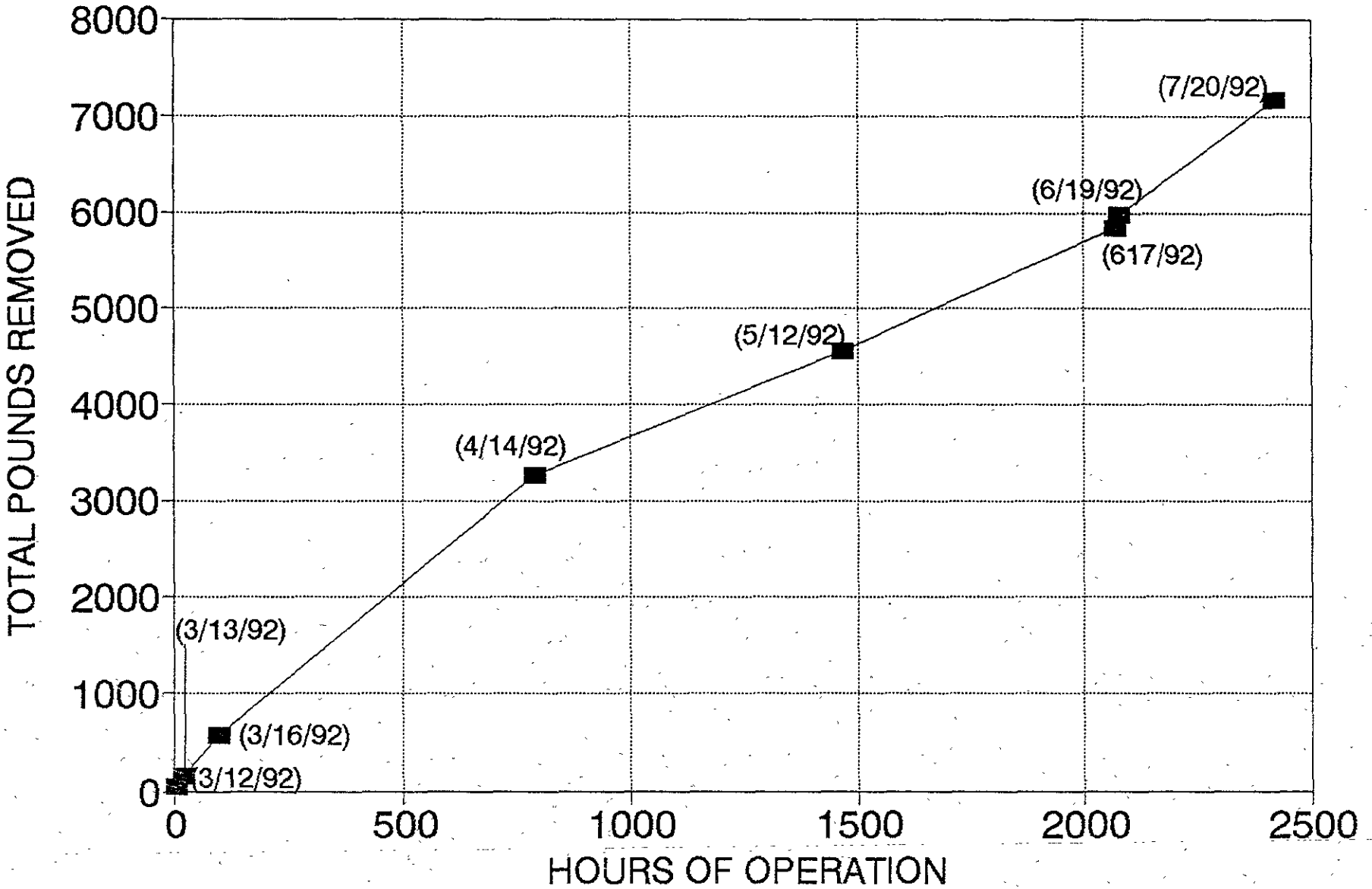


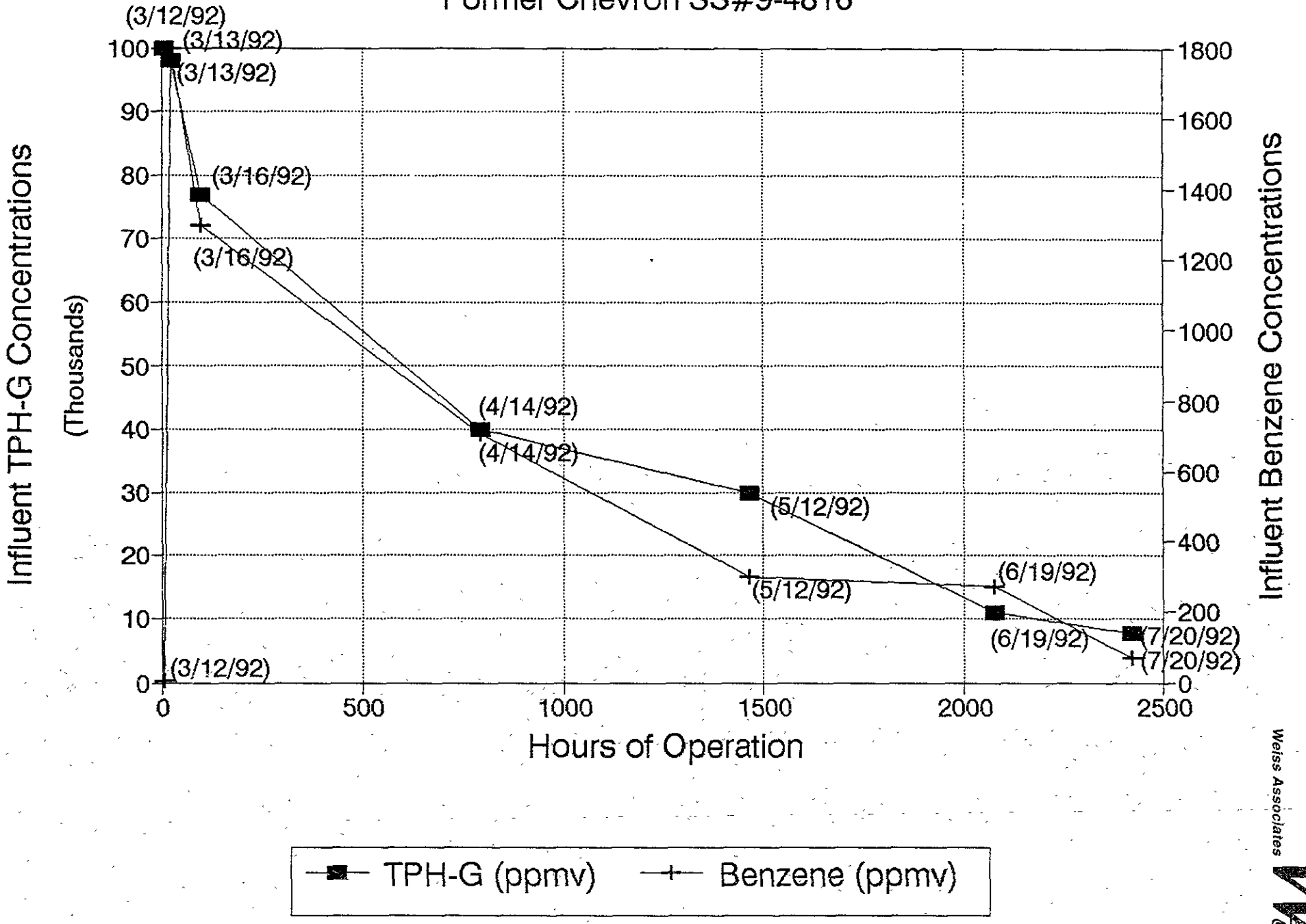
Figure 2. Monitoring and Extraction Well Locations - Former Chevron Service Station #9-4816, 301 14th Street, Oakland, California

Figure 3. TOTAL HYDROCARBON REMOVAL
FORMER CHEVRON SS#9-4816, OAKLAND



Weiss Associates

Figure 4. INFLUENT CONCENTRATIONS
Former Chevron SS#9-4816



Weiss Associates

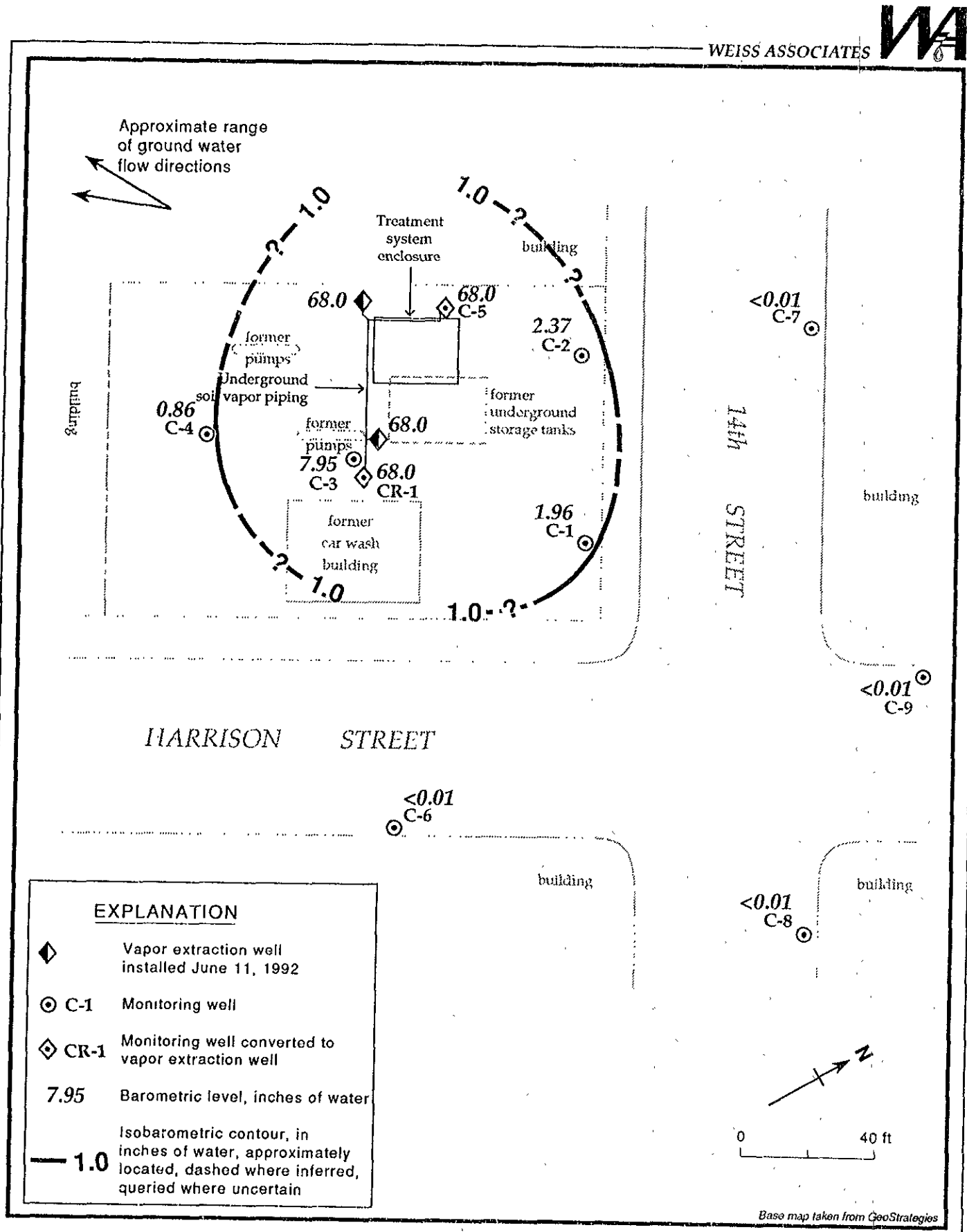


Figure 5. Isobarometric Contours for Soil Vapor Extraction - Former Chevron Service Station #9-4816, 301 14th Street, Oakland, California

8/7/92

Table 1. System Performance and Analytic Results, Former Chevron SS#9-4816, 301 14th Street, Oakland, California

DATE	WELL ID a	TOTAL HOURS b	TOTAL WELL GAS FLOW RATE (SCFM)	TOTAL SYSTEM FLOW RATE (SCFM)	FUEL HYDROCARBON CONCENTRATIONS (ppmv) INFLUENT			EFFLUENT			REMOVAL RATE (#/DAY) e		EMISSION RATE (#/DAY) f		DESTRUCTION EFFICENCY (%)	
					FID d	TPH-G	BENZ.	FID d	TPH-G	BENZ.	TPH-G	BENZ.	TPH-G	BENZ.	TPH-G	BENZ.
03/12/92	CR-1/C-5	5	4.9 c	34.5	>46,000	100,000	<4.2	185	<30	<0.085	157	<0.06	<0.33	<0.0009	>99.80	>85.80
03/13/92	CR-1/C-5	23	4.9 c	27.0	>47,800	98,000	1,800	80	<30	<0.085	154	2.6	<0.26	<0.0006	>99.80	>99.98
03/16/92	CR-1/C-5	98	4.9 c	26.5	>50,000	77,000	1,300	NA	<30	0.12	121	1.9	<0.26	0.0009	>99.80	99.95
04/14/92	CR-1/C-5	790	5.1 g	39.3	2,550	40,000	710	NA	<30	0.54	65	1.1	<0.38	0.0062	>99.40	99.40
05/12/92	CR-1/C-5	1465	2.7 g	52.9	6,500	30,000	300	NA	450	8.1	26	0.24	7.1	0.12	72.60	50.00 h,i
05/26/92	CR-1/C-5				2,934	---	---	1.9	---						99.93 j	
06/17/92	CR-1/C-5	2071	8.0 g,k	35.1	---	---	---	---	---	---	---	---	---	---	---	---
06/19/92	CR-1/C-5 & 2 new wells	2077	25.6 g,l	77.0	2,100	11,000	270	100	<30	0.64	90	2.0	<0.74	0.014	99.20	99.30
07/20/92	CR-1/C-5 & 2 new wells	2422	31.0 g	72.0	900	7,600	70	22	31	0.33	76	0.63	0.72	0.0069	99.00	98.90

NOTES:

a = Measurements/samples represent combined extraction from wells listed.
b = Total hours of operation equals engine hours as appear on engine computer printout minus 3050 hours of previous use at other sites.
c = Based on flow data for similar operation parameters, measured vacuum, and assumed influent temperature of 70 F.
d = Value reflects subtraction of carbon-tip (methane) measurement. In some cases, FID measurement of total VOCs exceeded instrument measurement range of 50,000 ppmv.
e = Removal rate based on total well gas flow rate.
f = Emission rate based on total system flow rate which includes system dilution air.
g = Based on measured vacuum and flow, and assumed influent temperature of 70 F.
h = BAAQMD was notified of higher emission rates and lower destruction efficiency. System optimization was performed May 20, 1992 to maximize destruction efficiency.

DEFINITIONS:

--- = Samples not collected
SCFM = Standard cubic feet per minute.
ppmv = Parts per million on volume to volume basis.
# = Pounds
FID = Total volatile organic compounds (VOCs) as measured by Foxboro organic vapor analyzer/flame ionization device.

TPH-G = Total purgeable hydrocarbons as gasoline.
NA = FID not functioning.
<n = Analytic result below detection limit of n.

--- Table 1 continues on next page ---

Table 1. System Performance and Analytic Results, Former Chevron SS#9-4816, 301 14th Street, Oakland, California

i = Contains corrected removal and emission rates and destruction efficiencies
j = Destruction efficiency based on FID measurements. The measurements were collected as requested by the BAAQMD to verify that the system optimization performed on May 20, 1992 was effective.
k = Based on vacuum and flow readings from the 6/10/92 site visit.
l = First day of system operations with the two wells (installed June 11, 1992) connected to the system as extraction wells.

Table 2. Total Hydrocarbon Removal, Former Chevron SS#9-4816, 301 14th Street, Oakland, California

DATE	WELL ID a	HOURS OF OPERATION b	TOTAL WELL GAS FLOW RATE (SCFM)	REMOVAL #TPH-G/HR	INTERVAL AVERAGE #TPH-G/HR	INTERVAL HOURS	INTERVAL TOTAL POUNDS TPH-G	CUMMULATIVE TOTAL POUNDS TPH-G REMOVED
03/12/92	CR-1/C-5	5	4.9 c	6.54	6.54	5	33	33
					6.48	18	117	150
03/13/92	CR-1/C-5	23	4.9 c	6.42				
					5.73	75	430	580
03/16/92	CR-1/C-5	98	4.9 c	5.04				
					3.88	692	2685	3265
04/14/92	CR-1/C-5	790	5.1 d	2.71				
					1.90	675	1283	4548
05/12/92	CR-1/C-5	1465	2.7 d	1.08				
					2.14	606	1297	5845
06/17/92 e	CR-1/C-5	2071	8.0 d,f	3.21 g				
06/19/92	CR-1/C-5 & 2 new wells	2077	25.6 d	3.75	3.75	6	23	5983
					3.45	345	1190	7173
07/20/92	CR-1/C-5 & 2 new wells	2422	31.0 d	3.15				

Notes:

a = Measurements/samples represent combined extraction from wells listed.
b = Total hours of operation equals engine hours as appear on engine computer printout minus 3050 hours of previous use at other sites.
c = Based on flow data for similar operation parameters, measured vacuum, and assumed influent temperature of 70 F.
d = Based on measured vacuum and flow, and assumed influent temperature of 70 F.
e = First day of system operation with the two new wells (installed June 11, 1992) connected to the system as extraction
f = Based on measured vacuum and flow from the 06/10/92 site visit.
g = Calculated estimates based on concentrations in samples collected 05/12/92.
SCFM = Standard cubic feet per minute.
ppmv = Parts per million on volume to volume basis.
# = Pounds
FID = Total volatile organic compounds (VOCs) as measured by Foxboro organic vapor analyzer/flame ionization device.
TPH-G = Total purgeable hydrocarbons as gasoline.

Table 3. Free Product Thickness, Former Chevron Service Station #9-4816
301 14th Street, Oakland, California

DATE	C-1	C-2	C-3	C-4	C-5	CR-1
	<----------product thickness (ft)---------->					
11/05/91 a	0	0.04	2.46	0	2.29	2.43
03/11/92	0	NM	1.09	NM	0.30	3.21
03/16/92	0	NM	2.32	NM	0	8.88
03/25/92	0	NM	2.31	NM	0	7.83
05/05/92	NM	NM	2.11	0	0	5.67
05/12/92	0	0	1.89	0	0.27	5.97
05/19/92 b	NM	NM	2.00	NM	NM	2.92
06/18/92	0	0	2.16	NM	0.85	3.12
07/28/92	0	0	0.51	NM	0	3.41

SVE system began 3-12-92

Notes:

NM = Not Measured
a = From 4th Quarter 1992 Ground Water Monitoring Report prepared by Alton Geoscience, Concord, California
b = Measurement on 5/19/92 was taken prior to free product removal by Erickson, Inc. from wells CR-1 and C-3. Erickson vacuumed product from the wells until <1/4 inch remained.

ATTACHMENT A

ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY FORMS

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

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

LABORATORY NO.: 13222
CLIENT: Weiss Associates
CLIENT JOB NO.: 4-582-51

DATE RECEIVED: 06/22/92
DATE REPORTED: 06/23/92

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS
by Modified EPA SW-846 Method 5030 and 8015

LAB #	Sample Identification	Concentration (ppm) Gasoline Range
1	06192-IN	11000
2	06192-OUT	ND<30

ppm - parts per million in air
Minimum Detection Limit for Gasoline in Air: 30 ppm
Concentration of gasoline in air is calculated based on 20 C and 1 ATM and an assumed molecular weight of hexane.
Reported as volume to volume.

QAQC Summary:
Daily Standard run at 2mg/L: %DIFF Gasoline = <15
MS/MSD Average Recovery = 106%: Duplicate RPD = 0%

Richard Srna, Ph.D.

Laboratory Director

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

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

LABORATORY NO.: 13222
CLIENT: Weiss Associates
CLIENT JOB NO.: 4-582-51

DATE RECEIVED: 06/22/92
DATE REPORTED: 06/23/92

ANALYSIS FOR BENZENE, TOLUENE, ETHYL BENZENE & XYLENES by EPA SW-846 Methods 5030 and 8020

LAB #	Sample Identification	Concentration(ppb) Benzene	Toluene	Ethyl Benzene	Xylenes
1	06192-IN	270000	290000	26000	130000
2	06192-OUT	640	ND<250	ND<65	ND<250

ppb - parts per billion in air

Minimum Detection Limit for Benzene in air = 85 ppb
Minimum Detection Limit for Toluene and Xylenes in air = 250 ppb
Minimum Detection Limit for Ethyl Benzene in air = 65 ppb
Concentration of BTXE in air is calculated based on 20 C and 1 ATM.
Reported as volume to volume.

QAQC Summary:

Daily Standard run at 20ug/L: %DIFF 8020 = <15%
MS/MSD Average Recovery = 92 % : Duplicate RPD = 7.1%

Richard Srna, Ph.D.

Laboratory Director

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

MOCK INVOICE

Chevron USA
P.O. Box 5004
San Ramon, CA 94583

Date: 06/23/92
Date Rcvd: 06/22/92
Date Rptd: 06/23/92
Our Job #: 13222
Invoice #: 13222

Weiss Associates Job # 4-582-51
Chevron USA Release # 3523000 Facility #: 9-4816

QTY/MATRIX	ANALYSIS		EXT. PRICE
2 Water sample(s)	for VBAIR	@ $0.00 (RUSH)	0.00
TOTAL INVOICE			0.00

Please Send Payment To:
Superior Precision Analytical
P.O. Box 1545
Martinez, CA 94553

TERMS: NET 30
A charge of 1.5% per month may be applied to unpaid balances.

Fax copy of Lab Report and COC to Chevron Contact: ☐ Yes ☐ No

Chain-of-Custody-Record

13222

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number 9-4816
Facility Address 301 14th Street, Oakland, CA
Consultant Project Number 4-582-51
Consultant Name Weiss Associates
Address 5500 Shellmound St., Emeryville, CA 94608
Project Contact (Name) Thomas Berry
(Phone) (510) 547-5420 (Fax Number) (510) 547-5043

Chevron Contact (Name) Nancy Vukelich
(Phone) (510) 842-9581 FAX: (510) 842-9591
Laboratory Name Superior Precision Analytical
Laboratory Release Number 3523000
Samples Collected by (Name) Brian Bosch
Collection Date 6-19-92
Signature Brian Bosch

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	Analyses To Be Performed: BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd,Cr,Pb,Zn,Ni (ICAP or AA)	Remarks
06192-IN		2	A	G	14:02	NONE	NO	X								* ANALYZE ONLY ONE Sample per set - the other is a duplicate.
06192-OUT		2	A	G	13:28	NONE	NO	X								

Please initial: BP
Samples Stored in ice: yes no
Appropriate containers: yes no
Samples preserved: NA
VOA's without headspace: NA
Comments: OK

RUSH

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Brian Bosch	WEISS	6-19-92 15:50	Dan Chatt	EXPRESS-IT	6-19-92 15:50
Dan C.	Express it	06-19-92 17:00	Louis Noya	Express it	06-22-92 0730
Luis Noya	Express it	06-22-92	Rhd Hill		6/22/92 9115

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted
72 hr.

COC-3.DWG/03 91/HCH

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

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

LABORATORY NO.: 13299
CLIENT: Weiss Associates
CLIENT JOB NO.: 4-582-51

DATE RECEIVED: 07/21/92
DATE REPORTED: 07/22/92

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS
by Modified EPA SW-846 Method 5030 and 8015

LAB #	Sample Identification	Concentration (ppm) Gasoline Range
1	20072 GTI IN	7600
2	20072 GTI OUT	31

ppm - parts per million in air
Minimum Detection Limit for Gasoline in Air: 30 ppm
Concentration of gasoline in air is calculated based on 20 C and 1 ATM and an assumed molecular weight of hexane.
Reported as volume to volume.

QAQC Summary:
Daily Standard run at 2mg/L: %DIFF Gasoline = <15
MS/MSD Average Recovery = 88%: Duplicate RPD = 7%

Richard Srna, Ph.D.

Laboratory Director

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

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

LABORATORY NO.: 13299
CLIENT: Weiss Associates
CLIENT JOB NO.: 4-582-51

DATE RECEIVED: 07/21/92
DATE REPORTED: 07/22/92

ANALYSIS FOR BENZENE, TOLUENE, ETHYL BENZENE & XYLENES by EPA SW-846 Methods 5030 and 8020

LAB #	Sample Identification	Concentration(ppb) Benzene	Toluene	Ethyl Benzene	Xylenes
1	20072 GTI IN	70000	74000	6700	58000
2	20072 GTI OUT	330	700	110	1100

ppb - parts per billion in air

Minimum Detection Limit for Benzene in air = 85 ppb
Minimum Detection Limit for Toluene and Xylenes in air = 250 ppb
Minimum Detection Limit for Ethyl Benzene in air = 65 ppb
Concentration of BTXE in air is calculated based on 20 C and 1 ATM.
Reported as volume to volume.

QAQC Summary:

Daily Standard run at 20ug/L: %DIFF 8020 = <15%
MS/MSD Average Recovery = 103%: Duplicate RPD = 10%

Richard Srna, Ph.D.

Laboratory Director

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

MOCK INVOICE

Chevron USA
P.O. Box 5004
San Ramon, CA 94583

Date: 07/22/92
Date Rcvd: 07/21/92
Date Rptd: 07/22/92
Our Job #: 13299
Invoice #: 13299

Weiss Associates Job # 4-582-51
Chevron USA Release # 3523000 Facility #: 9-4816

QTY/MATRIX	ANALYSIS		EXT. PRICE
2 Air sample(s) for	VBAIR	@ $0.00 (RUSH)	0.00
TOTAL INVOICE			0.00

Please Send Payment To:
Superior Precision Analytical
P.O. Box 1545
Martinez, CA 94553

TERMS: NET 30
A charge of 1.5% per month may be applied to unpaid balances.

Fax copy of Lab Report and COC to Chevron Contact: ☐ Yes ☐ No

~~55774~~ 13249

Chain-of-Custody-Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number 9-4816
Facility Address 310 14th Street, Oakland, CA
Consultant Project Number 4-582-83-51
Consultant Name WEISS ASSOCIATES
Address 5500 SHELLMOUND ST.
Project Contact (Name) THOMAS BERRY
(Phone) (510) 547-5420 (Fax Number)

Chevron Contact (Name) NANCY VUKELICH
(Phone) (510) 842-9581
Laboratory Name SUPERIOR PRECISION ANALYTICAL
Laboratory Release Number 3523000
Samples Collected by (Name) RUDY MARQUEZ
Collection Date 7/21/92
Signature Rudy R. Marquez

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil A = Air W = Water C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd,Cr,Pb,Zn,Ni (ICAP or AA)					Remarks
~~20072~~		2																		1 TO SAMPLE
20072 GTI IN		2	A	G	15:10	N/A	N	X												1 TO HOLD
20072 GTI OUT		2	A	G	15:13	N/A	N	X												

Please initial: dzo
Samples Stored in ice. No
~~Appropriate containers.~~ Yes
Samples preserved. No
VOA's without headspace. N/A
Comments:

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Rudy Marquez	WEISS ASSOCIATES	7/21/92 8:28		X519 EXPRESS-IT	7/21/92 0828
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
	X519 Express-IT	7/21/92 0855		Exp. U.S.	7/21/92 0925
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
	EXPRESS IT	7/21 0935	Cecilia Joaquin		7/21/92 0931

Turn Around Time (Circle Choice)
3 DAY
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted

LOCKED IN SECURE PLACE

COC-3.DWG/03 91/HCH

ATTACHMENT B

SAMPLE EMISSION CALCULATIONS

SAMPLE EMISSION CALCULATIONS
Chevron Service Station #9-4816
301-14th Street
Oakland, California

Given: System data from May 12, 1992

- Influent TPH-G concentration = 30,000 ppmv
- Effluent TPH-G concentration = 450 ppmv
- Influent benzene concentration = 300 ppmv
- Effluent benzene concentration is = 8.1 ppmv
- System vacuum = 38 inches of water
- Molecular weight of TPH-G (assumed to be equal to hexane) = 86 lbs/lb-mole.
- Molecular weight of benzene = 78 lbs/lb-mole
- Extraction flow rate based on the flow sensor and differential pressure gauge located before the ICE. The differential pressure = 0.05
- Emission flow rate is based on measurement by the ICE flow meter. Flow rate = 56.5 cfm

Uncontrolled Emissions (lb per day):

The extraction flow rate is based on measurements using a pitot tube type flow sensor with a differential pressure gauge and an assumed temperature at the sensor of 60°F. The estimated extraction flow rate for the May 12, 1992 data is 2.7 scfm.

The equation for the mass of hydrocarbons entering the treatment system per unit time is:

$$Removal\ Rate\left(\frac{lbs}{day}\right) = Conc.(ppmv) \times 10^{-6} \times flowrate(scfm) \times \frac{1lb\text{-}mole}{386\ ft^3} \times mol.\ wt.\left(\frac{lb}{lb\text{-}mole}\right) \times \frac{1440\ min.}{day}$$

For TPH-G and benzene:

$$TPH\text{-}G = 30{,}000 \times 10^{-6} \times 2.7\ scfm \times \frac{1lb\text{-}mole}{386\ ft^3} \times \frac{86\ lbs}{lb\text{-}mole} \times \frac{1440 min.}{day} = 25.9 \frac{lbs}{day}$$

$$Benzene = 300 \times 10^{-6} \times 2.7\ scfm \times \frac{1lb\text{-}mole}{386\ ft^3} \times \frac{78\ lbs}{lb\text{-}mole} \times \frac{1440\ min.}{day} = 0.24\ \frac{lbs}{day}$$

Controlled Emissions (lb per day):

The emission flow rate is based on the measurement by the ICE flow sensor in cfm, which must be converted to scfm using the following equation:

$$flowrate\ (scfm) = flowrate(ICE)\ (cfm) \times \left(\frac{14.7 + psig}{14.7}\right) \times \left(\frac{520}{460 + T_F}\right)$$

where

- T_F = temperature of air in °F,
- 520 = 460 + 60° = standard temperature rankine, and
- psig = $\frac{\text{inches of water pressure (negative)}}{\text{27.7 inches of water /1 psi}}$

So the effluent flow rate is:

$$Flowrate = 56.5\ cfm \times \frac{14.7 - \frac{45}{27.7}}{14.7} \times \frac{520}{460 + 70} = 49.3\ scfm$$

For TPH-G and benzene:

$$TPH\text{-}G = 450 \times 10^{-6} \times 49.3\ scfm \times \frac{1 lb\text{-}mole}{386\ ft^3} \times \frac{86\ lbs}{lb\text{-}mole} \times \frac{1440\ min.}{day} = 7.11\ \frac{lbs}{day}$$

$$Benzene = 8.1 \times 10^{-6} \times 49.3\ scfm \times \frac{1 lb\text{-}mole}{386\ ft^3} \times \frac{78\ lbs}{lb\text{-}mole} \times \frac{1440\ min.}{day} = 0.12\ \frac{lbs}{day}$$

Destruction Efficiency

The equation for destruction efficiency is:

$$Destruction\ efficiency = \frac{\frac{lbs\ removed}{day} - \frac{lbs\ emitted}{day}}{\frac{lbs\ removed}{day}} \times 100\%$$

For TPH-G and benzene:

$$TPH\text{-}G\ destruction\ efficiency = \frac{25.9 - 7.1}{25.9} \times 100\% = 72.6\%$$

$$\textit{benzene destruction efficiency} = \frac{0.24 - 0.12}{0.24} \times 100\% = 50.0\%$$