



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

94583-0804

Operations

February 26, 1993

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

478

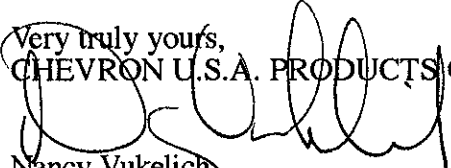
**Re: Former Chevron Service Station #9-4816
301 14th Street, Oakland**

Dear Ms. Eberle:

Enclosed we are forwarding the Bimonthly Progress Report dated February 22, 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 December 1, 1992 to January 31, 1993. During this period approximately 268 lbs. of hydrocarbons have been removed. Cumulative to date, approximately 10,434 lbs. of hydrocarbons (approximately 1,581 gallons) have been recovered. The system is temporarily shut down for minor repairs. Concentration levels will be field measured from each of the four (4) extraction points during re-startup to assess recovery levels at these areas. We will also evaluate installation of an additional extraction well northeast of the treatment enclosure to increase effectiveness in this area.

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 Hiatt, RWQCB
Mr. Thomas Berry, Weiss Associates
Mr. R.W. Cosby, 225/1936
Ms B.C. Owen
File (9-4816-7)

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

when was it shut down?
late Feb.
when will it restart?
this wk



FEB 23 '93 J.M.M.

February 22, 1993

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

Re: Bi-monthly Progress Report
December 1992 through January 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 SVE and treatment system consists of an internal combustion engine (ICE) which presently extracts vapors from wells VEW-1, VEW-2 and CR-1 (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 where they 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 versus time. We estimate that as of January 11, 1993, about 10,434 lbs (1,581 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 3,400 ppmv since mid-March 1992. Benzene concentrations have declined from 1,800 to 37 ppmv. The analytical reports and chain-of-custody forms for December 1992 and January 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.

To maximize vapor extraction efficiency and cost effectiveness, WA continued cyclic operation through mid-January 1993. WA operated the system for one week and then shut it down for a week, allowing hydrocarbon concentrations to diffuse from ground water and/or soil to soil vapor. When the system was restarted, increased vapor concentrations resulted in an improved hydrocarbon removal rate and a decrease in supplementary fuel consumption.

WA shut the SVE system down from December 7 to 15, December 21 to 28, December 31 to January 3, and January 8 to 11 for cyclic operation. Analytic results from influent vapor samples collected December 15, immediately following system start up, indicated non-detectable TPH-G concentrations, despite the presence of separate-phase product in wells CR-1 and C-3. This anomaly may have been caused by high ambient humidity and increased soil moisture due to extensive rain. Analysis of samples collected January 11, immediately following system start up, indicated that influent vapor concentrations had increased to 3,400 ppmv.

The system also shut down on December 16, 1992, when the water knockout drum filled to capacity. We restarted the system less than 16 hours later.

Because separate-phase hydrocarbons have been consistently detected in well CR-1, WA reconnected well CR-1 to the system January 3. As a result, system flow rates have decreased slightly, and influent TPH-G concentrations have increased to 3,400 ppmv.

In conjunction with vapor stream monitoring, WA measured separate-phase hydrocarbon thicknesses in onsite wells. These measurements are presented in Table 3. During December and January, separate-phase hydrocarbons were detected in wells C-3 and CR-1 at maximum thicknesses of 0.8 and 0.2 ft, respectively. Separate-phase hydrocarbons have not been measured in any onsite wells since January 11.

Nancy Vukelich
February 22, 1993

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Weiss Associates



As required, WA will continue monthly monitoring and bi-monthly reporting. Please call if you have any questions or require additional information.

Sincerely,
Weiss Associates

Kimberly Ohara
Staff Engineer

Thomas R. Berry
Project Geologist

TRB:kao
C:\KAO\582L3FES.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 - 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

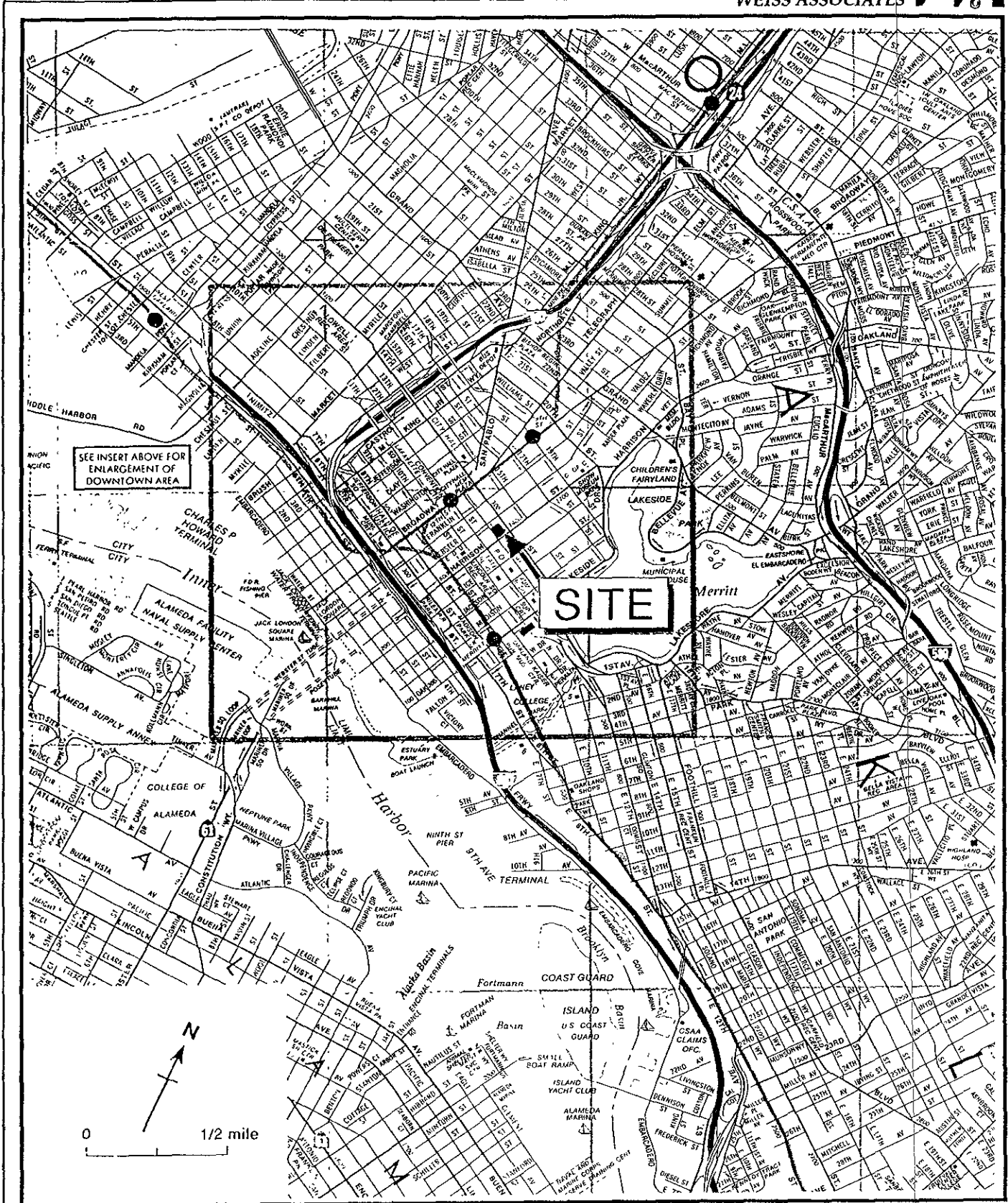


Figure 1. Site Location Map - Former Chevron Service Station #9-4816, 301 14th Street, Oakland, California

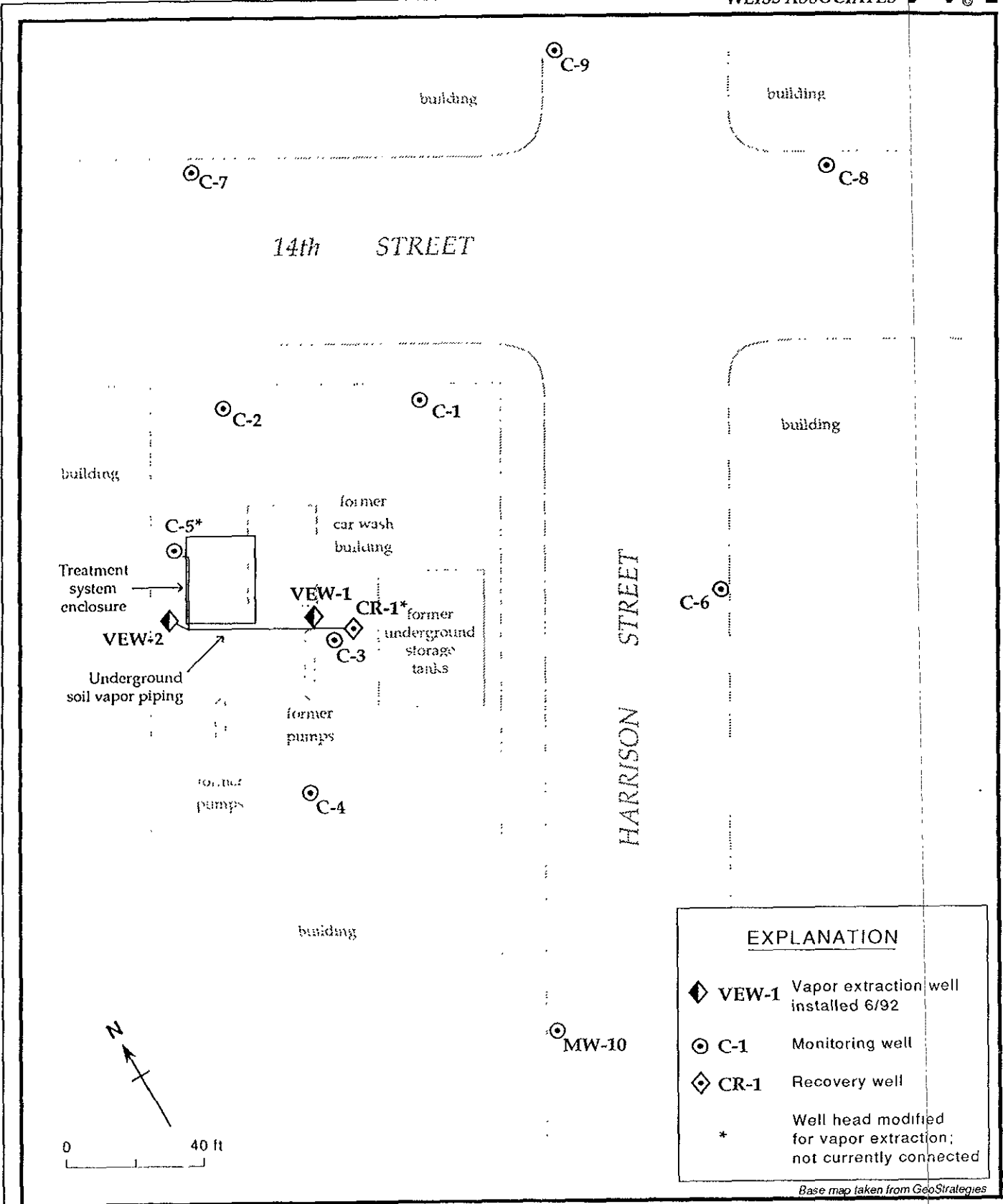


Figure 2. Monitoring and Extraction Well Locations - Former Chevron Service Station #9-4816, 301 14th Street, Oakland, California

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

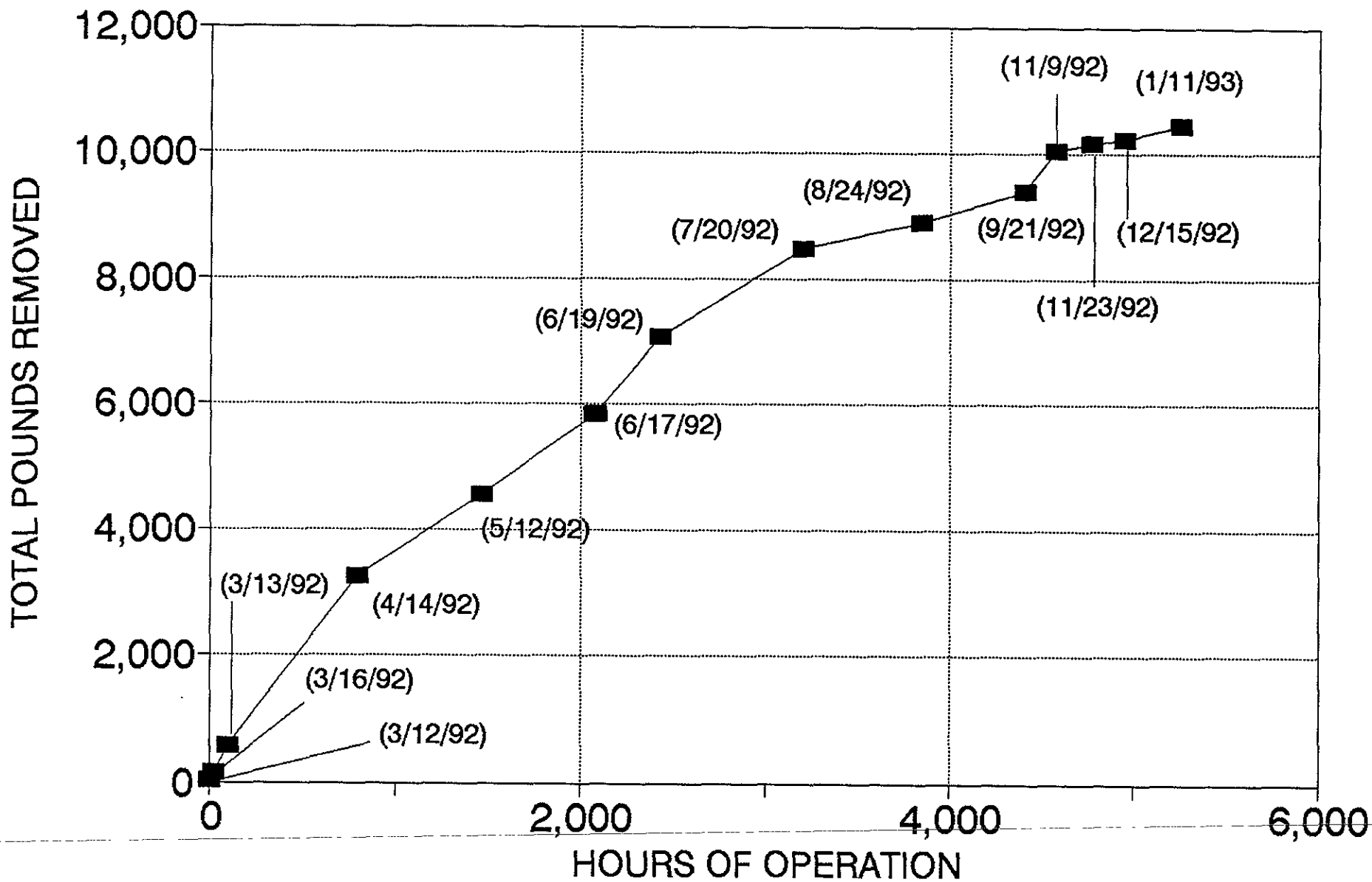


Figure 4. INFLUENT CONCENTRATIONS
Former Chevron SS#9-4816

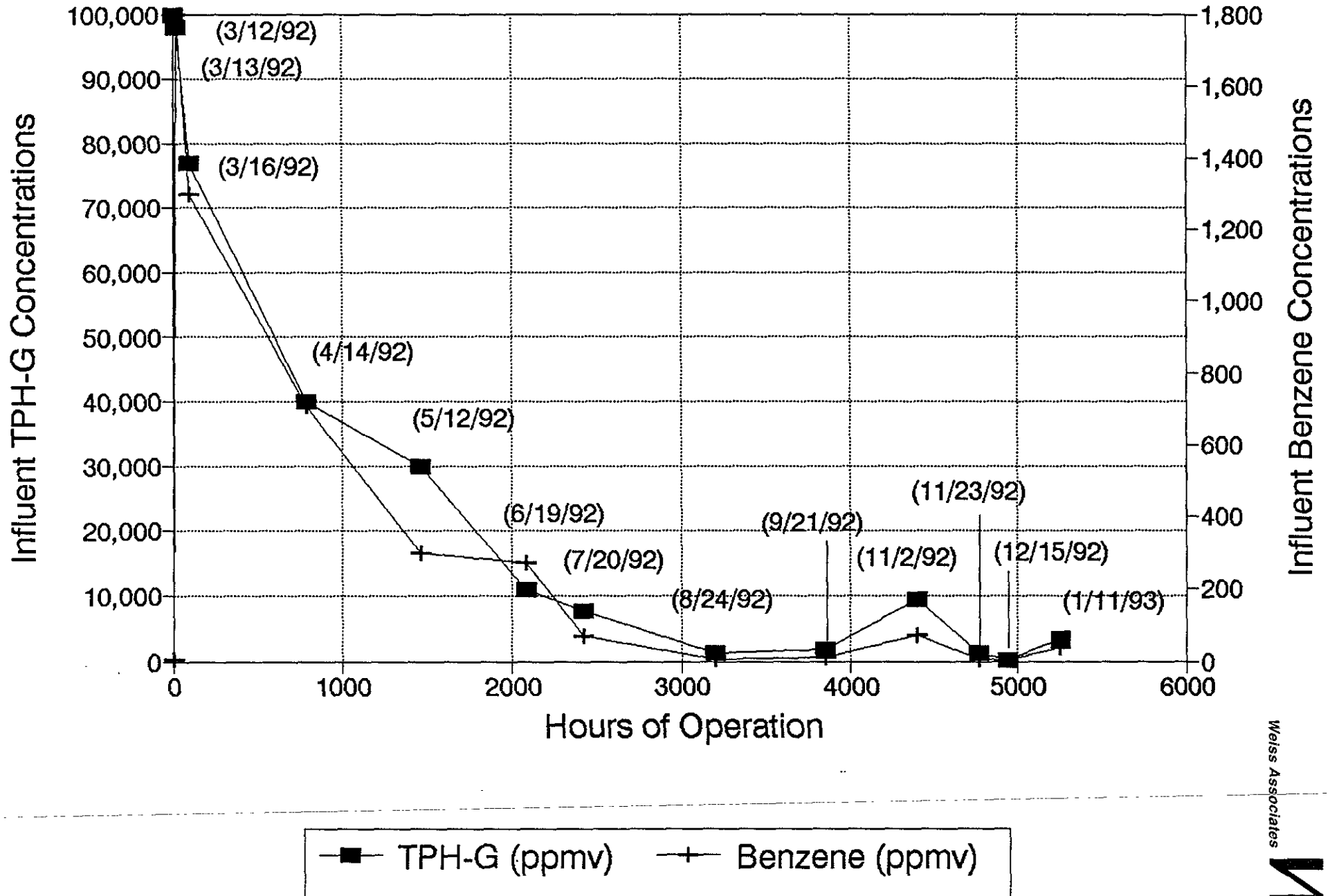
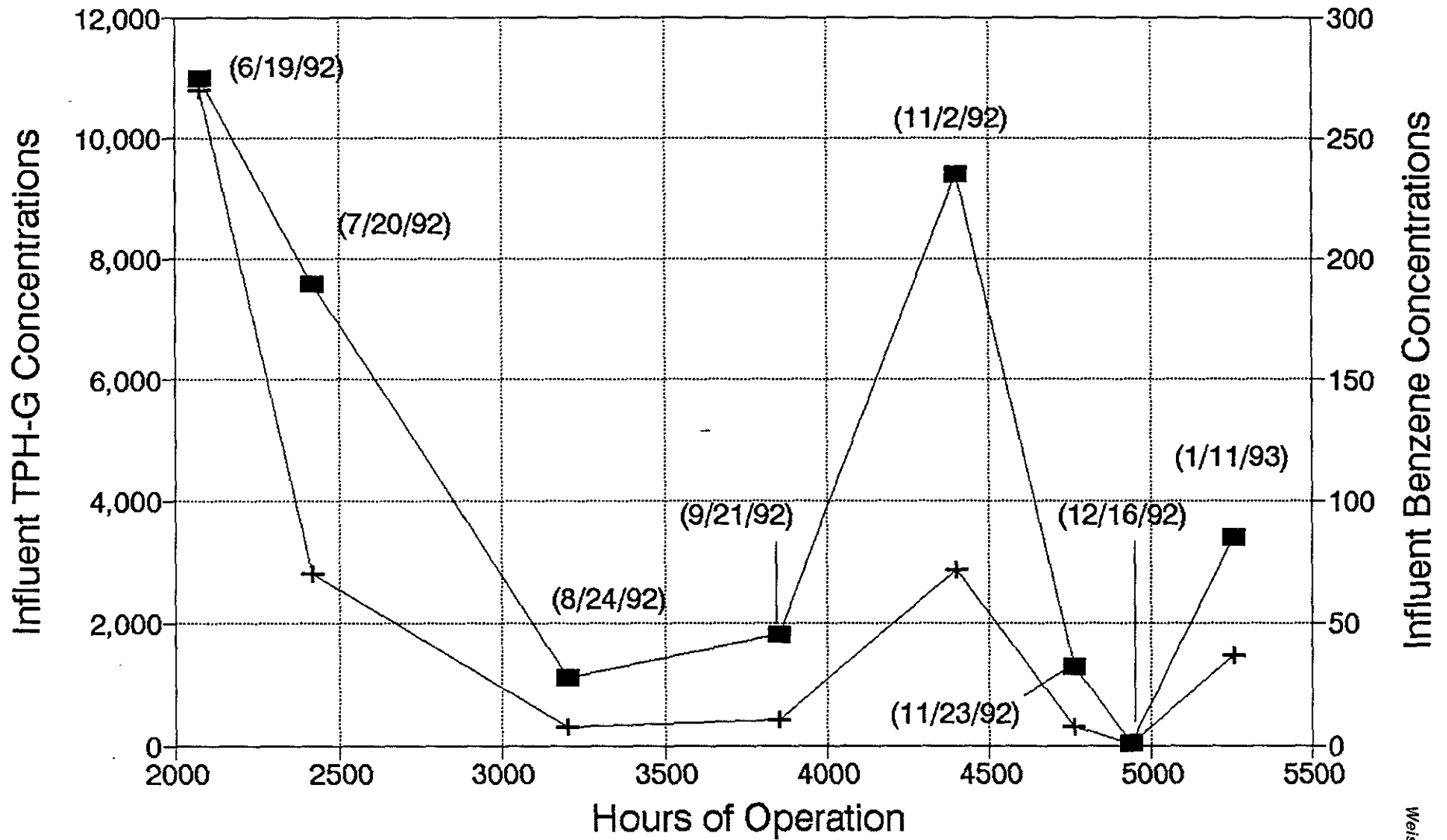


Figure 5. INFLUENT CONCENTRATIONS
Former Chevron SS#9-4816



TPH-G (ppmv)
 Benzene (ppmv)

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		
						FID c	TPH-G	Benzene	FID c	TPH-G	Benzene
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/VEW2	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/VEW2	2,422	31	h	72.0	900	7,600	70	22	31	0.33
08/10/92	CR-1/C-5/VEW1/VEW2	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 o	30.2	h	63.0	1,330	9,400	72	100	<30	<0.085
11/23/92	VEW-1/VEW-2	4,764 p	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	---	---	---	---	---

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

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

Date	Well ID a	Removal Rate (#/Day) d		Emission Rate (#/Day) e		Destruction Efficiency(%)	
		TPH-G	Benzene	TPH-G	Benzene	TPH-G	Benzene
03/12/92	CR-1/C-5	157	<0.06	<0.33	<0.0009	>99.80 g	>85.80 g
03/13/92	CR-1/C-5	154	2.6	<0.26	<0.0006	>99.80 g	>99.98 g
03/16/92	CR-1/C-5	121	1.9	<0.26	0.0009	>99.80 g	99.95
04/14/92	CR-1/C-5	65	1.1	<0.38	0.0062	>99.40 g	99.40
05/12/92	CR-1/C-5	26	0.24	7.1	0.12	72.60	50.00 i, j
05/26/92	CR-1/C-5					99.93 k	
06/17/92	CR-1/C-5						
06/19/92	CR-1/C-5/VEW1/VEW2	90	2.0	<0.74	0.014	99.20	99.30
07/20/92	CR-1/C-5/VEW1/VEW2	76	0.63	0.72	0.0069	99.00	98.90
08/10/92	CR-1/C-5/VEW1/VEW2						
08/10/92	VEW-1/VEW-2 n						
08/17/92	VEW-1/VEW-2						
08/24/92	VEW-1/VEW-2	11	0.071	<0.65	0.0030	>94.1 g	95.8
08/31/92	VEW-1/VEW-2					98.9	
09/08/92	VEW-1/VEW-2					98.9	
09/21/92	VEW-1/VEW-2	21.7	0.11	<0.76	<0.0019	>96.5 g	>98.3 g
11/02/92	VEW-1/VEW-2	91.1	0.63	<0.61	<0.0016	>99.3 g	>99.7 g
11/23/92	VEW-1/VEW-2	14.8	0.078	<0.72	<0.0018	>95.1 g	>97.7 g
12/07/92	VEW-1/VEW-2						
12/15/92	VEW-1/VEW-2	<0.32	<0.00082	<0.70	<0.0018	u	u
01/11/93	VEW-1/VEW-2/CR1	32.7	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

--Table 1 continues next page--

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

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 = 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 measurements were collected as requested by the BAAQMD to verify that the system 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, PID was used to measure vapor concentrations.
- s = Flow rate estimated based on previous engine data with similar system performance parameters.
- t = Vapor concentrations measured with PID were too high for instrument to measure.
- u = Unable to calculate destruction efficiency due to non-detectable concentrations of TPH-G and benzene.

DEFINITIONS:

- = Samples not collected
- SCFM = Standard cubic feet per minute.
- ppmv = Parts per million on volume to volume basis.
- TPH-G = Total purgeable hydrocarbons as gasoline.
- NA = FID not functioning
- <n = Analytic result below detection limit of n.

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
03/13/92	CR-1/C-5	23	4.9	c	6.42	6.48	18	117	150
03/16/92	CR-1/C-5	98	4.9	c	5.04	5.73	75	430	580
04/14/92	CR-1/C-5	790	5.1	d	2.71	3.88	692	2,685	3,265
05/12/92	CR-1/C-5	1,465	2.7	d	1.08	1.90	675	1,283	4,548
06/17/92 e	CR-1/C-5	2,071	8.0	d,f	3.21	2.15	606	1,297	5,845
06/19/92	CR-1/C-5/VEW1/VEW2	2,077	25.6	d	3.75	3.75	6	23	5,868
07/20/92	CR-1/C-5/VEW1/VEW2	2,422	31.0	d	3.15	3.45	345	1,190	7,058
08/24/92	VEW1/VEW2	3,204	31.4	d	0.45	1.80	782	1,408	8,465
09/21/92	VEW1/VEW2	3,852	37.6	d	0.90	0.68	648	437	8,903
10/16/92	VEW1/VEW2	4,400	40.0	d,h		0.90	548	493	9,396
11/02/92	VEW1/VEW2	4,400	30.2	d,i	3.80	3.80			9,396
11/09/92	VEW1/VEW2	4,571		h			171	650	10,046
11/16/92	VEW1/VEW2	4,571		j					
11/23/92	VEW1/VEW2	4,766	35.5	h,j	0.62	0.62	195	121	10,167
12/15/92	VEW1/VEW2	4,942	33.0		0.00	0.31	176	55	10,221
01/11/93	VEW1/VEW2/CR1	5,255	30.0		1.4	0.68	313	213	10,434

--- Table continued on next page ---

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

Notes and Definitions:

- 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.
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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
<-----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	d	NM
11/30/92	0	0	1.61	0	0	0.77	e	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	d	NM
01/08/93 g	NM	NM	0	NM	NM	0.01	d	NM
01/11/93 h	NM	NM	0.04	NM	NM	0	d	NM
01/11/93 i	NM	NM	0.1	NM	NM	0	d	NM
01/18/93	0	0	0	0	0	0	NM	NM
01/25/93	0	0	0	0	0	NM	NM	NM

Notes and Definitions:

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 1 • 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.: 13883
CLIENT: Weiss Associates
CLIENT JOB NO.: 4-582-51

DATE RECEIVED: 12/16/92
DATE REPORTED: 12/18/92
DATE ANALYZED: 12/17/92

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

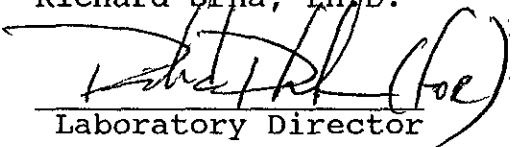
LAB #	Sample Identification	Concentration (ppm) Gasoline Range
1	122-INF	ND<30
2	122-EFF	ND<30

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 = 99%: 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.: 13883
CLIENT: Weiss Associates
CLIENT JOB NO.: 4-582-51

DATE RECEIVED: 12/16/92
DATE REPORTED: 12/18/92
DATE ANALYZED: 12/17/92

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	122-INF	ND<85	ND<250	ND<65	ND<250
2	122-EFF	ND<85	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 = 103%: Duplicate RPD = <3%

Richard Srna, Ph.D.


Laboratory Director

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 4-582-51
Consultant Name WEISS ASSOCIATES
Address 5500 SHELLMOUND ST.
Project Contact (Name) THOMAS BERRY
(Phone) (510) 547-5420 (Fax Number)

Chevron Contact (Name) NANCY VUKELICH VUKELICH
(Phone) (510) 842-9581
Laboratory Name SUPERIOR PRECISION ANALYTICAL
Laboratory Release Number 3523000
Samples Collected by (Name) RONALD C. JENSEN
Collection Date 12/15/92
Signature Ronald C. Jensen

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										Remarks			
								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)						
122-INF		1	A	G	16:15	NONE	N	X													
122-EFF		↓	↓	↓	16:05	↓	↓	↓													

Please initial:

Samples Stored in ice. NO

Appropriate containers. Yes

Samples preserved. NO

VOA's without headspace. N/A

Comments: _____

→ STORED IN SECURE AREA OVERNIGHT.

Relinquished By (Signature) <u>Ronald C. Jensen</u>	Organization <u>Weiss Assoc</u>	Date/Time <u>12/16/92</u>	Received By (Signature) <u>Joujann</u>	Organization <u>Weiss</u>	Date/Time <u>12/16/92</u>	Turn Around Time (Circle Choice) 24 Hrs. 48 Hrs. 5 Days 10 Days <u>As Contracted</u>
Relinquished By (Signature) <u>Joujann</u>	Organization <u>Weiss</u>	Date/Time <u>12/16/92 10:50</u>	Received By (Signature) <u>Kugler</u>	Organization <u>AERO</u>	Date/Time <u>12-16-92 10:55</u>	
Relinquished By (Signature) <u>Kugler</u>	Organization <u>AERO</u>	Date/Time <u>12-16-92 11:55</u>	Received For Laboratory By (Signature) <u>Celia Joujann</u>		Date/Time <u>12/16/92 11:55</u>	

COC-3.DWG/03/91/HCL



Superior Precision Analytical, Inc.

1555 Burke, Unit 1 • 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.: 13979
CLIENT: Weiss Associates
CLIENT JOB NO.: 4-582-51

DATE RECEIVED: 01/11/93
DATE REPORTED: 01/12/93
DATE ANALYZED: 01/11/93

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

LAB #	Sample Identification	Concentration (ppm) Gasoline Range
1	013-INF	3400
2	013-EFF	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 = 103%: Duplicate RPD = 1%

Richard Srna, Ph.D.

Cecilia G. Janguir (for)
Laboratory Director



Superior Precision Analytical, Inc.

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

LABORATORY NO.: 13979
CLIENT: Weiss Associates
CLIENT JOB NO.: 4-582-51

DATE RECEIVED: 01/11/93
DATE REPORTED: 01/12/93
DATE ANALYZED: 01/11/93

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	013-INF	37000	57000	4900	39000
2	013-EFF	320	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 = 91% : Duplicate RPD = 1%

Richard Srna, Ph.D.

Cecilia G. Jorgensen (for)
Laboratory Director

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 4-582-51
 Consultant Name WEISS ASSOCIATES
 Address 5500 SHELLMOUND ST.
 Project Contact (Name) THOMAS BERRY
 (Phone) (510) 547-5420 (Fax Number)

Chevron Contact (Name) NANCY VUKELICH VUKELICH
 (Phone) (510) 842-9581
 Laboratory Name SUPERIOR PRECISION ANALYTICAL
 Laboratory Release Number 3523000
 Samples Collected by (Name) RONALD C. JENSEN
 Collection Date 1/11/93
 Signature Ronald C. Jensen

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)	Analytes To Be Performed											Remarks			
								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)							
013-INF		1	A	G	12:54	NONE	N	X														
013-EFF		1	A	G	12:48	NONE	N	X														

Please Initial:

Samples Stored in Ice NO

Appropriate containers NO

Sample NO

VIA's NO

Comments [Signature]

Relinquished By (Signature) <u>Ronald C. Jensen</u>	Organization <u>Weiss Assoc</u>	Date/Time <u>1/11/93 14:00</u>	Received By (Signature) <u>[Signature]</u>	Organization <u>Petro</u>	Date/Time <u>1/11/93</u>	Turn Around Time (Circle Choice) 24 Hrs. 48 Hrs. 5 Days 10 Days <u>As Contracted</u>
Relinquished By (Signature) <u>[Signature]</u>	Organization <u>Petro</u>	Date/Time <u>1/11/93</u>	Received By (Signature) <u>[Signature]</u>	Organization	Date/Time	
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature) <u>Nancy Pettit</u>		Date/Time <u>1/11/93 1400</u>	

COC-3.DWG/03.91/HCH

ATTACHMENT B
SAMPLE EMISSION CALCULATIONS

SAMPLE EMISSION CALCULATIONS

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

Weiss Associates



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:

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

For TPH-G and benzene:

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

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

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:

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

where

- T_F = temperature of air in $^{\circ}\text{F}$,
- $520 = 460 + 60^{\circ}\text{F} = \text{standard temperature rankine, and}$
- $\text{psig} = \frac{\text{inches of water pressure (negative)}}{2.77 \text{ inches of water / 1 psi}}$

So the effluent flow rate is:

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

For TPH-G and benzene:

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

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

Destruction Efficiency

The equation for destruction efficiency is:

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

For TPH-G and benzene:

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

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