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INTERTEC

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Engineers and Scientists Serving the Built and Natural Environments®

August 28, 1997

Project No. CMXX-95-0157

Mr. John McDermott
Capsule Environmental Engineering, Inc.
1970 Oakcrest Avenue, Suite 215
St. Paul, MN 55113

Dear Mr. McDermott:

Re: SVE System Operating Results and Closure Recommendation, Ingersoll-Rand Equipment Sales, 1944 Marina Boulevard, San Leandro, California

Introduction

The purpose of this letter is to summarize the operating results of the soil vapor extraction (SVE) system installed at the Ingersoll-Rand Equipment Sales (IRES) facility located at 1944 Marina Boulevard, San Leandro, California. Based upon the observed operating results, it appears that the SVE system has accomplished its goal of remediating gasoline-impacted "source" soils at the site; therefore, closure and abandonment of the SVE system is recommended.

Background

In 1991, a SVE system consisting of one regenerative vacuum blower and four vent wells VW-1 through VW-4 were installed at the site and operated for several months. System operation was discontinued when water levels rose and the system collected condensate. It is reported that 800 pounds (approximately 143 gallons) of product was removed from vent well VW-3 during initial operation. Vent well VW-3 is located within the area that had formerly contained gasoline-impacted (source) soils associated with a former 5,000 gallon unleaded gasoline underground storage tank (UST).

In late 1994, five additional SVE vent wells VW-5 through VW-9 were installed. These vent wells were installed to provide the SVE system with flexibility in vacuum configuration over a larger area including the downgradient property boundary.

In May 1995, SVE testing was conducted on all vent wells except VW-2, which was buried and could not be located. The testing results were used as the basis for a redesign of the SVE system. Construction of the redesigned system began in mid-September and was completed in early October. The original regenerative vacuum blower, connected to vent wells VW-1, VW-4, VW-5 and VW-9, comprised the redesigned system. The extracted soil vapors are routed through three vapor-phase granular activated carbon (GAC) vessels prior to discharge to the atmosphere. Figure 1 depicts the layout of the SVE system at the site.

Operating Results

The redesigned SVE system became operational during October 1995. Since then, the system has generally been operated during the normal 5 day work week when facility personnel are available to perform permit-required daily air monitoring of the system emissions.

As required by the Bay Area Air Quality Management District air emission permit, system monitoring has included the collection of daily organic vapor readings. Readings are obtained between the regenerative blower and the first carbon vessel, between the carbon vessels, and from the system exhaust to the atmosphere. The readings, which are taken with a photoionization detector meter (PID), are presented in Table 1. A graph of the PID readings taken between the system blower and the first carbon vessel (extracted soil vapors prior to treatment) versus time is included as Figure 2.

Periodically, samples of the extracted soil vapors have been collected for laboratory analysis of benzene, ethyl benzene, toluene, xylenes (BETX) and total hydrocarbons (THC) as gasoline. Samples were collected on October 3, 1995, October 16, 1996 and June 12, 1997. The samples were collected from a sample port located between the regenerative blower and the first carbon vessel, and are therefore representative of the gasoline constituent concentrations in the extracted soil vapor prior to treatment through the carbon vessels. Laboratory analytical results are summarized in Table 2. THC as gasoline analytical results versus time are also presented in Figure 2. Complete laboratory reports are attached.

During the laboratory sample collection events, field readings of oxygen, carbon dioxide and organic vapor concentration, and vacuum/pressure, velocity and temperature of the system air flow were also measured. These measurements were generally obtained on the extracted soil vapors from each individual vent well, after the regenerative blower, between each of the three carbon vessels, and from the system exhaust to the atmosphere. These results are presented in Table 3.

Discussion

PID readings at the blower have declined from a high of 177 parts per million (ppm) after the startup of the redesigned system on October 3, 1995 to zero ppm currently. Blower PID readings, which have been at zero ppm since November 7, 1996, have reached asymptotic levels beyond which further significant reduction is not expected.

THC as gasoline analytical results of extracted soil vapor samples collected at the blower have declined from 880,000 $\mu g/m^3$ at system startup on October 3, 1995 to 4,200 $\mu g/m^3$ on June 12, 1997. Based upon the analytical results and air flow measurements taken at the time of sampling, the gasoline constituent mass removal rates for the SVE system were 1.58, 0.22 and 0.0075 gallons of gasoline per day on October 3, 1995, October 16, 1996 and June 12, 1997, respectively. The total gasoline constituent mass removed via vapor extraction during the period October 3, 1995 through August 8, 1997 is calculated to be approximately 153 gallons of gasoline. Calculations are attached.

An additional significant amount of gasoline, the mass of which has not been estimated, has most likely been degraded in-situ by SVE enhancement of natural aerobic degradation processes. SVE systems typically enhance aerobic degradation of petroleum products by replenishing oxygen to the impacted subsurface unsaturated zones. Oxygen depletion is typically the primary limiting factor with respect to the rate of aerobic degradation at petroleum leak sites.

Oxygen concentrations at the blower have increased from 16.5 percent on October 4, 1995 to 20.2 percent on June 12, 1997, while carbon dioxide concentrations have correspondingly decreased from 3.0 to 0.45 percent. Further significant in-situ gasoline constituent degradation by operating the SVE system to provide oxygen enhancement is not expected.

Conclusions

Based upon monitoring and operating results obtained from the SVE system over time, it appears that the SVE system has effectively remediated petroleum-impacted soils in the unsaturated zone above the water table as intended. Further operation of the system is not expected to significantly reduce residual gasoline constituent concentrations remaining in the unsaturated soil zone. Residual gasoline constituent levels, which do not appear to pose any significant health risk or environmental risk, should diminish over time due to natural biodegradation processes.

Recommendations

Braun Intertec recommends that operation of the SVE system be terminated and that the system be dismantled/abandoned in accordance with state and local requirements.

If you have any questions concerning this information, please call us at (612) 683-8700.

Sincerely,

Chris D. McElligott

Christopher D. McElligott, P.E.
Senior Remediation Engineer

Gerald E. Stuth

Gerald E. Stuth, P.E.
Senior Project Manager

Attachments:
Figures 1 and 2
Tables 1 through 3
Laboratory Reports, Numbers 95-3176, 96-3634 and 97-2112
Mass Removal Calculations

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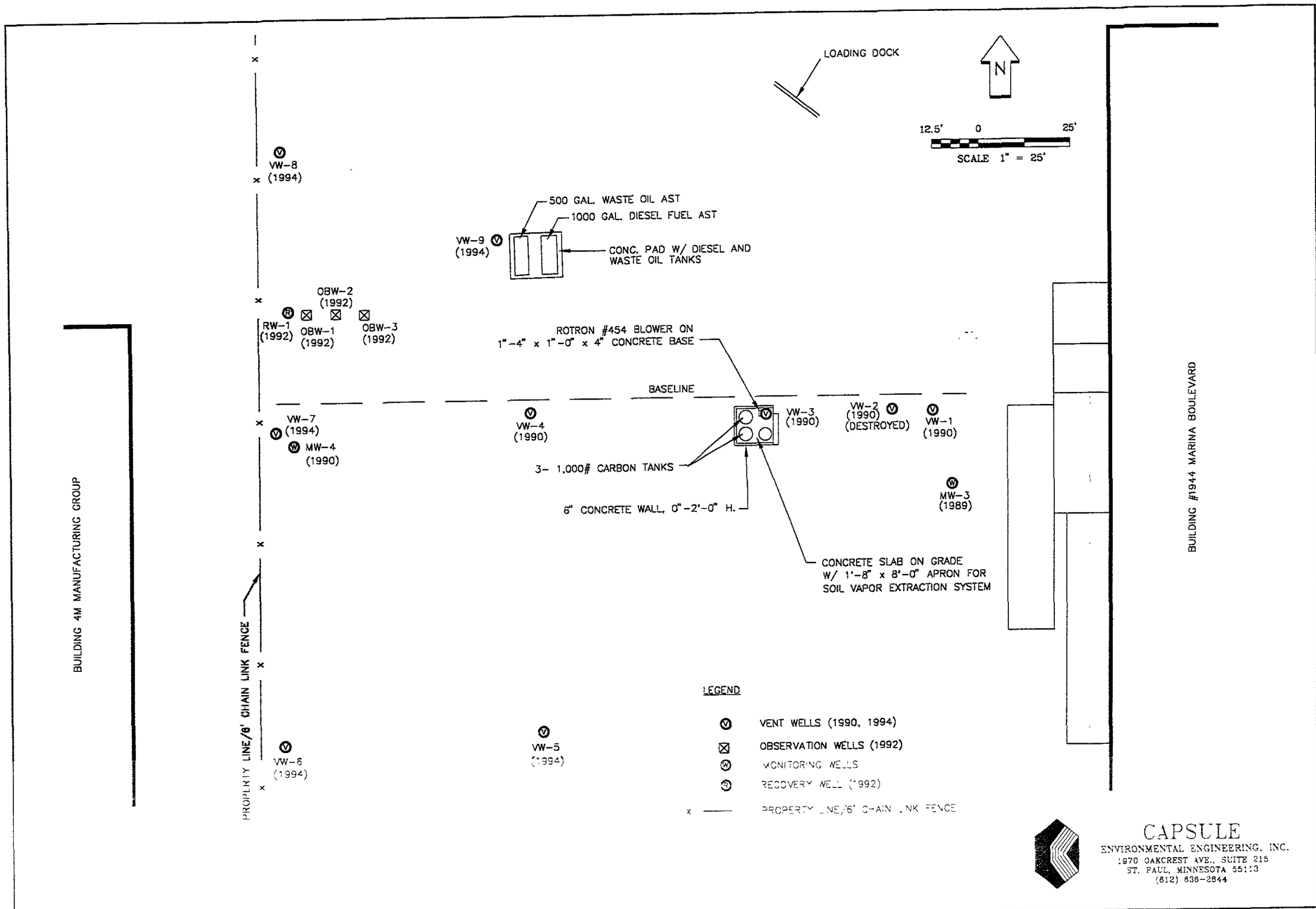

CAPSULE
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BRAUN INTERTEC

VENT WELL PLAN
INGERSOLL-RAND EQUIPMENT SALES
1944 MARINA BOULEVARD
SAN LEANDRO, CALIFORNIA

INT	LOI	DATE	05-23-95
DRAWN BY	GLS		08-11-97
APP'D BY		JOB No	CMXX 95-0157
DWG No	MX5015/18	SHEET	OF
SCALE	1" = 25'		

FIGURE NO.

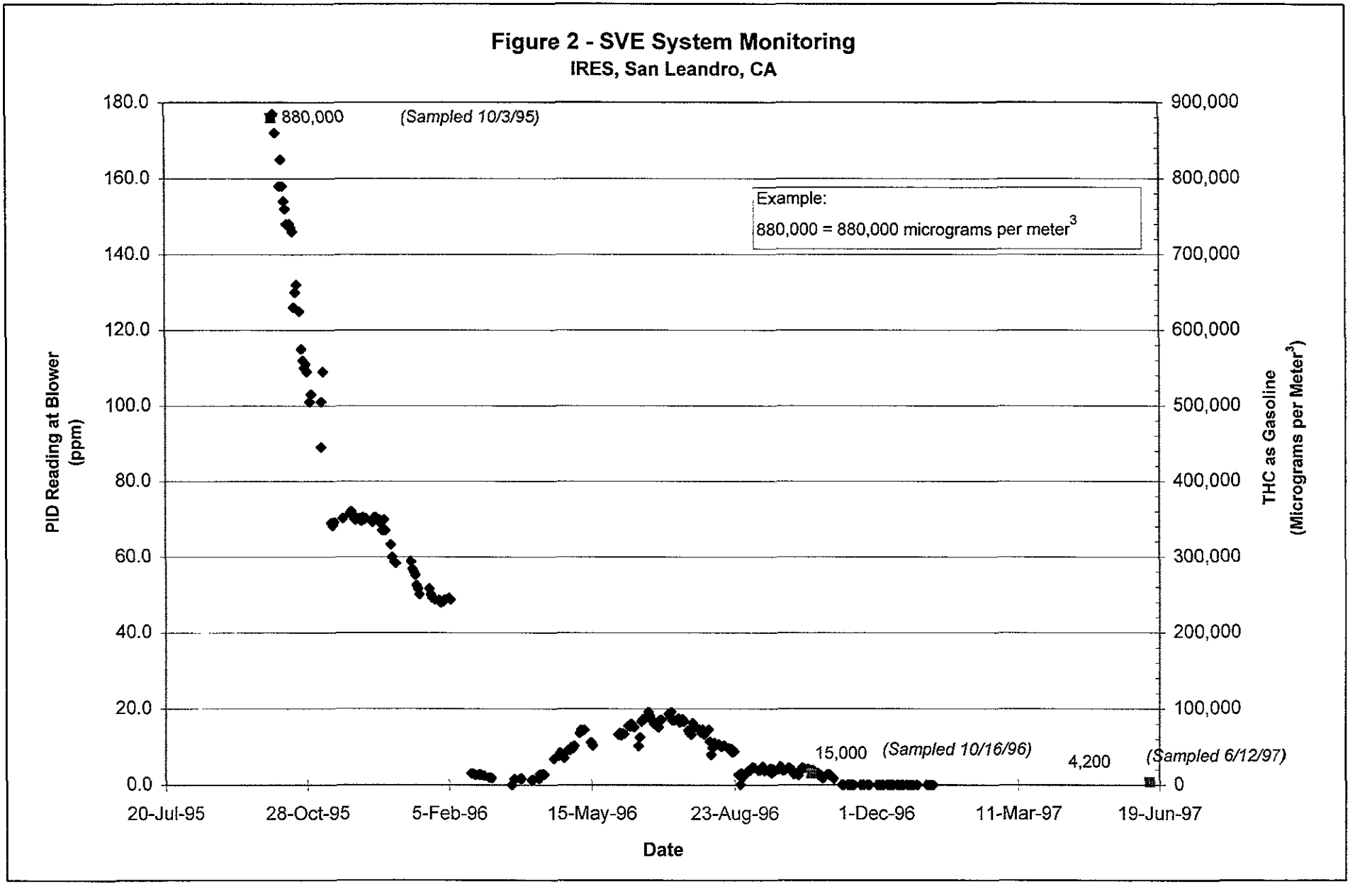
Figure 2 - SVE System Monitoring
IRES, San Leandro, CA
880,000
(Sampled 10/3/95)
Example:
880,000 = 880,000 micrograms per meter3
15,000
(Sampled 10/16/96)
4,200
(Sampled 6/12/97)
PID Reading at Blower (ppm)
THC as Gasoline (Micrograms per Meter3)
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
20-Jul-95
28-Oct-95
5-Feb-96
15-May-96
23-Aug-96
1-Dec-96
11-Mar-97
19-Jun-97
Date

Table 1 **Record of Daily Monitoring** **Soil Vapor Extraction System** **IRES, San Leandro, CA**

Note: Photoionization detection (PID) readings, in ppm, using OVM 580M

Date	Time	Blower/ Vessel #1	Vessel #1/ Vessel #2	Vessel #2/ Vessel #3	Vessel #3/ Exhaust	Comments
10/5/95	4:00 PM	177.0	1.1	0.3	0.0	
10/6/95	3:30 PM	172.0	1.1	0.0	0.0	
10/9/95	3:00 PM	158.0	1.9	0.3	0.0	
10/10/95	6:00 AM	165.0	1.9	0.3	0.0	
10/11/95	8:00 AM	158.0	1.9	0.3	0.0	
10/12/95	5:00 PM	154.0	1.1	0.3	0.0	
10/13/95	4:45 PM	152.0	1.9	0.3	0.0	
10/14/95	11:00 AM	148.0	1.9	0.3	0.0	
10/16/95	12:00 PM	148.0	1.9	0.3	0.0	
10/17/95	1:25 PM	147.0	1.3	0.3	0.0	
10/18/95	12:00 PM	146.0	1.2	0.3	0.0	
10/19/95	5:00 PM	126.0	1.9	0.3	0.0	
10/20/95	5:00 PM	130.0	1.9	0.4	0.0	
10/21/95	7:39 AM	132.0	1.5	0.4	0.0	
10/22/95						Sunday off
10/23/95	8:25 AM	125.0	2.3	0.3	0.0	
10/24/95	12:00 PM	115.0	1.9	0.2	0.0	
10/25/95	5:00 PM	112.0	2.3	0.1	0.0	
10/26/95	12:00 PM	110.0	2.4	2.2	1.2	
10/27/95	12:00 PM	111.0	2.3	2.2	1.2	
10/28/95	3:30 PM	109.0	2.7	2.2	1.7	
10/30/95	5:00 PM	101.0	2.6	3.1	3.0	
10/31/95	1:00 PM	103.0	2.6	3.5	2.6	
11/1/95						
11/7/95		89.0	2.0	0.2	0.0	with Toxi RAE
11/7/95		101.0	2.7	2.6	1.0	with Toxi RAE
11/8/95		109.0	2.8	0.5	3.0	with Toxi RAE
11/9/95						Shut down 11-9 to 11-14 to test meter
11/14/95		69.0	0.8	0.2	0.2	with Mini RAE
11/15/95		68.2	0.6	0.4	0.2	with Mini RAE
11/16/95		69.1	0.8	0.4	0.2	outside = 12.0
11/17/95						shut down 11-17 to 11-22 to test meters
11/22/95		70.2	0.7	0.4	0.2	outside = 2.0
11/23/95						shut off 11-23 to 11-27 for holiday
11/27/95	3:00 PM	71.5	0.8	0.6	0.3	outside = 2.1
11/28/95	5:00 PM	72.0	0.7	0.4	0.2	outside = 2.0
11/29/95	8:25 AM	71.1	0.8	0.4	0.2	outside = 2.1
11/30/95	4:15 PM	70.2	0.8	0.5	0.1	outside = 2.0
12/1/95	5:25 PM	69.8	0.6	0.4	0.2	outside = 2.1
12/2/95	1:52 PM	70.2	0.8	0.4	0.1	outside = 2.0
12/4/95	4:00 PM	70.2	0.9	0.5	0.2	outside = 2.5
12/5/95	5:00 PM	69.5	0.8	0.6	0.2	outside = 2.6
12/6/95	5:00 PM	70.5	0.7	0.4	0.2	outside = 2.4
12/7/95	12:50 PM	69.8	0.8	0.5	0.1	outside = 2.5
12/8/95	5:00 PM	70.2	0.7	0.4	0.2	outside = 2.4
12/13/95	12:25 PM	69.2	0.9	0.6	0.2	outside = 2.6
12/14/95	5:00 PM	70.3	0.8	0.4	0.2	outside = 2.5
12/15/95	5:00 PM	70.5	0.9	0.6	0.3	outside = 2.2
12/18/95	5:00 PM	69.8	1.7	0.3	0.0	
12/19/95	4:30 PM	68.8	1.6	0.2	0.0	
12/20/95	12:25 PM	67.0	1.3	0.5	0.0	
12/21/95	11:30 AM	69.8	1.7	0.7	0.1	
12/22/95	2:30 PM	67.0	2.3	0.2	0.0	
12/26/95	3:35 PM	63.2	1.3	0.1	0.0	
12/27/95	4:10 PM	59.9	0.8	0.1	0.0	
12/28/95	5:00 PM	58.7	0.6	0.0	0.0	
12/29/95	5:10 PM	58.3	0.4	0.0	0.0	
12/30/95						Shut down 12-30 to 1-9 no one to monitor

Table 1 (continued) Record of Daily Monitoring Soil Vapor Extraction System IRES, San Leandro, CA

Date	Time	Blower/ Vessel #1	Vessel #1/ Vessel #2	Vessel #2/ Vessel #3	Vessel #3/ Exhaust	Comments
1/9/96		58.8	0.8	0.1	0.0	
1/10/96		56.8	0.6	0.1	0.0	
1/11/96		55.9	0.5	0.1	0.0	
1/12/96		55.2	0.5	0.1	0.0	
1/13/96		52.5	0.3	0.0	0.0	
1/14/96		51.6	0.3	0.0	0.0	
1/15/96		50.1	0.3	0.0	0.0	
1/22/96		51.6	0.3	0.0	0.0	
1/23/96		50.1	0.3	0.0	0.0	
1/24/96		49.2	0.3	0.0	0.0	
1/25/96		49.0	0.3	0.0	0.0	
1/26/96		48.7	0.2	0.0	0.0	
1/29/96		48.6	0.2	0.0	0.0	
1/30/96		47.9	0.2	0.0	0.0	
1/31/96						unit shut off for quarterly sampling
2/1/96		48.2	0.2	0.0	0.0	
2/2/96		48.7	0.2	0.0	0.0	
2/5/96		49.1	0.2	0.0	0.0	
2/6/96		48.7	0.2	0.0	0.0	
2/9/96						not reading
2/20/96						drained 18 gal.of water
2/21/96						water being exited out of exhaust
2/21/96		3.0	0.0	0.0	0.0	
2/22/96		3.0	0.0	0.0	0.0	
2/23/96		2.8	0.0	0.0	0.0	
2/24/96		2.6	0.0	0.0	0.0	
2/26/96		2.7	0.0	0.0	0.0	
2/27/96		2.9	0.0	0.0	0.0	
2/28/96		2.6	0.0	0.0	0.0	
2/29/96						drained water; tank 1/2 full.
3/1/96		2.4	0.0	0.0	0.0	
3/4/96		1.9	0.0	0.0	0.0	
3/5/96		2.0	0.0	0.0	0.0	
3/6/96		1.8	0.0	0.0	0.0	
3/7/96						drained water, tank 1/3 full
3/20/96		0.0	0.0	0.0	0.0	
3/21/96						no reading; drained water, 1/3 full
3/22/96		1.5	0.0	0.0	0.0	drained water
3/26/96		1.6	0.0	0.0	0.0	
3/27/96		1.7	0.0	0.0	0.0	
4/3/96		1.2	0.0	0.0	0.0	
4/4/96		1.4	0.0	0.0	0.0	
4/8/96		1.6	0.0	0.0	0.0	
4/9/96		2.8	0.0	0.0	0.0	
4/10/96		2.6	0.0	0.0	0.0	
4/11/96		2.9	0.0	0.0	0.0	
4/12/96		2.7	0.0	0.0	0.0	
4/15/96						system off; no readings
4/16/96						system off; no readings
4/17/96						system off; no readings
4/18/96						system off; no readings
4/19/96		6.9	0.0	0.0	0.0	
4/22/96		7.6	0.0	0.0	0.0	
4/23/96		8.4	0.0	0.0	0.0	
4/24/96		8.2	0.0	0.0	0.0	
4/25/96		7.6	0.0	0.0	0.0	drained water; 1/3 tank of water
4/26/96		7.1	0.0	0.0	0.0	
4/29/96		9.1	0.0	0.0	0.0	
4/30/96		9.1	0.0	0.0	0.0	
5/1/96		9.8	0.0	0.0	0.0	
5/2/96		9.6	0.0	0.0	0.0	
5/3/96		10.2	0.0	0.0	0.0	
5/6/96						system off, no readings
5/7/96		13.6	0.0	0.0		

Table 1 (continued) Record of Daily Monitoring Soil Vapor Extraction System IRES, San Leandro, CA

Date	Time	Blower/ Vessel #1	Vessel #1/ Vessel #2	Vessel #2/ Vessel #3	Vessel #3/ Exhaust	Comments
5/8/96		14.4	0.0	0.0	0.0	
5/9/96		14.3	0.0	0.0	0.0	
5/10/96		14.4	0.0	0.0	0.0	
5/13/96						system off, no readings
5/14/96						system off, no readings
5/15/96		11.1	0.0	0.0	0.0	raining
5/16/96		10.4	0.0	0.0	0.0	raining
5/17/96						no readings
5/20/96						no readings
5/21/96						no readings
5/22/96						no readings
5/23/96						no readings
5/24/96						no readings
5/27/96						no readings
5/28/96						no readings
5/29/96						no readings
5/30/96						no readings
5/31/96						no readings
6/3/96		13.2	0.0	0.0	0.0	
6/4/96		13.6	0.0	0.0	0.0	
6/5/96		13.0	0.0	0.0	0.0	
6/6/96		13.5	0.0	0.0	0.0	
6/7/96		13.4	0.0	0.0	0.0	
6/10/96		15.5	0.0	0.0	0.0	
6/11/96		15.3	0.0	0.0	0.0	
6/12/96		16.0	0.0	0.0	0.0	
6/13/96		15.3	0.0	0.0	0.0	
6/14/96		15.1	0.0	0.0	0.0	
6/17/96		10.2	0.0	0.0	0.0	
6/18/96		12.5	0.0	0.0	0.0	
6/19/96		16.6	0.0	0.0	0.0	
6/20/96		17.2	0.0	0.0	0.0	
6/21/96		17.2	0.0	0.0	0.0	
6/24/96		19.1	0.0	0.0	0.0	
6/25/96		18.2	0.0	0.0	0.0	
6/26/96		17.2	0.0	0.0	0.0	
6/27/96		16.6	0.0	0.0	0.0	
6/28/96		16.1	0.0	0.0	0.0	
7/1/96		15.1	0.0	0.0	0.0	
7/2/96		16.9	0.0	0.0	0.0	
7/3/96		17.1	0.0	0.0	0.0	
7/8/96		18.6	0.0	0.0	0.0	
7/9/96		17.9	0.0	0.0	0.0	
7/10/96		19.1	0.0	0.0	0.0	
7/11/96		16.9	0.0	0.0	0.0	
7/12/96		16.9	0.0	0.0	0.0	
7/15/96		17.4	0.0	0.0	0.0	
7/16/96		16.4	0.0	0.0	0.0	
7/17/96		16.6	0.0	0.0	0.0	
7/18/96		17.2	0.0	0.0	0.0	
7/19/96		16.6	0.0	0.0	0.0	
7/22/96		14.3	0.0	0.0	0.0	
7/23/96		13.6	0.0	0.0	0.0	
7/24/96		13.2	0.0	0.0	0.0	
7/25/96		16.2	0.0	0.0	0.0	
7/26/96		15.1	0.0	0.0	0.0	
7/29/96		14.7	0.0	0.0	0.0	
7/30/96		14.3	0.0	0.0	0.0	
7/31/96		13.7	0.0	0.0	0.0	
8/1/96		14.5	0.0	0.0	0.0	
8/2/96		13.2	0.0	0.0	0.0	
8/5/96		14.5	0.0	0.0	0.0	
8/6/96		11.4	0.0	0.0	0.0	

Table 1 (continued) Record of Daily Monitoring Soil Vapor Extraction System IRES, San Leandro, CA

Date	Time	Blower/ Vessel #1	Vessel #1/ Vessel #2	Vessel #2/ Vessel #3	Vessel #3/ Exhaust	Comments
8/7/96		8.0	0.0	0.0	0.0	
8/8/96		9.7	0.0	0.0	0.0	
8/9/96		11.0	0.0	0.0	0.0	
8/12/96		10.6	0.0	0.0	0.0	
8/13/96		10.4	0.0	0.0	0.0	
8/14/96		10.1	0.0	0.0	0.0	
8/15/96		10.2	0.0	0.0	0.0	
8/16/96		10.3	0.0	0.0	0.0	
8/19/96		9.7	0.0	0.0	0.0	
8/20/96		9.3	0.0	0.0	0.0	
8/21/96		9.4	0.0	0.0	0.0	
8/22/96		8.6	0.0	0.0	0.0	
8/23/96		8.8	0.0	0.0	0.0	
8/26/96		2.7	0.0	0.0	0.0	
8/27/96		0.1	0.0	0.0	0.0	
8/28/96		3.1	0.0	0.0	0.0	
8/29/96		2.1	0.0	0.0	0.0	
8/30/96		2.5	0.0	0.0	0.0	
9/2/96		3.9	0.0	0.0	0.0	
9/3/96		3.8	0.0	0.0	0.0	
9/4/96		4.2	0.0	0.0	0.0	
9/5/96		4.7	0.0	0.0	0.0	
9/6/96		4.5	0.0	0.0	0.0	
9/7/96						no reading (weekend)
9/8/96						no reading (weekend)
9/9/96		3.8	0.0	0.0	0.0	
9/10/96		3.9	0.0	0.0	0.0	
9/11/96		4.2	0.0	0.0	0.0	
9/12/96		4.8	0.0	0.0	0.0	
9/13/96		3.7	0.0	0.0	0.0	
9/16/96		3.7	0.0	0.0	0.0	
9/17/96		4.3	0.0	0.0	0.0	
9/18/96		3.1	0.0	0.0	0.0	
9/19/96		4.2	0.0	0.0	0.0	
9/20/96		3.6	0.0	0.0	0.0	
9/23/96		4.0	0.0	0.0	0.0	
9/24/96		4.8	0.0	0.0	0.0	
9/25/96		4.6	0.0	0.0	0.0	
9/26/96		3.8	0.0	0.0	0.0	
9/27/96		3.8	0.0	0.0	0.0	
9/30/96		4.5	0.0	0.0	0.0	
10/1/96		4.3	0.0	0.0	0.0	
10/2/96		3.6	0.0	0.0	0.0	
10/3/96		3.8	0.0	0.0	0.0	
10/4/96		2.7	0.0	0.0	0.0	
10/7/96		2.5	0.0	0.0	0.0	
10/8/96		3.6	0.0	0.0	0.0	
10/9/96		3.8	0.0	0.0	0.0	
10/10/96		4.5	0.0	0.0	0.0	
10/11/96		4.3	0.0	0.0	0.0	
10/14/96		4.2	0.0	0.0	0.0	
10/15/96		3.8	0.0	0.0	0.0	
10/16/96		3.4	0.0	0.0	0.0	
10/17/96		3.9	0.0	0.0	0.0	
10/18/96		3.7	0.0	0.0	0.0	
10/21/96		3.1	0.0	0.0	0.0	
10/22/96		2.4	0.0	0.0	0.0	
10/23/96		2.5	0.0	0.0	0.0	
10/24/96		1.7	0.0	0.0	0.0	
10/25/96		1.9	0.0	0.0	0.0	
10/28/96		2.8	0.0	0.0	0.0	
10/29/96		2.7	0.0	0.0	0.0	Rainy Day
10/30/96		2.3	0.0	0.0	0.0	Rainy Day
10/31/96		1.9	0.0	0.0	0.0	

Table 1 (continued) Record of Daily Monitoring Soil Vapor Extraction System IRES, San Leandro, CA

Date	Time	Blower/ Vessel #1	Vessel #1/ Vessel #2	Vessel #2/ Vessel #3	Vessel #3/ Exhaust	Comments
11/1/96		1.6	0.0	0.0	0.0	
11/4/96						OVM meter broken
11/5/96						OVM meter broken
11/6/96						OVM meter broken
11/7/96		0.0	0.3	0.0	0.0	
11/8/96		0.0	0.0	0.0	0.0	
11/11/96		0.0	0.0	0.0	0.0	
11/12/96		0.0	0.0	0.0	0.0	
11/13/96		0.0	0.0	0.0	0.0	
11/14/96		0.0	0.0	0.0	0.0	
11/15/96		0.0	0.0	0.0	0.0	
11/18/96						No reading -- raining
11/19/96						No reading -- raining
11/20/96		0.0	0.0	0.0	0.0	
11/21/96						No reading -- raining
11/22/96		0.0	0.0	0.0	0.0	
11/25/96		0.0	0.0	0.0	0.0	
11/26/96		0.0	0.0	0.0	0.0	
11/27/96						Thanksgiving holiday -- no reading
12/2/96		0.0	0.0	0.0	0.0	
12/3/96		0.0	0.0	0.0	0.0	Drained tank (~2/3 full)
12/4/96						No reading -- raining
12/5/96		0.0	0.0	0.0	0.0	Drained tank (~1/4 full)
12/6/96		0.0	0.0	0.0	0.0	
12/9/96		0.0	0.0	0.0	0.0	
12/10/96		0.0	0.0	0.0	0.0	
12/11/96		0.0	0.0	0.0	0.0	
12/12/96		0.0	0.0	0.0	0.0	
12/13/96		0.0	0.0	0.0	0.0	
12/16/96		0.0	0.0	0.0	0.0	
12/17/96		0.0	0.0	0.0	0.0	
12/18/96		0.0	0.0	0.0	0.0	
12/19/96		0.0	0.0	0.0	0.0	
12/20/96		0.0	0.0	0.0	0.0	
12/23/96		0.0	0.0	0.0	0.0	Drained tank (~1/2)
12/24/96		0.0	0.0	0.0	0.0	
12/25/96						Christmas holiday -- no reading
12/26/96		0.0	0.0	0.0	0.0	
12/27/96		0.0	0.0	0.0	0.0	
12/30/96		0.0	0.0	0.0	0.0	
12/31/96						No reading -- raining
1/1/97						New Year's Day holiday -- no reading
1/2/97						No reading -- raining
1/3/97						No reading - raining
1/6/97		0.0	0.0	0.0	0.0	Drained tank (~1/4)
1/7/97		0.0	0.0	0.0	0.0	
1/8/97		0.0	0.0	0.0	0.0	
1/9/97		0.0	0.0	0.0	0.0	
1/10/97		0.0	0.0	0.0	0.0	
1/13/97						No reading -- unit off for 2 weeks (drained tank ~1/4)
CLOSED/TURNED OFF FROM 1/14/97 to 2/5/97 DUE TO RAIN, TESTING AND ELECTRICAL PROBLEMS						
2/6/97		0.0	0.0	0.0	0.0	
2/7/97		0.0	0.0	0.0	0.0	
2/10/97		0.0	0.0	0.0	0.0	
2/11/97		0.0	0.0	0.0	0.0	
2/12/97		0.0	0.0	0.0	0.0	
2/13/97		0.0	0.0	0.0	0.0	
2/14/97		0.0	0.0	0.0	0.0	
2/18/97		0.0	0.0	0.0	0.0	
2/19/97		0.0	0.0	0.0	0.0	
2/20/97		0.0	0.0	0.0	0.0	
2/21/97		0.0	0.0	0.0	0.0	
2/24/97		0.0	0.0	0.0	0.0	Drained tank (~1/2 full of water)
2/25/97		0.0	0.0	0.0	0.0	

Date	Time	Blower/ Vessel #1	Vessel #1/ Vessel #2	Vessel #2/ Vessel #3	Vessel #3/ Exhaust	Comments
2/28/97		0.0	0.0	0.0	0.0	
3/3/97		0.0	0.0	0.0	0.0	
3/4/97		0.0	0.0	0.0	0.0	
3/5/97		0.0	0.0	0.0	0.0	
3/6/97		0.0	0.0	0.0	0.0	
3/7/97		0.0	0.0	0.0	0.0	
3/10/97		0.0	0.0	0.0	0.0	
3/11/97		0.0	0.0	0.0	0.0	
3/12/97		0.0	0.0	0.0	0.0	
3/13/97		0.0	0.0	0.0	0.0	
3/14/97		0.0	0.0	0.0	0.0	
3/17/97		0.0	0.0	0.0	0.0	
3/18/97		0.0	0.0	0.0	0.0	
3/19/97		0.0	0.0	0.0	0.0	
3/20/97		0.0	0.0	0.0	0.0	
3/21/97		0.0	0.0	0.0	0.0	
3/24/97		0.0	0.0	0.0	0.0	
3/25/97		0.0	0.0	0.0	0.0	
3/26/97		0.0	0.0	0.0	0.0	
3/27/97		0.0	0.0	0.0	0.0	
3/28/97		0.0	0.0	0.0	0.0	
3/31/97		0.0	0.0	0.0	0.0	
4/1/97		0.0	0.0	0.0	0.0	
4/2/97		0.0	0.0	0.0	0.0	
4/3/97		0.0	0.0	0 0	0.0	
4/4/97		0.0	0.0	0.0	0.0	
4/7/97		0.0	0.0	0.0	0.0	
4/8/97		0.0	0.0	0.0	0.0	
4/9/97		0.0	0.0	0.0	0.0	
4/10/97		0.0	0.0	0.0	0.0	
4/11/97		0.0	0.0	0.0	0.0	
4/14/97		0.0	0.0	0.0	0.0	
4/15/97		0.0	0.0	0.0	0.0	
4/16/97		0.0	0.0	0.0	0.0	
4/17/97		0.0	0.0	0.0	0.0	
4/18/97		0.0	0.0	0.0	0.0	
4/21/97		0.0	0.0	0.0	0.0	
4/22/97		0.0	0.0	0.0	0.0	
4/23/97		0.0	0.0	0.0	0.0	
4/24/97		0.0	0.0	0.0	0.0	
4/25/97		0.0	0.0	0.0	0.0	

Prepared by: John McDermott, Feb 1996
Updated by: Julie Theisen, August 1997

Table 2

SVE System Extracted Soil Vapor Analytical Results (ug/m^3)
IRES, San Leandro, CA

Date Sampled	Benzene	Ethyl Benzene	Toluene	Total Xylenes	THC as Gasoline
10/03/95	8,500	11,000	88,000	100,000	880,000
10/16/96	< 840	< 830	< 1,000	920	15,000
06/12/97	< 650	< 700	< 910	< 650	4,200

Note: < = Less than

Table 3

SVE System Field Readings
IRES, San Leandro, CA

Location	Date	Vacuum (inches of water)	Pressure (inches of water)	PID Reading (ppm)	Velocity (fpm)	CO_2 (%)	O_2 (%)	Temperature (°F)
VW-1	10-03-95 (Early AM)	3.5		175.0				
VW-4	10-03-95 (Early AM)	6.0		70.0				
VW-5	10-03-95 (Early AM)	6.5		12.0				
VW-9	10-03-95 (Early AM)	5.5		20.0				
After Blower	10-03-95 (Early AM)		9.6	137	5900			
After GAC Vessel #1	10-03-95 (Early AM)		3.3	0	2850			
After GAC Vessel #2	10-03-95 (Early AM)		1.3	0	1980			
After GAC Vessel #3	10-03-95 (Early AM)		0.2	0	1950			

Table 3 (Continued)

SVE System Field Readings
IRES, San Leandro, CA

Location	Date	Vacuum (inches of water)	Pressure (inches of water)	PID Reading (ppm)	Velocity (fpm)	CO_2 (%)	O_2 (%)	Temperature (°F)
VW-1	10-03-95 (Late AM)	3		97.0				
VW-4	10-03-95 (Late AM)	5.5		21.0				
VW-5	10-03-95 (Late AM)	5.5		8.0				
VW-9	10-03-95 (Late AM)	5		6.0				
After Blower	10-03-95 (Late AM)		13	136.0	5400			
After GAC Vessel #1	10-03-95 (Late AM)		10	0.0	4525			
After GAC Vessel #2	10-03-95 (Late AM)		5	0.0	4300			
After GAC Vessel #3	10-03-95 (Late AM)		2	0.0	4160			

Table 3 (Continued)

SVE System Field Readings
IRES, San Leandro, CA

Location	Date	Vacuum (inches of water)	Pressure (inches of water)	PID Reading (ppm)	Velocity (fpm)	CO_2 (%)	O_2 (%)	Temperature (°F)
VW-1	10-04-95	3.0		198.0		2.5	18.7	
VW-4	10-04-95	5.5		8.0		3.5	11.0	
VW-5	10-04-95	5.5		15.7		4.0	7.7	
VW-9	10-04-95	5.0		5.7		> 6.0	11.5	
After Blower	10-04-95		16	139.0	5250	3.0	16.5	110.6
After GAC Vessel #1	10-04-95		10	14.0	4270			
After GAC Vessel #2	10-04-95		6	3.0	4175			
After GAC Vessel #3	10-04-95		2	0.0	3730			

Note: > = Greater than

Table 3 (Continued)

SVE System Field Readings
IRES, San Leandro, CA

Location	Date	Vacuum (inches of water)	Pressure (inches of water)	PID Reading (ppm)	Velocity (fpm)	CO_2 (%)	O_2 (%)	Temperature (°F)
VW-1	10-16-96	2.7		1.5		0.2	20.6	
VW-4	10-16-96	5.6		1.5		1.4	18.9	
VW-5	10-16-96	5.6		1.5		2.6	17.1	
VW-9	10-16-96	4.8		1.5		1.1	19.6	
After Blower	10-16-96		19	1.5	4529	0.4	20.4	67.7
After GAC Vessel #1	10-16-96		12	0	4703			
After GAC Vessel #2	10-16-96		6	0	4450			
After GAC Vessel #3	10-16-96		1	0	4554			

Table 3 (Continued)

SVE System Field Readings
IRES, San Leandro, CA

Location	Date	Vacuum (inches of water)	Pressure (inches of water)	PID Reading (ppm)	Velocity (fpm)	CO_2 (%)	O_2 (%)	Temperature (°F)
VW-1	06-12-97	3		0		0.15	20.7	72
VW-4	06-12-97	5.5		0		0.5	20.1	71
VW-5	06-12-97	5.5		0		3.0	16.8	72
VW-9	06-12-97	5		0		0.6	19.7	72
After Blower	06-12-97		15	0	5400	0.45	20.2	97.5
After GAC Vessel #1	06-12-97		10	0	4660	0.45		
After GAC Vessel #2	06-12-97		5.5	0	4860	0.4		
After GAC Vessel #3	06-12-97		1	0	4800	0.5		

BRAUN℠
INTERTEC

Braun Intertec Corporation
6875 Washington Avenue South
P.O. Box 39108
Minneapolis, Minnesota 55439-0108
612-941-5600 Fax: 942-4844

Engineers and Scientists Serving the Built and Natural Environments℠

October 19, 1995

Project CMXX-95-0157
Report 95-3176

Mr. Chris McElligott/MH
Braun Intertec Corporation

Re: IRES

San Leandro, CA

Braun Intertec Corporation received your analytical request on October 6, 1995. Analytical results are summarized on the following laboratory report.

Routine Braun Intertec Corporation QA/QC was followed. Quality control data have been reviewed. No anomalies were encountered in the analysis of this sample.

We appreciate the opportunity to meet your analytical needs. If you have any questions or need additional information, please call Linda Thiery at 612-942-4813.

Sincerely,

Linda J. Thiery

Linda J. Thiery
Project Manager

Attachments
Chain of Custody
Laboratory Results

Client:	IRES	**Laboratory:**	Braun Intertec Corporation	**Date Sampled:**	10/03/95
Log-in:	95-3176	**Lab Contact/Phone:**	L. Thiery/612-942-4813	**Date Received:**	10/06/95
Project Number:	CMXX-95-0157	**Sampler:**	Braun Intertec	**Date Reported:**	10/19/95
Matrix:	Air Tube	**% Moisture:**	Not Applicable		
Lab Sample ID:	95-3176-01	**MDL:**	Method Detection Limit		
		RL:	Reporting Limit		

Client Sample ID/Description: AS-1

Compound	Extract Method	Extract Date	Analysis Method	Analysis Date	Dilution Factor	MDL	RL	Sample Result	
Air Analysis									
Benzene	-	-	NIOSH	10/17/95	1	250	250	8500	ug/m3
Ethyl Benzene	-	-	NIOSH	10/17/95	1	250	250	11000	ug/m3
Toluene	-	-	NIOSH	10/17/95	1	250	250	88000	ug/m3
Total Hydrocarbons as Gasoline	-	-	NIOSH	10/17/95	1	6200	6200	880000	ug/m3
Xylenes, Total	-	-	NIOSH	10/17/95	1	1200	1200	100000	ug/m3

(End of Report)

BRAUNSM
INTERTEC

Chain Of Custody - ECS

Log-in Report # 95-3176
Page 1 of 1
Rush #
Exception Rate

Site Identification
I.R.E.S.
SAN LEANDRO, CA

Client Identification

a = soil c = solid e = lube or filter
b = water d = liquid f = sludge
o = other

Project #: CMXX 95 0157

Task #:

Project Manager CHRIS MCELLIGOTT
Sampled By: TIM BIDINES
Temperature Upon Receipt ☐ Received on Ice °C
Condition Upon Receipt ☐ Good ☐ Other

Evidence Tape Intact ☐ Yes ☐ No ☐ NA
WI LUST Project ☐ Yes ☐ No
Are samples in compliance with soil movement regulations ☐ Yes ☐ No ☐ NA

Sample No. (Lab Use Only)	Sample Identification	Collection Date	Collection Time	Bottle type and number: Sample Matrix Code	VOA 40ml. 60 ml.	Metals (Filtered)	Metals (Unfiltered)	General	Nutrient	IL HCl	IL Generals	Tubes/OVM	Other	Analysis/Remarks
95-3176-01	AES-1	10/3	1400	e								1		BEX, THC as GASOLINE
														4 LITERS

Relinquished By	Date	Time	Received By:	Relinquished By:	Date	Time	Received By:
Randall Bol	10/6/95	0900			/ /		
Relinquished By:	Date / /	Time	Received for Laboratory By:	Date 10/6/95	Time 15:50	Comments:	

BRAUN[SM]
INTERTEC

Braun Intertec Corporation
6875 Washington Avenue South
P.O. Box 39108
Minneapolis, Minnesota 55439-0108
612-941-5600 Fax: 942-4844

Engineers and Scientists Serving the Built and Natural Environments[®]

October 28, 1996

Project CMXX-95-0157
Report 96-3634

Mr. Jerry Stuth/MH
Braun Intertec Corporation

Re: IRES
1944 Marina Blvd.
San Leandro, CA 94577

Braun Intertec Corporation received your analytical request on October 21, 1996. Analytical results are summarized on the following laboratory report.

Routine Braun Intertec Corporation QA/QC was followed. Quality control data have been reviewed. No anomalies were encountered in the analysis of this sample.

When possible these samples will be held by the laboratory for 14 days from the date of this report. The process of disposing or returning the samples will occur at that time. Arrangements can be made for extended sample storage by contacting us at this time.

We appreciate the opportunity to meet your analytical needs. If you have any questions or would like additional information, please call Barbara Maki at 612-942-4820.

Sincerely,

Barbara J. Maki
Project Manager

Attachments
Chain of Custody
Laboratory Results

Client: IRES
Log-in: 96-3634
Project Number: CMXX-95-0157
PO Number:
Client Reference:
Matrix: Air Tube
Lab Sample ID: 96-3634-01

Client Sample ID/Description: AS-1

Laboratory: Braun Intertec Corporation
Lab Contact/Phone: B. Maki/612-942-4820
Sampler: Braun Intertec
% Moisture: Not Applicable
MDL: Method Detection Limit
RL: Reporting Limit

Date Sampled: 10/16/96
Date Received: 10/21/96
Date Reported: 10/28/96

Compound	Extract Method	Extract Date	Analysis Method	Analysis Date	Dilution Factor	MDL	RL	Sample Result	
Air Analysis									
Benzene	-	-	NIOSH	10/25/96	1.0	840	840	<840	ug/m3
Ethyl Benzene	-	-	NIOSH	10/25/96	1.0	830	830	<830	ug/m3
Toluene	-	-	NIOSH	10/25/96	1.0	1000	1000	<1000	ug/m3
Total Hydrocarbons as Gasoline	-	-	NIOSH	10/25/96	1.0	1100	1100	15000	ug/m3
Xylenes, Total	-	-	NIOSH	10/25/96	1.0	900	900	920	ug/m3

(End of Report)

BRAUN INTERTEC

Chain Of Custody - ECS

Page 1 of 1

Rush #

Exception Rate

Site Identification	Client Identification
INGERSOLL-RAND EQUIPMENT SALES 1944 MARINA BLVD SAN LEANDRO, CA	

a = soil c = solid e = tube or filter
b = water d = liquid f = sludge
o = other

Project Manager: JERRY SMITH
Sampled By: TIM BOWLES
Temperature Upon Receipt ☐ Received on Ice °C
Condition Upon Receipt ☐ Good ☐ Other

Evidence Tape Intact ☐ Yes ☐ No ☐ NA
WI LUST Project ☐ Yes ☐ No
Are samples in compliance with soil movement regulations ☐ Yes ☐ No ☐ NA

Project #: CMXX 95 0157 **Task #:**

Sample No. (Lab Use Only)	Sample Identification	Collection Date	Collection Time	Bottle type and number: Sample Matrix Code	VOA 40ml. 60 ml.	Metals (Filtered)	Metals (Unfiltered)	General	Nutrient	IL HCl	IL Generals	Tubes/OVM	Other	Analysis/Remarks
96-36-34-01	AS-1	10/16	1100	e								1		BETX, THC as GASOLINE

Relinquished By:	Date	Time	Received By:	Relinquished By:	Date	Time	Received By:
[signature]	TLB 10/24/96	1200			/ /		
Relinquished By:	Date / /	Time	Received for Laboratory By: [signature]	Date 10/24/96	Time	Comments:	

BRAUN℠
INTERTEC

June 24, 1997

Report 97-2112
Project CMXX-95-0157

Mr. Jerry Stuth/MH
Braun Intertec Corporation

Re: IRES (Ingersoll-Rand Equipment Sales)
1944 Marina Blvd.
San Leandro, CA 94577

Braun Intertec Corporation received your analytical request on June 16, 1997. Analytical results are summarized on the following laboratory report.

Routine Braun Intertec Corporation QA/QC was followed. Quality control data have been reviewed.

When possible these samples will be held by the laboratory for 14 days from the date of this report. The process of disposing or returning the samples will occur at that time. Arrangements can be made for extended sample storage by contacting us at this time.

We appreciate the opportunity to meet your analytical needs. If you have any questions or would like additional information, please call Wallace Zick at 612-942-4946.

Sincerely,

Wallace S. Zick, Jr.
Technical Manager

Attachments
Chain of Custody
Laboratory Results

Client: IRES (Ingersoll-Rand Equipment Sales)
Log-in: 97-2112
Project Number: CMXX-95-0157
PO Number:
Client Reference:
Matrix: Air Tube
Lab Sample ID: 97-2112-01

Client Sample ID/Description: AS-1

Laboratory: Braun Intertec Corporation
Lab Contact/Phone: W. Zick/612-942-4946
Sampler:
% Moisture: Not Applicable
MDL: Method Detection Limit
RL: Reporting Limit

Date Sampled: 06/12/97
Date Received: 06/16/97
Date Reported: 06/24/97

Compound	Extract Method	Extract Date	Analysis Method	Analysis Date	Dilution Factor	MDL	RL	Sample Result	
Air Analysis									
Benzene	-	-	NIOSH	06/24/97	1.0	650	650	<650	ug/m3
Ethyl Benzene	-	-	NIOSH	06/24/97	1.0	700	700	<700	ug/m3
Toluene	-	-	NIOSH	06/24/97	1.0	910	910	<910	ug/m3
Total Hydrocarbons as Gasoline	-	-	NIOSH	06/24/97	1.0	950	950	4200	ug/m3
Xylenes, Total	-	-	NIOSH	06/24/97	1.0	650	650	<650	ug/m3

(End of Report)

BRAUN[SM] INTERTEC

Chain Of Custody - ECS

[redacted] # [redacted]

Page _____ of _____

Rush # _____

Exception Rate _____

Site Identification

INGERSOLL-RAND
EQUIPMENT SALES
1944 MARINA BLVD
SAN LEANDRO, CA

Client Identification

a = soil c = solid e = lube or filter
b = water d = liquid f = sludge
o = other _____

Project Manager JERRY STUTH
Sampled By: TIM BODINE
Temperature Upon Receipt ☐ Received on Ice °C
Condition Upon Receipt ☐ Good ☐ Other

Evidence Tape Intact ☐ Yes ☐ No ☐ NA
WI LUST Project ☐ Yes ☐ No
Are samples in compliance with soil movement regulations ☐ Yes ☐ No ☐ NA

Project #: CMXX9501.57

Task #:

Sample No. (Lab Use Only)	Sample Identification	Collection Date	Collection Time	Sample Matrix Code	Bottle type and number: VOA 40ml. 60 ml.	Metals (Filtered)	Metals (Unfiltered)	General	Nutrient	IL HCl	IL Generals	Tubes/OVM	Other	Analysis/Remarks
97-212-01	AS-1	6/12	850	c								1		BETX, THC as GASOLINE
														(4 LITERS)

Relinquished By:	Date	Time	Received By:	Relinquished By:	Date	Time	Received By:
[signature]	6/16/96	0740	[signature]		/ /		
Relinquished By:	Date / /	Time	Received for Laboratory By: [signature]	Date 6/16/97	Time 8:00	Comments:	

Braun Intertec Corporation, Inc. 6875 Washington Avenue, Shipping and Receiving, Minneapolis, MN 55439

Form No. Claim 1/95

CAPSULE®
ENVIRONMENTAL ENGINEERING, INC

September 3, 1997

Mr. Scott Seery, CHMM
Alameda County Environmental Health Department
Environmental Protection Division
Suite 250
1131 Harbor Bay Parkway
Alameda, California 94502

Dear Mr. Seery:

RE: Ingersoll-Rand Equipment Sales, San Leandro

On behalf of Ingersoll-Rand Equipment Sales (IRES), Capsule Environmental Engineering and Braun Intertec, our project partner, are submitting the enclosed closure recommendation for the soil vapor extraction system at the IRES facility at 1944 Marina Boulevard, San Leandro.

The remaining part of the closure activities, outlined in my June 4 and August 8, 1997 letters, is being prepared. A technical letter, developing the data and information to support the IRES as a "low risk" ground water case, will be submitted in late September. With the completion of soil venting the first "low risk groundwater case" definition criterion is met, namely, the source has been remediated.

We will await Alameda County's response to the closure recommendation. If you have any questions or comments regarding the operational summary, our closure recommendation, or this letter, please contact me at (800) 328-8246.

Sincerely,

CAPSULE ENVIRONMENTAL ENGINEERING, INC.

John McDermott
Hydrogeologist

JJM:cen
enclosure

cc: R. Heindl/IRES, Bethlehem, PA
T. Tinsley/IRES, San Leandro, CA
M. Bakaldin/San Leandro Fire Dept., San Leandro, CA
J. Stuth/Braun Intertec
C. McElligott/Braun Intertec
J. Henner/Azure Environmental

1970 Oakcrest Avenue, Suite 215 • St. Paul, MN 55113-2624 • (612) 636-2644 • Fax (612) 636-3106
Toll Free 1-800-328-8246

BRAUN INTERTEC

Description: IRES, San Leandro, CA
SVE system
Project No: CMXX-95-0157
Date: 8-8-97 By: C. McElligott

Contaminant Mass Removal Calculations

Cross-sectional area of SVE piping at monitoring port:

$$A = \frac{\pi d^2}{4} = \frac{\pi (2\ in)^2}{4} = \pi\ in^2$$

$$\pi\ in^2 \times \frac{1\ ft^2}{144\ in^2} = \underline{0.0218\ ft^2}$$

On 10-3-95:

blower velocity = $V = 5400\ \frac{ft}{min}$

blower cfm = $V \times A = 5400\ \frac{ft}{min} \times 0.0218\ ft^2 \approx \underline{118\ \frac{ft^3}{min}}$

blower $\frac{m^3}{sec} = 118\ \frac{ft^3}{min} \times \frac{1\ min}{60\ sec} \times \frac{0.02832\ m^3}{ft^3} \approx \underline{0.056\ \frac{m^3}{sec}}$

extraction rate for THC as Gasoline:

$$880{,}000\ \frac{ug}{m^3} \times 0.056\ \frac{m^3}{sec} = 49{,}280\ \frac{ug}{sec}$$

$$49{,}280\ \frac{ug}{sec} \times 1 \times 10^{-9}\ \frac{kg}{ug} \times 86{,}400\ \frac{sec}{day} \times 0.37\ \frac{gal\ gasoline}{kg}$$

$$\approx \underline{1.58\ \frac{gal\ gasoline}{day}}$$

BRAUN INTERTEC

Description: IRES, San Leandro, CA
SVE System
Project No: CMXX-95-0157
Date: 8-8-97 By: C. McElligott

On 10-16-96 :

$V = 4529 \frac{ft}{min}$

blower cfm = $V \times A = 4529 \frac{ft}{min} \times 0.0218 ft^2 = 98.7 \frac{ft^3}{min}$

blower $\frac{m^3}{sec} = 98.7 \frac{ft^3}{min} \times \frac{1 min}{60 sec} \times \frac{0.02832 m^3}{ft^3} = 0.046 \frac{m^3}{sec}$

extraction rate for THC as Gasoline :

$15{,}000 \frac{ug}{m^3} \times 0.046 \frac{m^3}{sec} = 690 \frac{ug}{sec}$

$690 \frac{ug}{sec} \times 1 \times 10^{-9} \frac{kg}{ug} \times 86{,}400 \frac{sec}{day} \times 0.37 \frac{gal\ gasoline}{kg}$

$\approx 0.022 \frac{gal\ gasoline}{day}$

BRAUN INTERTEC

Description: IRES, San Leandro, CA
SVE System
Project No: CMXX-95-0157
Date: 8-8-97 By: C. McElligott

On 6-12-97:

$V = 5400 \frac{ft}{min}$

blower cfm = $V \times A = 5400 \frac{ft}{min} \times 0.0218 ft^2 = 118 \frac{ft^3}{min}$

blower $\frac{m^3}{sec} = 118 \frac{ft^3}{min} \times \frac{1 min}{60 sec} \times \frac{0.02832 m^3}{ft^3} = 0.056 \frac{m^3}{sec}$

extraction rate for THC as Gasoline:

$4200 \frac{ug}{m^3} \times 0.056 \frac{m^3}{sec} = 235.2 \frac{ug}{sec}$

$235.2 \frac{ug}{sec} \times 1 \times 10^{-9} \frac{kg}{ug} \times 86,400 \frac{sec}{day} \times 0.37 \frac{gal\ gasoline}{kg}$

$\approx 0.0075 \frac{gal\ gasoline}{day}$

BRAUN INTERTEC

Description: IRES, San Leandro, CA
SVE System
Project No: cmxx-95-0157
Date: 8-8-97 By: C. McElligott

Calculation of Total Contaminant Mass Extracted from Subsurface by Redesigned SVE System, 10-3-95 through 8-8-97

Assumptions: Mass removal rate on sampling date is representative of the time period to mid-point between sampling dates.

		Number of Days in Operation		Mass Removal Rate		Mass Removed
10-3-95	Sample Date	94 days	X	1.58 gal/day	=	148.52
4-9-96	Mid-Point	117	X	0.022	=	2.57
10-16-96	Sample Date	63	X	0.022	=	1.39
2-12-97	Mid-Point	86	X	0.0075	=	0.64
6-12-97	Sample Date	41	X	0.0075	=	0.31
8-8-97	Calculated Through This Date					

Total 153.43 gallons of gasoline