Chevron

June 22, 1993

Chevron U.S.A. Products Company
2410 Camino Ramon
San Ramon, CA 94583

Marketing Department
Phone 510 842 9500

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

Dear Ms. Eberle:

Enclosed we are forwarding the Bimonthly Progress Report dated June 17, 1993, 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 April 1, 1993 to May 31, 1993. Cumulative to date, approximately 10,985 lbs. of hydrocarbons (approximately 1,664 gallons) have been recovered. The newly installed extraction well VEW-3 was connected to the system on April 1 and 2, 1993. The system was restarted on April 2, 1993. The system has been shut down since April 16, 1993, due to extremely low hydrocarbon and benzene destruction efficiencies of the IC Engine. Since system shutdown the air permit has been modified, all necessary equipment has been allocated and P.G. & E. service has been coordinated. We are in the process of replacing the IC Engine with the vapor-phase carbon. This modification should be completed within the next three weeks.

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.

Sincerely,
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 (9-4816-9)

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: 510-450-6000

June 17, 1993

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

Re: Bi-monthly Progress Report
April through May 1993
Chevron Service Station #9-4816
301-14th Street
Oakland, California
WA Job #4-582-52

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 current SVE and treatment system consists of an internal combustion engine (ICE) which extracts vapors from VEW-1, VEW-3, 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. The system operated in compliance throughout this reporting period.

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 and are analyzed for total petroleum hydrocarbons as gasoline (TPH-G), benzene, ethylbenzene, toluene and total xylenes. Additionally, field measurements are taken with a flame ionization detector (FID) or photo ionization detector (PID). Table 1 presents a summary of analytic results, FID/PID measurements, hours of system operation, calculated emission rates and estimated 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 and hydrocarbon removal rate versus time. We estimate that as of April 13, 1993, about 10,985 lbs (1,664 gallons) of hydrocarbons have been removed from soil and ground water beneath the site. As shown on Figures 4 and 5, influent concentrations have declined from 100,000 parts per million by volume (ppmv) to 400 ppmv since mid-March 1992. Benzene concentrations have declined from 1,800 to 0.6 ppmv. The analytical reports and chain-of-custody forms for April 1993 are

included as Attachment A. A sample emissions calculation based on the BAAQMD Manual of Procedures for Soil Vapor Extraction dated July 12, 1991, is presented as Attachment B.

On April 1 and 2, 1993, WA connected newly installed vapor extraction well VEW-3 to the SVE and treatment system. The ICE was shut down briefly during construction activities and restarted on April 2.

The system also shut down on April 10, 1993 due to high water level in the water knockout drum. WA returned to the site on April 13 to restart and optimize the system and to collect vapor samples for analysis. Based on the analytic results for these samples, WA shut the system down on April 16, 1993. The results indicated extremely low petroleum hydrocarbon and benzene destruction efficiencies. The system did not operate for the remainder of April and all of May.

On April 13, WA measured separate-phase hydrocarbon thicknesses in onsite wells in conjunction with vapor stream monitoring . These measurements are presented in Table 3. Separate-phase hydrocarbons were not detected in any onsite wells and have not been detected since January 11, 1993.

The hydrocarbon mass removal rate during April was 1.6 lbs/day. Due to this low mass removal rate, ICE hydrocarbon destruction efficiencies are low. To more cost-effectively abate SVE emissions, WA will replace the ICE with an activated carbon system. System modification and start-up are scheduled for June 1993.

WA will continue bi-monthly reporting and conduct start-up and monitoring activities for the activated carbon system as specified by the BAAQMD permit.

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

Sincerely,
Weiss Associates

Kimberly Ohara
Staff Engineer

FOR TRB

Thomas R. Berry, R.G.
Project Geologist

TRB:kao

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Attachments:

Figure 1 - Site Location Map
Figure 2 - Monitoring and Extraction Well Locations
Figure 3 - Total Hydrocarbon Removal
Figure 4 - Influent Concentrations
Figure 5 - Influent Concentrations
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

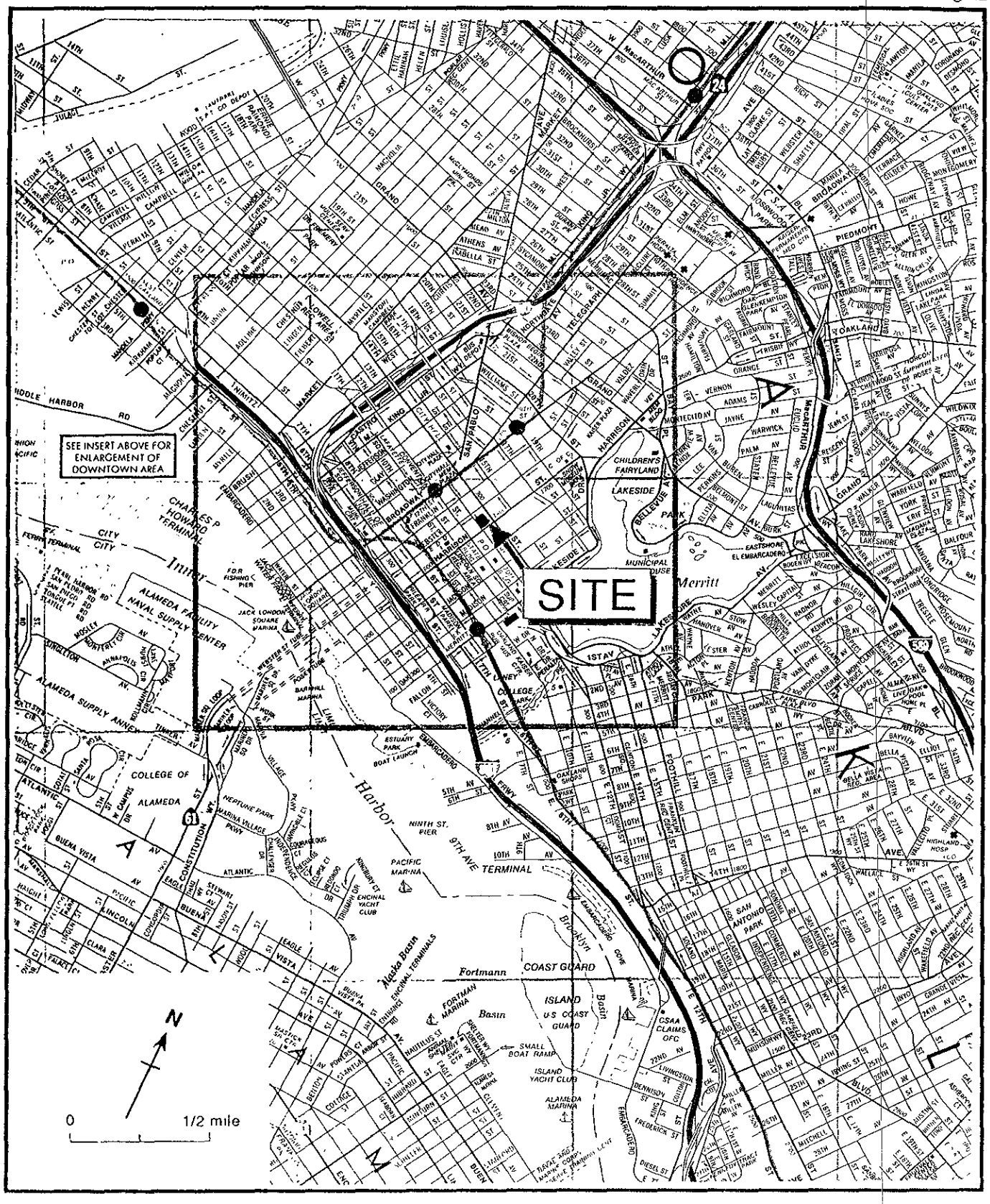


Figure 1. Site Location Map - Former Chevron Service Station #9-4816, 301 14th Street, Oakland, California

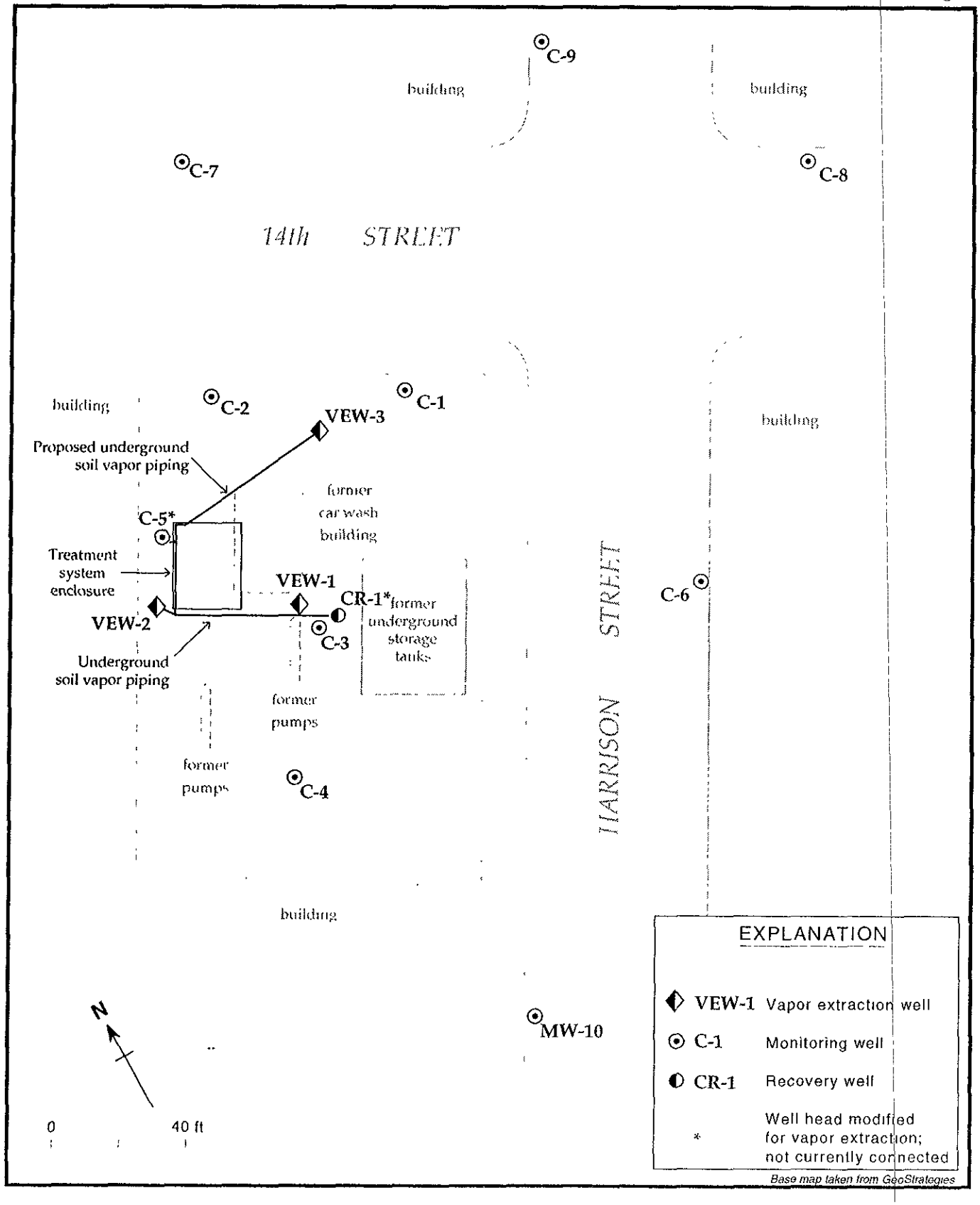
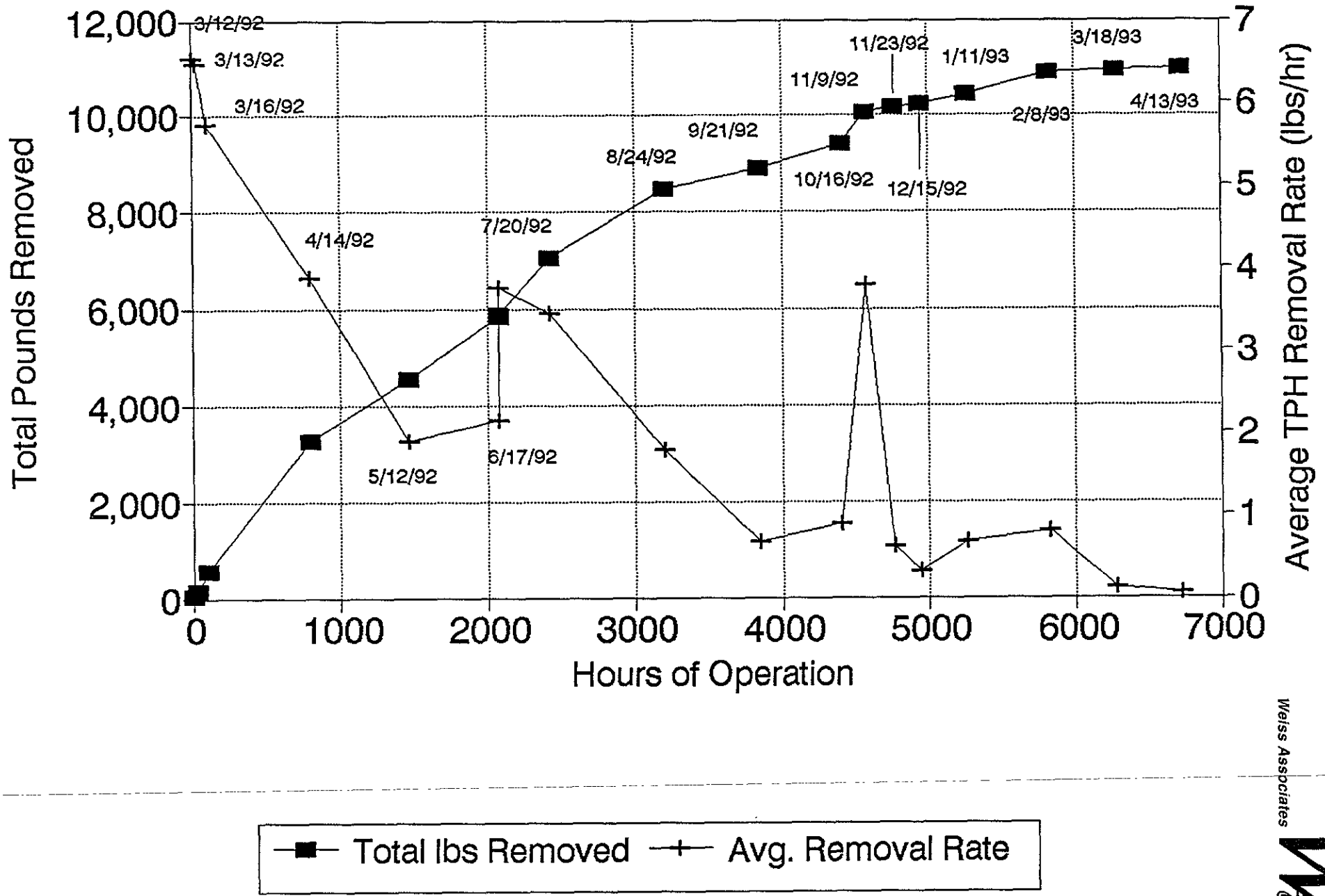


Figure 2. Monitoring and Extraction Well Locations - Former Chevron Service Station #9-4816, 301 14th Street, Oakland, California

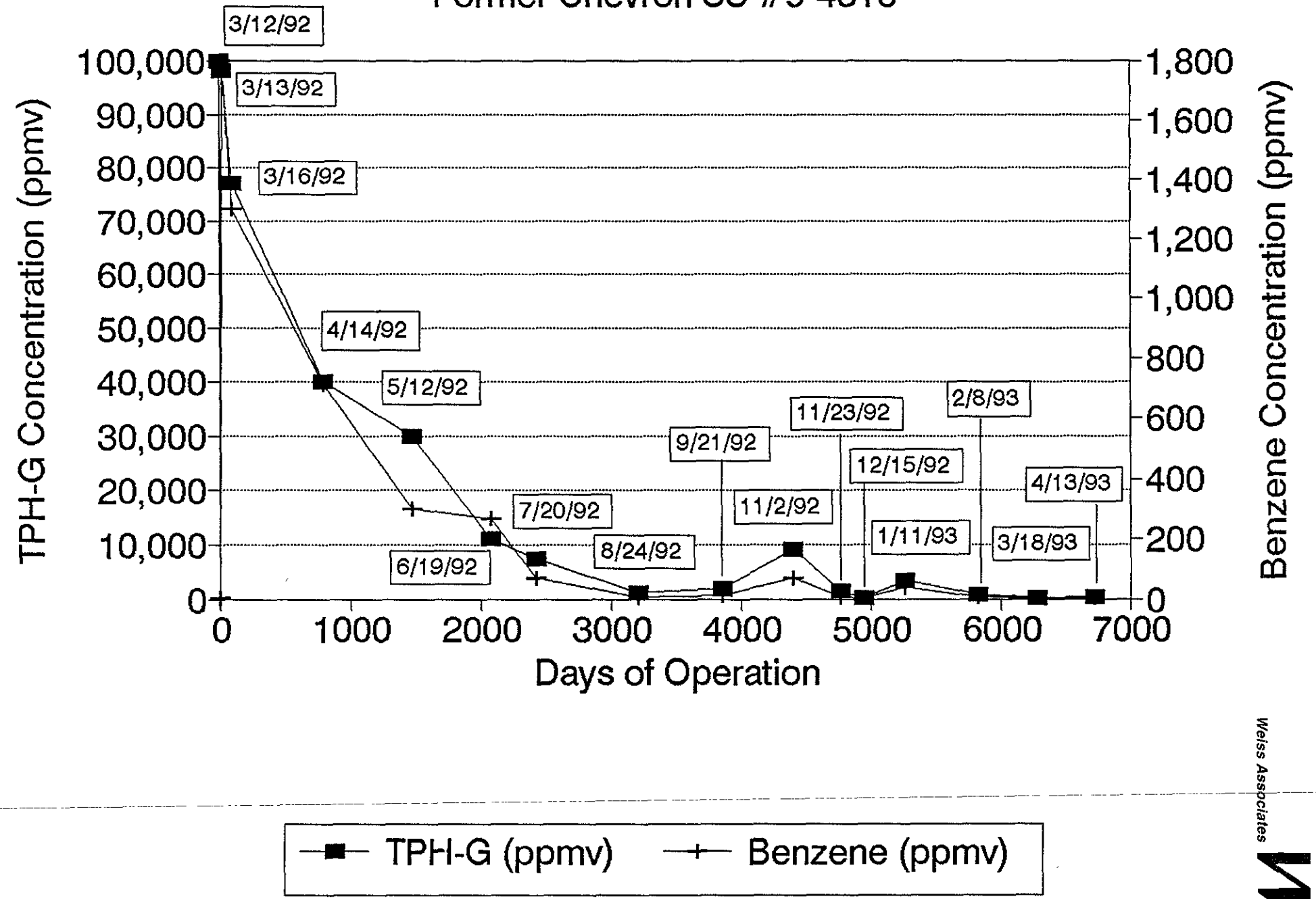
6/16/93

Figure 3. Total Hydrocarbon Removal
Former Chevron SS#9-4816, Oakland



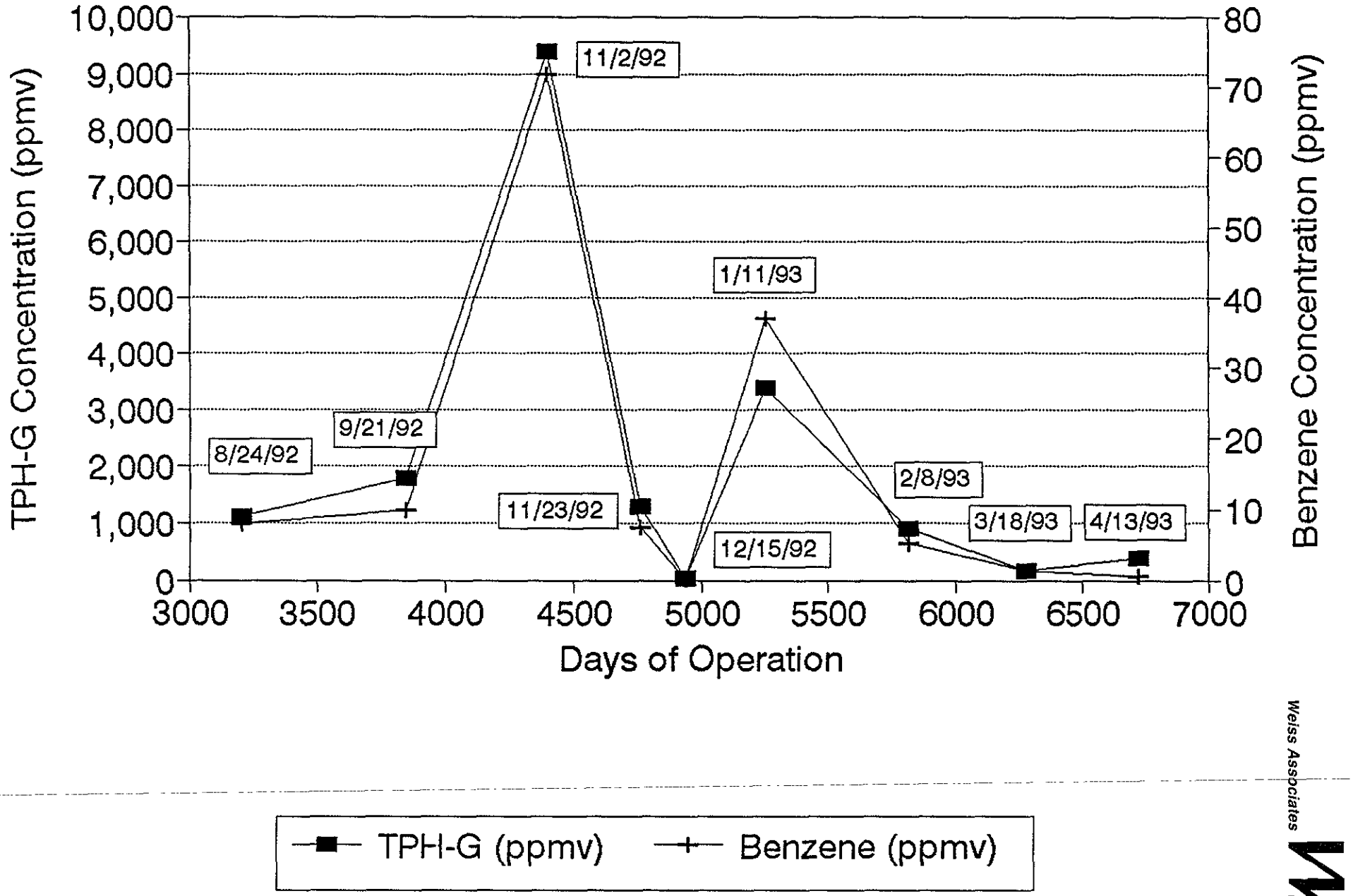
Weiss Associates

Figure 4. Influent Concentrations
Former Chevron SS #9-4816



Weiss Associates

Figure 5. Influent Concentrations
Former Chevron SS #9-4816



Weiss Associates

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 FID c	Influent TPH-G	Influent B	Effluent FID c	Effluent TPH-G	Effluent B
03/12/92	CR-1/C-5		5	4.9	f	34.5	>46,000	100,000	<4.2	185	<30	<0.085
03/13/92	CR-1/C-5		23	4.9	f	27.0	>47,800	98,000	1,800	80	<30	<0.085
03/16/92	CR-1/C-5		98	4.9	f	26.5	>50,000	77,000	1,300	NA	<30	0.12
04/14/92	CR-1/C-5		790	5.1	h	39.3	2,550	40,000	710	NA	<30	0.54
05/12/92	CR-1/C-5		1,465	2.7	h	52.9	6,500	30,000	300	NA	450	8.1
05/26/92	CR-1/C-5						2,934	---	---	1.9	---	---
06/17/92	CR-1/C-5		2,071	8.0	h,l	35.1	---	---	---	---	---	---
06/19/92	CR-1/C-5/VEW1/VEW-2		2,077	25.6	h,m	77.0	2,100	11,000	270	100	<30	0.64
07/20/92	CR-1/C-5/VEW1/VEW-2		2,422	31.0	h	72.0	900	7,600	70	22	31	0.33
08/10/92	CR-1/C-5/VEW1/VEW-2		2,700	31.2	h	70.7	750	---	---	---	---	---
08/10/92	VEW-1/VEW-2	n		34.8	h		1,980	---	---	---	---	---
08/17/92	VEW-1/VEW-2		3,036	24.7	h	74.1	1,778	---	---	300	---	---
08/24/92	VEW-1/VEW-2		3,204	31.4	h	67.6	---	1,100	7.8	---	<30	0.15
08/31/92	VEW-1/VEW-2		3,345			76.2	8,850	---	---	100	---	---
09/08/92	VEW-1/VEW-2		3,541	38.3	h	78.8	8,760	---	---	100	---	---
09/21/92	VEW-1/VEW-2		3,852	37.6	h	78.5	15,740	1,800	10	640	<30	<0.085
11/02/92	VEW-1/VEW-2		4,400	30.2	h	63.0	1,330	9,400	72	100	<30	<0.085
11/23/92	VEW-1/VEW-2		4,764	35.5	h	74.3	450	1,300	7.5	78	<30	<0.085
12/07/92	VEW-1/VEW-2		4,941	28.7	h	72.9	10,942	---	---	---	---	---
12/15/92	VEW-1/VEW-2		4,942	33.0	h	72.8	---	<30	<0.085	---	<30	<0.085
12/28/92	VEW-1/VEW-2		5,085	17.4	h		1,175	---	---	7.5	---	---
01/11/93	VEW-1/VEW-2/CR1	q	5,255	30.0	r,s	65.6	t	3,400	37	8.7	<30	0.32
01/18/93	VEW-1/VEW-2/CR1		5,347			42.5	t	---	---	---	---	---
01/25/93	VEW-1/VEW-2/CR1		5,512			40.3	345	---	---	---	---	---
02/02/93	VEW-1/VEW-2/CR1		5,676				351	---	---	---	---	---
02/08/93	VEW-1/VEW-2/CR1		5,818	18.0	r, s	56.4	251	920	5.2	22.1	<30	0.36
03/15/93	VEW-1/VEW-2/CR1		6,214				380	---	---	7	---	---
03/18/93	VEW-1/VEW-2/CR1		6,280	20.1	h	57.8	200	160	1.3	50	<30	0.72
04/13/93	VEW-1/VEW-3/CR1/C5		6,726	12.5	h	47.8	515	400	0.6	w	84	0.93

-- Table 1 continues on next page --

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

Date	Well ID a		Removal Rate (#/day) d		Emission Rate (#/day) e		Destruction Efficiency (%)			
			TPH-G	B	TPH-G	B	TPH-G		B	
03/13/92	CR-1/C-5		157	<0.06	<0.33	<0.0009	>99.80	g	>85.80	g
03/16/92	CR-1/C-5		154	2.6	<0.26	<0.0006	>99.80	g	>99.98	g
04/14/92	CR-1/C-5		121	1.9	<0.26	0.0009	>99.80	g	99.95	
05/12/92	CR-1/C-5		65	1.1	<0.38	0.0062	>99.40	g	99.40	
05/26/92	CR-1/C-5		26	0.24	7.1	0.12	72.60		50.00	i, j
06/17/92	CR-1/C-5						99.93	k		
06/19/92	CR-1/C-5/VEW1/VEW-2									
07/20/92	CR-1/C-5/VEW1/VEW-2		90	2.0	<0.74	0.014	99.20		99.30	
08/10/92	CR-1/C-5/VEW1/VEW-2		76	0.63	0.72	0.0069	99.00		98.90	
08/10/92	VEW-1/VEW-2	n								
08/17/92	VEW-1/VEW-2									
08/24/92	VEW-1/VEW-2									
08/31/92	VEW-1/VEW-2		11	0.071	<0.65	0.0030	>94.1	g	95.80	
09/08/92	VEW-1/VEW-2						98.9			
09/21/92	VEW-1/VEW-2						98.9			
11/02/92	VEW-1/VEW-2		22	0.11	<0.76	<0.0019	>96.5	g	>98.3	g
11/23/92	VEW-1/VEW-2		91	0.63	<0.61	<0.0016	>99.3	g	>99.7	g
12/07/92	VEW-1/VEW-2		15	0.077	<0.72	<0.0018	>95.1	g	>97.7	g
12/15/92	VEW-1/VEW-2									
12/28/92	VEW-1/VEW-2		<0.32	<0.00082	<0.70	<0.0018	u		u	
01/11/93	VEW-1/VEW-2/CR1	q	33	0.32	<0.56	0.0054	>99.0	g	98.3	g
01/18/93	VEW-1/VEW-2/CR1									g
01/25/93	VEW-1/VEW-2/CR1									g
02/02/93	VEW-1/VEW-2/CR1									
02/08/93	VEW-1/VEW-2/CR1		5.3	0.027	<0.48	0.0052	>90.9		80.7	
03/15/93	VEW-1/VEW-2/CR1									
03/18/93	VEW-1/VEW-2/CR1		1.0	0.0076	<0.42	v	>58.0	g	v	
04/13/93	VEW-1/VEW-3/CR1/C5		1.6	0.0022	1.3	0.013	18.8		x	

-- Table 1 continues on next page --

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

Notes:

a = Measurements/samples represent combined extraction from wells listed.
b = Total hours of operation equals engine hours as they appear on engine computer printout minus 3050 hours of previous use at other sites.
c = Value reflects subtraction of carbon-tip (methane) measurement. In some cases, FID measurement of total VOCs exceeded instrument measurement range of 50,000 ppmv.
d = Removal rate based on total well gas flow rate.
e = Emission rate based on total system flow rate which includes system dilution air and is measured by the ICE internal flow sensor.
f = Based on flow data for similar operation parameters, measured vacuum, and assumed influent temperature of 70 F.
g = Destruction efficiency calculation limited by analytic detection limit.
h = Based on measured vacuum and flow, and assumed influent temperature of 70 F.
i = System was shut down May 19, 1992, immediately following receipt of analytic results indicating system non-compliance due to low system destruction efficiency. Low efficiency was due to system adjustments made during a manufacturer's demonstration for Chevron USA. System was restarted May 20, 1992 and optimized according to previously effective system parameters. Mr. Alex Saschin of the BAAQMD was also notified of system non-compliance on May 20.
j = Contains corrected removal and emission rates and destruction efficiencies.
k = Destruction efficiency based on FID measurements. The BAAQMD requested the measurements to verify that optimization performed on May 20, 1992 was effective.
l = Based on vacuum and flow readings from the 6/10/92 site visit.
m = First day of system operations with the new wells VEW-1 and VEW-2 (installed June 11, 1992) connected to the system as extraction wells.
n = CR-1 and C-5 disconnected from system to optimize TPH removal rate.
o = Engine hours upon system start-up on November 2, 1992.
p = Engine hours immediately prior to system shut down on November 23, 1992.
q = CR-1 reconnected to the system on January 3, 1993.
r = Due to FID malfunction or unavailability, PID was used to measure vapor concentrations.
s = Well gas flow rate estimated based on previous engine data with similar system performance parameters.
t = Vapor concentrations were too high for PID to measure.
u = Unable to calculate actual destruction efficiency due to non-detectable concentrations of TPH-G and benzene.
v = Due to the conservative flow rate measured by the ICE flow sensor, the calculated benzene emission rate is higher than the calculated benzene removal rate. The ICE flow sensor measurement has a considerable margin of error and is used as a very conservative estimate of total system flow to account for the small amount of dilution air added by the engine. Because the calculated emission rate was higher than the removal rate, the destruction efficiency cound not be calculated.
w = FID measurement indicated a negative petroleum hydrocarbon concentration: the measurement for methane was higher than the measurement for total hydrocarbons.
x = The benzene destruction efficiency could not be calculated because the effluent benzene concentration was detected as higher than the influent benzene concentration by the analytic laboratory. This discrepancy may be attributed to normal laboratory error for low concentrations.

TPH-G = total petroleum hydrocarbons as gasoline
NA = FID not functioning
<n = analytic result below detection limit of n.
--- = samples not collected
scfm = standard cubic feet per minute
ppm = parts per million on volume to volume basis

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	Cumulative 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	2,685	3,265
04/14/92	CR-1/C-5	790	5.1	d	2.71					
							1.90	675	1,283	4,548
05/12/92	CR-1/C-5	1,465	2.7	d	1.08					
							2.15	606	1,303	5,851
06/17/92 e	CR-1/C-5	2,071	8.0	d,f	3.21	g				
06/19/92	CR-1/C-5/VEW1/VEW2	2,077	25.6	d	3.75		3.75	6	23	5,874
							3.45	345	1,190	7,064
07/20/92	CR-1/C-5/VEW1/VEW2	2,422	31.0	d	3.15					
							1.80	782	1,408	8,472
08/24/92	VEW-1/VEW-2	3,204	31.4	d	0.45					
							0.68	648	441	8,913
09/21/92	VEW-1/VEW-2	3,852	37.6	d	0.90					
							0.90	548	493	9,406
10/16/92	VEW-1/VEW-2	4,400	40.0	d,h						
11/02/92	VEW-1/VEW-2	4,400	30.2	d,i	3.80		3.80	171	650	10,056
11/09/92	VEW-1/VEW-2	4,571		h						
11/16/92	VEW-1/VEW-2	4,571		j						

— Table 2 continues on next page —

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	Cumulative Total Pounds TPH-G Removed
11/23/92	VEW-1/VEW-2	4,766	35.5 h,j	0.62	0.62	195	121	10,177
					0.31	176	55	10,231
12/15/92	VEW-1/VEW-2	4,942	33.0	0.00				
					0.68	313	213	10,444
01/11/93	VEW-1/VEW-2/CR1	5,255	30.0	1.40				
					0.81	563	456	10,900
02/08/93	VEW-1/VEW-2/CR1	5,818	18.0	0.22				
					0.13	462	61	10,961
03/18/93	VEW-1/VEW-2/CR1	6,280	20.1	0.042				
					0.054	446	24	10,985
04/13/93	VEW-1/VEW-3/CR1/C5	6,726	12.5	0.067				

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 wells.
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.
h = System down upon departure to allow vapors to accumulate in pore spaces.
i = System restarted November 2, 1992. Operation parameters and samples recorded and collected at system stabilization. Removal rate is based on data collected November 2, and is not an interval average.
j = System restarted November 16, 1992. Operation parameters and samples recorded and collected November 23, 1992. Removal rate is based on data collected November 23, and is not an interval average.
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	VEW-1	VEW-2	VEW-3
		<----------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	c	0	0	2.16	NM	0.85	3.12	NM	NM	
07/28/92		0	0	0.51	NM	0	3.41	NM	NM	
08/17/92		0	0	0	0	0	0	NM	NM	
09/15/92		0	0	0	0	0	0	Dry	Dry	
11/02/92		0	0	1.64	0	0	0	Dry	Dry	
11/16/92		NM	NM	1.66	NM	0	1.67	NM	NM	
11/30/92		0	0	1.61	0	0	0.77	Dry	Dry	
12/15/92		0	0	0.8	0	0	0.2	Dry	Dry	
01/04/93		NM	NM	0.6	NM	NM	0	NM	NM	
01/08/93	f	NM	NM	0	NM	NM	0	NM	NM	
01/08/93	g	NM	NM	0	NM	NM	0.01	NM	NM	
01/11/93	h	NM	NM	0.04	NM	NM	0	NM	NM	
01/11/93	i	NM	NM	0.1	NM	NM	0	NM	NM	
01/18/93		0	0	0	0	0	0	NM	NM	
01/25/93		0	0	0	0	0	NM	NM	NM	
02/02/93		NM	NM	0	NM	NM	NM	NM	NM	
02/08/93		0	0	0	0	0	NM	NM	NM	
03/15/93		0	0	0	0	0	0	0	Dry	
04/13/93		0	0	0	0	0	0	0	Dry	0

Notes:

NM = Not Measured
Dry = Attempted to measure depth to water and free product thickness but the well was dry.

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.
c = VEW-1 and VEW-2 installed June 11, 1992 by Groundwater Technology, Concord, California
d = 1.75 gallons separate-phase product were bailed from well CR-1.
e = About 1 gallon separate-phase product was bailed from well CR-1.
f = FP measured before system shut down.
g = FP measured after system shut down.
h = FP measured before system start-up.
i = FP measured after system start-up.

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.: 14344
CLIENT: WEISS ASSOCIATES
CLIENT JOB NO.: 4-582-52

DATE RECEIVED: 04/14/93
DATE REPORTED: 04/15/93
DATE ANALYZED: 04/14/93

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

LAB #	Sample Identification	Concentration (ppm) Gasoline Range
1	SYS-IN	400
2	SYS-OUT	84

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 = 93%: Duplicate RPD = 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

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

LABORATORY NO.: 14344
CLIENT: WEISS ASSOCIATES
CLIENT JOB NO.: 4-582-52

DATE RECEIVED: 04/14/93
DATE REPORTED: 04/15/93
DATE ANALYZED: 04/14/93

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	SYS-IN	600	1800	200	4700
2	SYS-OUT	930	190	ND<65	320

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 = 94% : Duplicate RPD = 2%

Richard Srna, Ph.D.

Laboratory Director

Fax copy of Lab Report and COC to Chevron Contact: ☐ No 14794

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 ST. OAKLAND CA.
Consultant Project Number 4-592-52
Consultant Name WEISS ASSOCIATES
Address 5500 SHELL MOUND ST. EMERYVILLE, CA.
Project Contact (Name) TOM BERRY
(Phone) 450-6122 (Fax Number) (510) 547-5043

Chevron Contact (Name) NANCY VUKELICH
(Phone) (510) 842-9581
Laboratory Name GTEL
Laboratory Release Number 3523000
Samples Collected by (Name) (RRM) RUDY R. MARQUEZ
Collection Date 4/13/93
Signature Rudy 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
								Analyses To Be Performed												
SYS-IN		1	A	G	1800	NONE	N	X												
SYS-OUT		1	A	G	18:00	↓	↓	↓												

RUSH

Please initial:
Samples Stored in Ice. RP
Appropriate containers. MT
Samples preserved. MA
VOA's without headspace. MA
Comments:

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Rudy R. Marquez	W.A.	4/14/93	Ronald C. Jensen	Weiss assoc.	4/14/93
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Ronald C. Jensen	Weiss assoc.	4/14/93 13:08	John Wells	GTEL	4/14 13:08
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
John Wells	GTEL	4/14 14:35			4/14/93 1530

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

LOCKED IN SECURE AREA Relinquished [illegible] 4/14 7:00 PM

COC-3.DWG/03 91/HCH

ATTACHMENT B

SAMPLE EMISSION CALCULATIONS

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:

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

For TPH-G and benzene:

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

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

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:

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

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