RADIAN INTERNATIONAL LLC

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LOCKHEED BEAUMONT NO. 1
JUNE 1996 VAPOR SAMPLING REPORT

Prepared for:

Lockheed Martin
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10 October 1996

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1.0 Introduction

As part of Lockheed-Martin's ongoing remediation of soil and groundwater contamination at the Beaumont, California No. 1 site, Radian International LLC (Radian) sampled and analyzed soil vapors from 12 wells on 26 and 27 June 1996. These wells are located in the "burn pit" area of the site.

This work supplements previous studies at the site, including the "Remediation System 6-Month Evaluation" performed by Radian in December 1994.[1]

The purpose of the sampling was to collect additional data from the wells sampled in December 1994 and to provide a comparison of the vapor concentrations. Changes in the vapor concentrations between December 1994 and June 1996 provide information regarding the overall progress of the remediation program at the site.

During the sampling round, the weather was clear and sunny, and there had been no recent rainfall (previous 3-4 weeks). The vapor extraction system operating at the site was turned off by Lockheed staff on 21 June, five days before the start of the sampling event. For the previous December 1994 sampling, the system had also been turned off. Table 1-1 shows a comparison of the wells sampled for the two sampling rounds.

Because of the rise in groundwater levels between 1994 and June 1996, the screened intervals in the "EW" series wells were submerged, and vapors could not be sampled. For the current sampling round, at the request of Lockheed, vapor samples were collected from the carbon beds used for treating the off-gas from the air stripper at the site.

The samples were collected from:

1) The air stripper effluent (between the air stripper and the primary carbon bed);

2) The off-gas from the primary carbon (between the primary and secondary carbon beds); and

3) The off-gas from the secondary carbon bed (discharge to the atmosphere).

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[1] Radian Corporation. Lockheed Propulsion Company Beaumont Test Facilities Remediation System 6-Month Evaluation Final Report, May 1995.

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Table 1-1. Vapor Well Sampling

Well Location No.	Dec. 1994	June 1996
VEW-6	X	X
VEW-8	X	X
VEW-10	X	X
VEW-11	X	X
VRW-1	X	X
VRW-2	X	X
VRW-3	X	---
VMW-3	X	X
VMW-6	X	X
VMW-8	X	X
VMW-13	X	X
VMW-16	X	X
VMW-19	---	X
VMW-20	X	---
EW-8	X	---
EW-9	X	---
EW-10	X	---
EW-11	X	---
EW-12	X	---
EW-14	X	---
Air Stripper Primary Influent	---	X
Air Stripper Primary Effluent (off-gas)	---	X
Stack Effluent (Secondary Bed)	---	X

2.0 Previous Investigations

The Lockheed Beaumont site is located south of the city of Beaumont, California as shown in Figure 2-1. The site is approximately 9,100 acres in size and was used from 1960 to 1974 for mixing and testing of solid rocket motor propellant and other ballistics testing.

From 1986 to 1992, an extensive soil and groundwater investigation was performed, a Remedial Action Plan (RAP) prepared and approved by the California Department of Toxic Substances Control and the Regional Water Quality Control Board, and a soil and groundwater remediation program developed. The remediation system includes soil vapor extraction and treatment, two-phase extraction (soil and groundwater), and groundwater pumping, treatment, and re-injection. The remediation system was started in July 1994, and in December 1994 a 6-month evaluation was performed (Radian Report, "Remediation System 6-month Evaluation, Lockheed Propulsion Company Beaumont site No. 1", May 1995). Subsequent to that report, Radian prepared an additional report evaluating system enhancements by air sparging (Radian Report, "Lockheed Beaumont No. 1 Air Sparging Pilot Test Report", February 1996). This current report provides additional information regarding changes in soil vapor concentrations at the site as the result of the on-going remediation effort.

In the "Burn Pit" area of the site, five conventional vapor extraction wells (low vacuum) are operated to extract shallow vapors. Concurrently, four high vacuum two-phase extraction wells are being operated. The two-phase wells were designed to extract both deeper soil vapors and groundwater. However, a rise in water levels has submerged the screened intervals in these wells, and they are now used primarily for groundwater extraction.

There have been three rounds of soil vapor measurements taken: April 1994, December 1994, and June 1996. Groundwater levels and groundwater quality measurements are taken at regular intervals. Water levels are measured monthly in wells, and water quality sampling is performed twice yearly. These activities are ongoing as part of the remediation of the site.

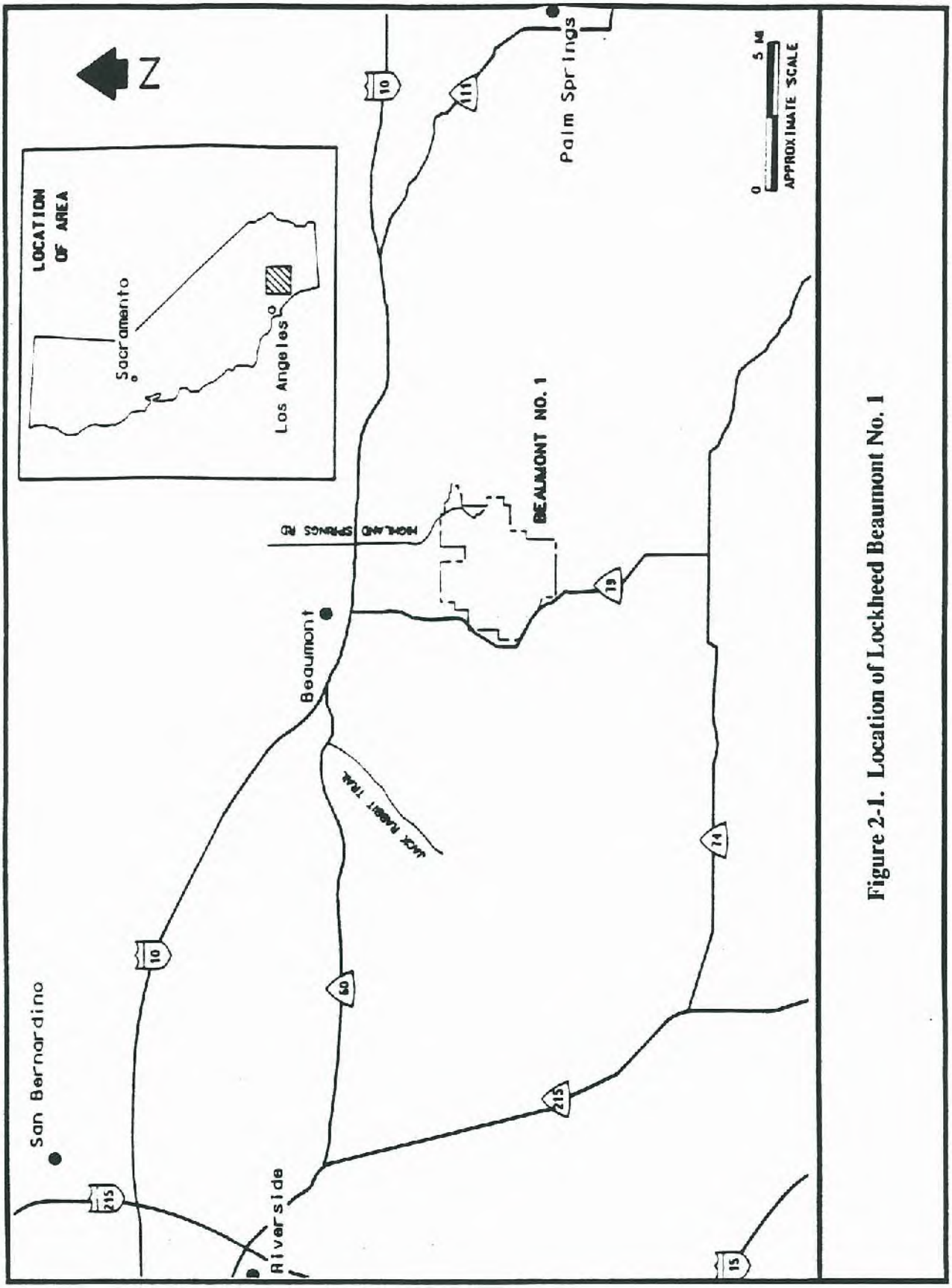

Figure 2-1. Location of Lockheed Beaumont No. 1

3.0 Field Methodology

The field methodology for sampling and analyzing the samples was generally similar to the work performed in 1994. However, for the current sampling round, chemical analyses were performed by Centrum Analytical Laboratory using an on-site mobile laboratory. Appendix A includes a more detailed description of the sampling methodology, Sample Control Logs for the samples taken, Soil Gas Field Data Sheets and lab results.

The wells were sampled cleanest wells first, and proceeding to more contaminated wells last. Wells where the groundwater level was above the top of the screen were not sampled. The sampling equipment and the well were purged prior to sampling to help ensure that a representative vapor sample was obtained.

Samples were sealed and transported to the mobile lab (onsite) for immediate analysis. The lab tested each sample for volatile organics using EPA Method 8260. A total of 27 samples were analyzed (details presented in Appendix A):

- 12 vapor wells locations (see Table 1-1);
- 3 air stripper locations;
- 6 equipment blanks;
- 3 field duplicates; and
- 3 re-samples because of low surrogate recovery by the lab.

4.0 Discussion

Table 4-1 presents the laboratory results for the June 1996 sampling and the earlier December 1994 sampling.

The results of the sampling and analysis indicate that the soil vapor concentrations at the site continue to drop over time. The same contaminants continue to be present, and no new contaminants were observed during this sampling round. Concentrations present in April 1994 were more than 100,000 parts-per-billion volume (ppbv) total VOCs and have been reduced significantly. The highest concentrations observed in December 1994 were near 16,000 ppbv (well VEW-11). The highest concentrations observed in the current sampling are 8,250 ppmv (well VEW-11). In two wells, VRW-1 and VRW-2, concentrations increased slightly. However, concentrations in these two wells continue to be relatively low, at 500 ppbv or less. Overall, concentrations in the other wells sampled were reduced to levels from one-half to less than one-tenth of the December 1994 concentrations.

Figures 4-1 4-2 and 4-3 show total VOC concentrations for the April and December 1994 sampling and the current June 1996 sampling. The contour lines indicate that the contamination continues to center around the same area.

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Table 4-1. Lockheed Beaumont
26-27 June 1996/December 1994
Vapor Sampling Results

COMPOUND (Detection Limit Jun 1996 / Dec 1994)	VEW-6	VEW-8	VEW-10	VEW-10 duplicate	VEW-11	VEW-11 duplicate	VRW-1	VRW-1 duplic.	VRW-2	VMW-3	VMW-3 duplic. *	VMW-6	VMW-8	VMW-13	VMW-16	VMW-16 duplicate	VMW-19*	Air Stripr. Effluent *	Prim./Stg. Carbon Effluent*	Stack Effluent*
1,1-Dichloroethene (250/17)	350/ 1,360	ND/ 840	250/ 3,420	250/ 3,420	6,800/ 7,740	6,600/ 7,740	500/ ND	/	/	1,400/ 1,350	1,500/	480/ 2,390	/	ND/ 690	ND/ 2,140	ND/ 2,140	/	380/ *	280/	/
Methylene Chloride (1,400/Not Analyzed for)	/	/	1,600/ ND	1,600/ ND	/	/	/	/	/	/	1,700/	/	/	/	/	/	/	/	/	/
1,1,1-Trichloroethane (180/33)	/	/	1,000/ 4,440	1,000/ 4,440	180/ 3,860	ND /3,860	/	/	/	350/ 1,420	550/	ND/ 960	ND/ 180	ND/ 200	ND/ 320	ND/ 320	/	/	/	/
1,1,2-Trichloroethane (180/33)	/	/	/	/	/	/	/	/	/	310/ ND	290/	/	/	/	/	/	/	/	/	/
Trichloroethene (190/49)	240/ 1,130	ND/ 290	ND/ 2,280	ND/ 2,280	1,000/ 4,580	950/ 4,580	/	/	/	910/ 2,650	890/	ND/ 2,360	ND/ 210	ND/ 280	ND/ 3,660	ND/ 3,660	/	300/	/	/
Toluene (270/63)	/	/	290/ ND	270/ ND	270/ ND	270/ ND	ND/ 90	ND/ 90	290/ ND	/	320/	/	/	ND/ 30	/	/	/	/	/	/
Perchloroethene (300/76)	/	/	/	/	ND/ 100	ND/ 100	/	/	/	/	/	/	/	ND/ 60	/	/	/	/	/	/
Total Sum	590/ 2,510	ND/ 1,130	3,140/ 10,080	3,120/ 10,080	8,250/ 15,980	7,830/ 15,980	500/ 90	ND/ 90	290/ ND	3,170/ 5,620	5,200/	480/ 5,910	ND/ 390	ND/ 1,290	ND/ 6,620	ND/ 6,620	ND/ *	680/ *	280/ *	ND/ *

Notes: This table only shows compounds that were detected at one or more locations.
- All results in parts per billion (ppb) volume
- ND or blank = not detected
- June 1996 concentration / December 1994 concentration
- * = This location not sampled in December 1994

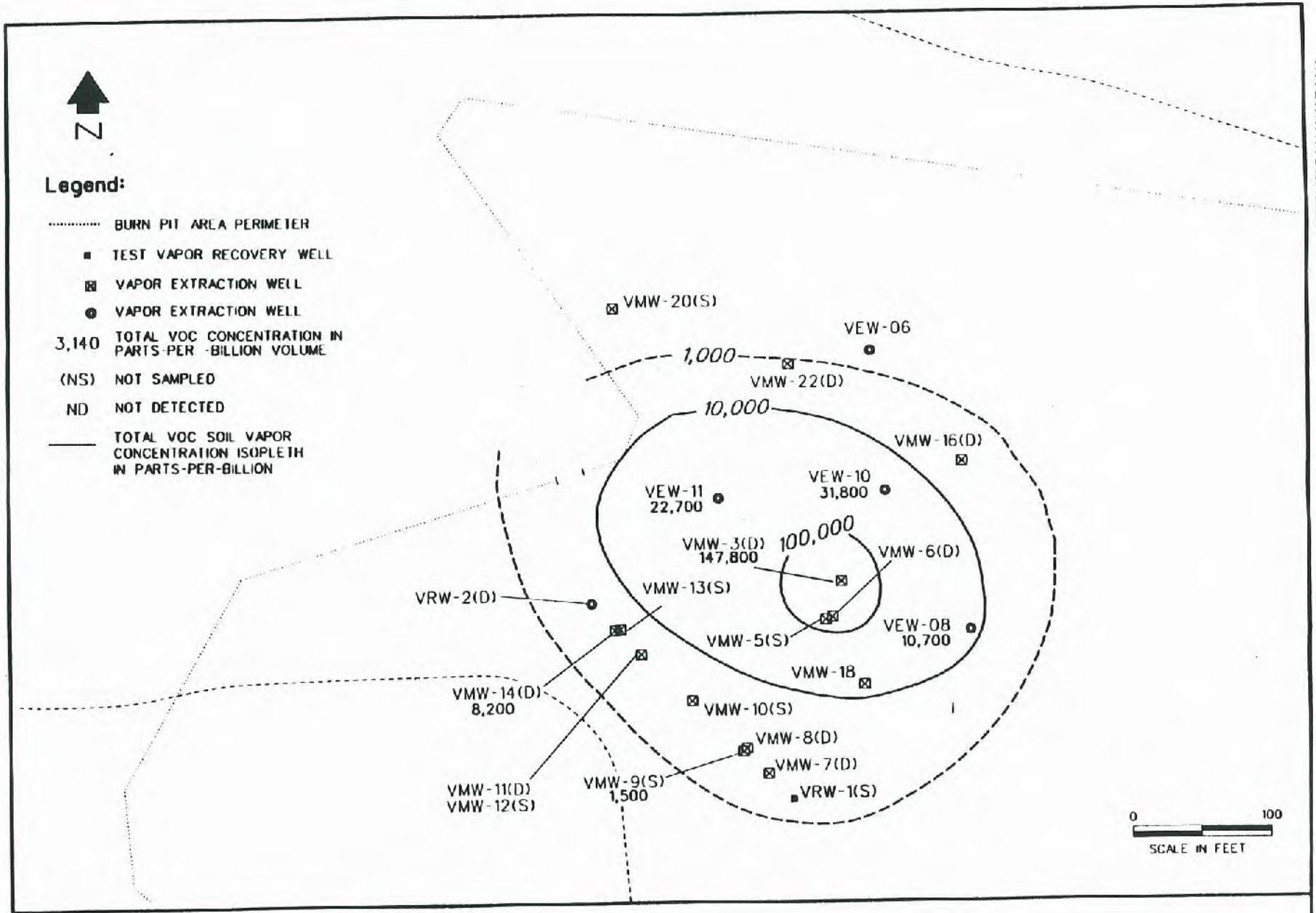

Figure 4-1 Soil Vapor Concentrations in Alluvium, April 1994

LOCK17 BPSV2Q94 SAC VRL

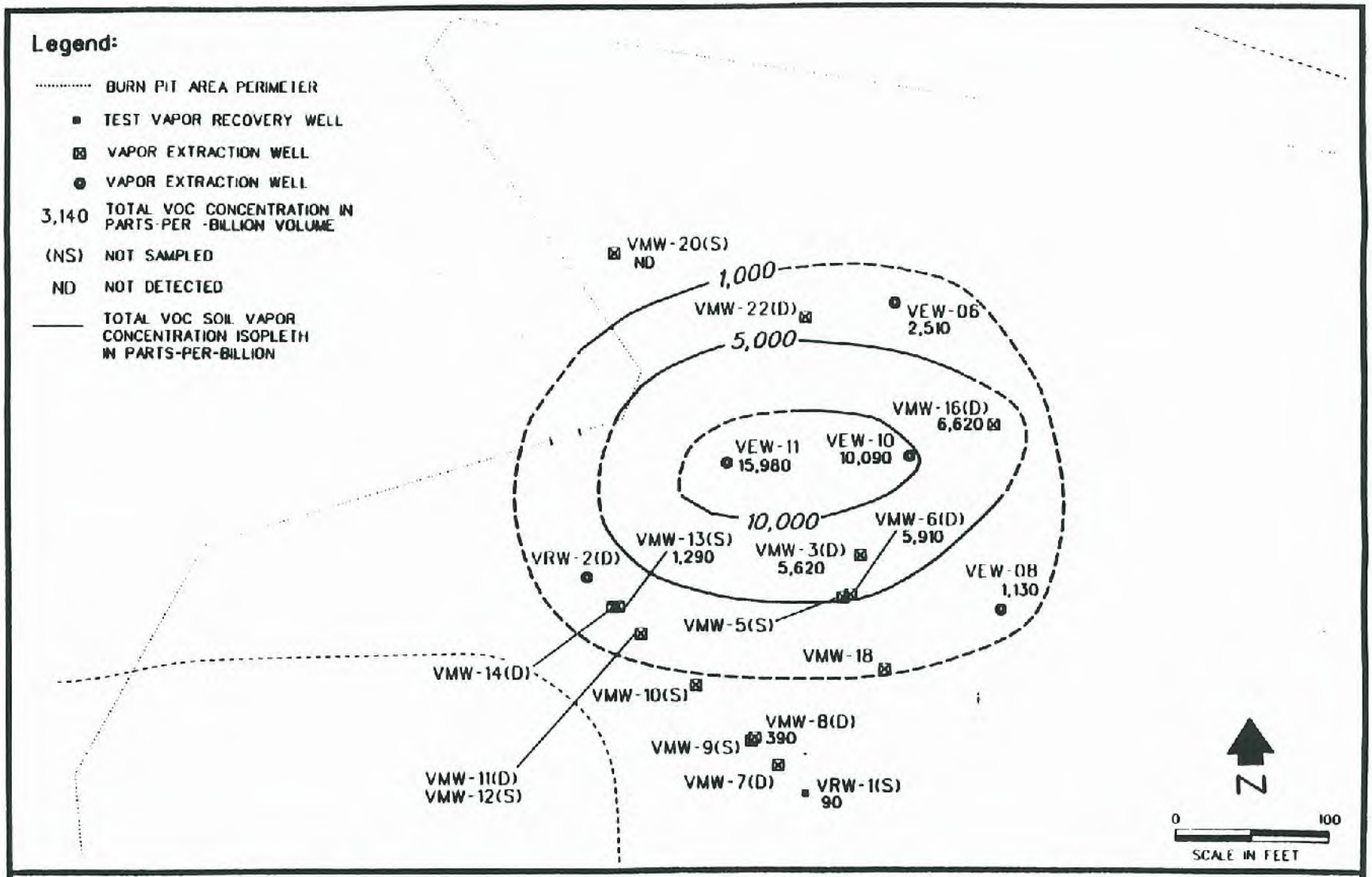

Figure 4-2. Soil Vapor Concentrations in Alluvium, December 1994

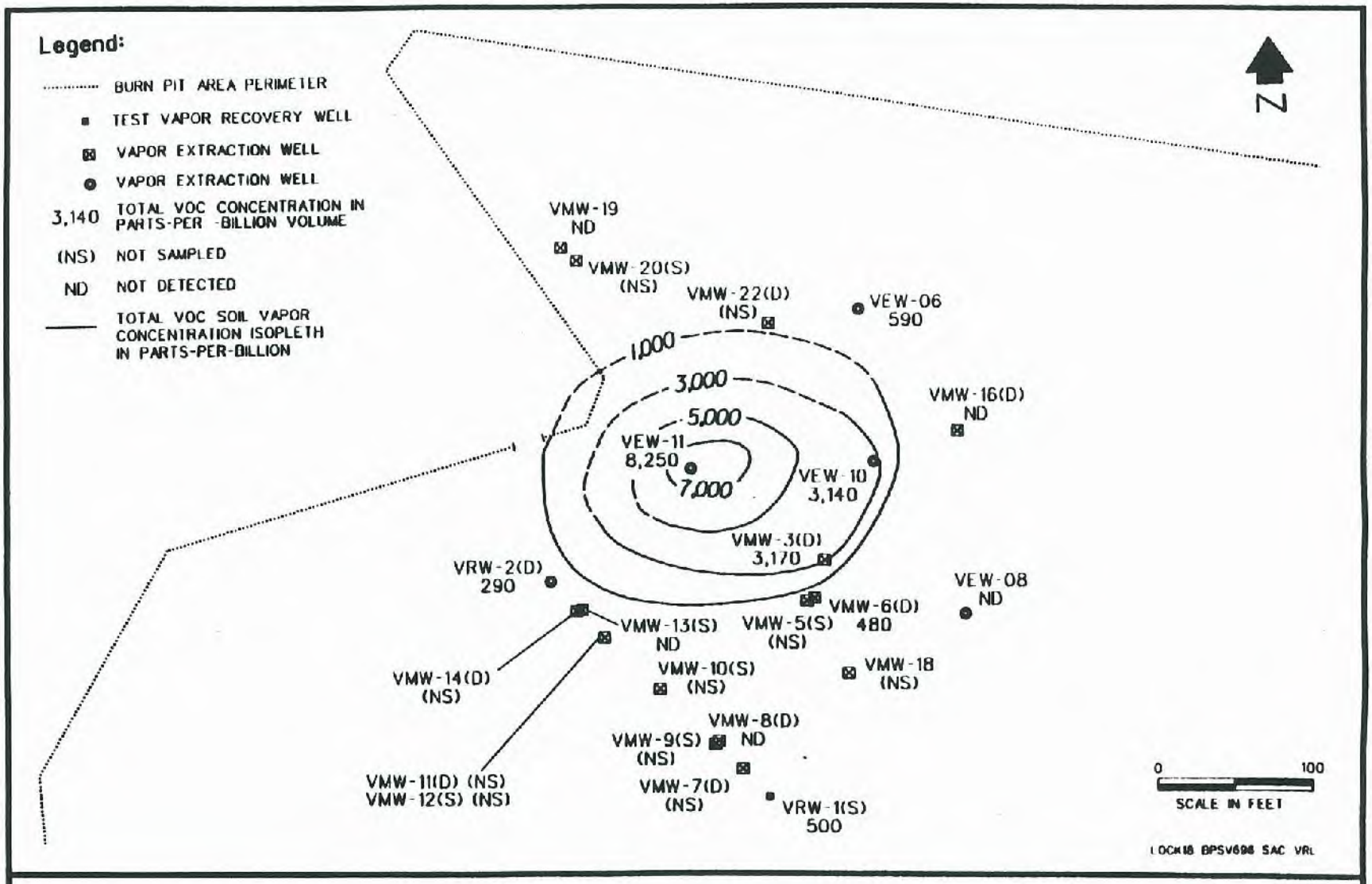

Figure 4-3. Soil Vapor Concentrations in Alluvium, June 1996

5.0 Conclusions and Recommendations

With continued operation of the vapor extraction wells and two-phase wells, soil vapor concentrations will continue to decrease in the burn pit area. At some time in the next year or two, soil vapors should decrease to the point where they are not of concern.

If groundwater levels continue to decline, the screened intervals of the two-phase wells will be exposed, and the amount of vapors extracted should increase. This will accelerate the decline in soil vapor concentrations. At some point in the future, the conventional vapor extraction system can be operated cyclically to save on operating costs, or turned off all together.

5.1 General Remediation System Operations

Now that the remediation system at the site has an operating history of more than two years, and a considerable amount of data has been collected, the data should be evaluated to answer any questions regarding system performance. These questions include:

- What parts of the system have worked well, and have produced the intended results?
- What should be the remediation end-point? How "clean" should it be?
- Now that there is data on system performance, how long will it take to reach the end-point and what will it cost to get there?
- Compare remediation and divestiture time lines, do they coincide?
- What are the cost-vs-time trade-offs for various modes of remediation system operation?

5.2 Possible Remediation System Strategies

Based on the available information, we suggest that three remediation system operation strategies be considered. They include a low cost strategy, a continued current operation strategy, and a higher cost (more rapid remediation) strategy. For each, a general strategy is stated, and various operational changes to meet the strategy are presented.

Lower Operating Costs:

- Minimize operations or shut system off altogether to reduce short-term costs.

Options:

- Examine regulatory latitude to revise operations, refocus sampling.
- Determine what the costs to operate at a minimum level are.
- Evaluate likely plume response to minimized operation and new remediation end-point.
- Run the conventional vapor extraction system cyclically.
- Stop extracting groundwater in the Burn Pit Area or extract cyclically.
- Turn off the CatOx system if the vapors are low enough to justify.
- Stop operations in the Burn Pit Area and only operate in the Rocket Motor Production area.
- Turn off the system altogether.

Maintain Current Operating Approach:

- Keep system configuration as it is now, or initiate minor revisions until property divestiture strategy is clear.

Options:

- Determine time line of likely remediation end-point.
- Refine sampling effort to support system performance evaluation.
- Evaluate long-term operating expense.
- Continue operations in current configuration.

- Attempt to operate system in 2-Phase mode.

Accelerate Remediation:

- Enhance system with Air Sparging to reduce clean-up time line.

Options:

- Evaluate likely remediation time frame.
- Revise sampling plan to support early shut-down of system components.
- Add more extraction wells.
- Add Air Sparging to expedite remediation.

Consideration of the above remediation strategies and approaches may help Lockheed more closely match operation of the system, and remediation results to other corporate objectives for the divestiture or development of the site.

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Appendix A

Field Data Sheets, Lab Results

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Sampling Methodology

The sampling methodology was as follows:

- Using previous analytical results, a cleanest to dirtiest scenario was developed in which the presumably clean wells were sampled first and dirtiest wells last (the collection order is shown on the Master Sample Control Log in Appendix A).
- Whenever possible, water levels were recorded in the burn pit (primarily the EW wells and VRW-3) before sampling. If the screen interval was saturated, the well was bypassed as a sampling location.
- Prior to sampling, the OVA was calibrated to 100 ppm hexane.
- All syringes were 5.0 cc and provided to Radian by Centrum. An equipment blank was run for each syringe prior to use in the field.
- A generator supplied by Lockheed-Martin was used to power the sampling apparatus.

Sample collection procedures were as follows:

1) Run ambient air through the sampling system for a minimum of five minutes prior to sampling.

2) Attach the Teflon tubing to the well head for the precalculated amount of time. Purge time was calculated using the following calculation:

   screen interval × 0.66 × 3 × 4.4 = liters, then,
   liters/4.0 liters/min = purge time in minutes.

   A two-inch well uses the same formula, except 0.17 is substituted for 0.65. The purge rate of the pump was set for 4.0 liters/min using a rotometer attached to the exhaust (effluent) side of the pump.

3) Each vapor sample location was assigned a unique sample number which was recorded on a unique COC.

4) The highest OVA reading obtained during purging was recorded in the comments section of the COC.

5) After the purge time was complete, the shut-off valve on the pump was closed and the pump turned off.

6) A syringe was inserted through the septum on the sample port and the mininert valve was opened. Each sample was collected over a period of 12 seconds. Each sample was withdrawn and purged to the atmosphere.

7) Step 6 was repeated two additional times.

8) On the third time, the mininert valve on the syringe was closed before withdrawal. If a field duplicate was specified, steps 6 and 7 were repeated.

9) The syringe was placed into a plastic bag, shielded from the sun, a chain-of-custody (COC) form was completed, and the sample was delivered to the mobile lab for immediate analysis.

The mobile lab analyzed the samples for volatile organics using EPA Method 8260. A total of 27 samples were analyzed:

- 12 vapor well locations (see Table 1-1);
- 3 airstripping compound locations;
- 6 equipment blanks (each syringe #1, 2, 3) once a day prior to use;
- 3 field duplicates (VMW-16, VEW-10, VEW-11);
- 3 resamples: VMW-3 and VMW-8 due to low surrogate recovery, and well VRW-1 at the request of BobLockheed.

VRW-1 was repeated because the well was left open (or more likely does not have a permanent cap). The well was originally sampled because the water table was below the screen interval. Since the results were ND, it was capped and let sit overnight to collect vapor. The following day, three complete well volumes were purged (total time 2 hours and 24 minutes). A sample was then collected (also came back ND).

APPENDIX A

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Centrum
(800) 798-9336

EPA 8010 Compounds (Volatile Halocarbons) by GC/MS

Client:	Radian	Date Sampled:	06/26/96
Project:	Beaumont Vapor Wells	Date Received:	06/26/96
Job No.:	M3-010	Date Analyzed:	06/26/96
Matrix:	Vapor	Batch Number:	M38260A012
Analyst:	JMR	Method Number:	8260

	Sample ID:	Blank	Syringe#1 Blank(001)	VRW-2 002	VMW-19 003	Syringe#2 Blank(004)	VRW-1 005
Compounds	DL	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v
Bromobenzene	300	ND	ND	ND	ND	ND	ND
Bromodichloromethane	300	ND	ND	ND	ND	ND	ND
Bromoform	300	ND	ND	ND	ND	ND	ND
Bromomethane	300	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	300	ND	ND	ND	ND	ND	ND
Chlorobenzene	300	ND	ND	ND	ND	ND	ND
Chloroethane	300	ND	ND	ND	ND	ND	ND
Chloroform	300	ND	ND	ND	ND	ND	ND
Chloromethane	300	ND	ND	ND	ND	ND	ND
Dibromochloromethane	300	ND	ND	ND	ND	ND	ND
Dibromomethane	300	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	300	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	300	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	300	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	250	ND	ND	ND	ND	ND	500
cis-1,2-Dichloroethene	300	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	300	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	300	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	300	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	300	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	300	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	300	ND	ND	ND	ND	ND	ND
Methylene chloride	1400	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	300	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	300	ND	ND	ND	ND	ND	ND
Tetrachloroethene	300	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	180	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	180	ND	ND	ND	ND	ND	ND
Trichloroethene	186	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	300	ND	ND	ND	ND	ND	ND
Vinyl chloride	300	ND	ND	ND	ND	ND	ND

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Matrix:	Vapor	Batch Number:	M38260A012
Analyst:	JMR	Method Number:	8260

	Sample ID:	Blank	Syringe#1 Blank(001)	VRW-2 002	VMW-19 003	Syringe#2 Blank(004)	VRW-1 005
Compounds	DL	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v
Benzene	310	ND	ND	ND	ND	ND	ND
Toluene	270	ND	ND	290	ND	ND	ND
Ethylbenzene	230	ND	ND	ND	ND	ND	ND
Total Xylenes	230	ND	ND	ND	ND	ND	ND

Surrogates (% recovery) Limits: 70 - 120

Sample ID:	Blank	Syringe#1 Blank(001)	VRW-2 002	VMW-19 003	Syringe#2 Blank(004)	VRW-1 005
Dibromofluoromethane	98	70	71	100	96	73
Toluene-d8	98	97	98	98	97	96
Bromofluorobenzene	108	109	108	107	105	105

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Job No.:	M3-010	Date Analyzed:	06/26/96
Matrix:	Vapor	Batch Number:	M38260A012
Analyst:	JMR	Method Number:	8260

	Sample ID:	VMW-8 006	VMW-13 007	VMW-16 008	VMW-16 009	Syringe#3 Blank(010)	VMW-3 011
Compounds	DL	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v
Bromobenzene	300	ND	ND	ND	ND	ND	ND
Bromodichloromethane	300	ND	ND	ND	ND	ND	ND
Bromoform	300	ND	ND	ND	ND	ND	ND
Bromomethane	300	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	300	ND	ND	ND	ND	ND	ND
Chlorobenzene	300	ND	ND	ND	ND	ND	ND
Chloroethane	300	ND	ND	ND	ND	ND	ND
Chloroform	300	ND	ND	ND	ND	ND	ND
Chloromethane	300	ND	ND	ND	ND	ND	ND
Dibromochloromethane	300	ND	ND	ND	ND	ND	ND
Dibromomethane	300	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	300	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	300	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	300	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	250	ND	ND	ND	ND	ND	**1,400**
cis-1,2-Dichloroethene	300	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	300	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	300	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	300	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	300	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	300	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	300	ND	ND	ND	ND	ND	ND
Methylene chloride	1400	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	300	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	300	ND	ND	ND	ND	ND	ND
Tetrachloroethene	300	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	180	ND	ND	ND	ND	ND	**550**
1,1,2-Trichloroethane	180	ND	ND	ND	ND	ND	**310**
Trichloroethene	186	ND	ND	ND	ND	ND	**910**
1,2,3-Trichloropropane	300	ND	ND	ND	ND	ND	ND
Vinyl chloride	300	ND	ND	ND	ND	ND	ND

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Centrum
(800) 798-9336

EPA 8010 Compounds (Volatile Halocarbons) by GC/MS

Client:	Radian	Date Sampled:	06/26/96
Project:	Beaumont Vapor Wells	Date Received:	06/26/96
Job No.:	M3-010	Date Analyzed:	06/26/96
Matrix:	Vapor	Batch Number:	M38260A012
Analyst:	JMR	Method Number:	8260

	Sample ID:	VMW-8 006	VMW-13 007	VMW-16 008	VMW-16 009	Syringe#3 Blank(010)	VMW-3 011
Compounds	**DL**	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v
Benzene	310	ND	ND	ND	ND	ND	ND
Toluene	270	ND	ND	ND	ND	ND	ND
Ethylbenzene	230	ND	ND	ND	ND	ND	ND
Total Xylenes	230	ND	ND	ND	ND	ND	ND

Surrogates (% recovery) Limits: 70 - 120

Sample ID:	VMW-8 006	VMW-13 007	VMW-16 008	VMW-16 009	Syringe#3 Blank(010)	VMW-3 011
Dibromofluoromethane	71	99	99	97	72	67*
Toluene-d8	96	97	96	96	98	96
Bromofluorobenzene	105	104	103	105	108	103

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Client:	Radian	Date Sampled:	06/26/96
Project:	Beaumont Vapor Wells	Date Received:	06/26/96
Job No.:	M3-010	Date Analyzed:	06/26/96
Matrix:	Vapor	Batch Number:	M38260A012
Analyst:	JMR	Method Number:	8260

	Sample ID:	VMW-6 012	VMW-8 013
Compounds	DL	ppb v/v	ppb v/v
Bromobenzene	300	ND	ND
Bromodichloromethane	300	ND	ND
Bromoform	300	ND	ND
Bromomethane	300	ND	ND
Carbon tetrachloride	300	ND	ND
Chlorobenzene	300	ND	ND
Chloroethane	300	ND	ND
Chloroform	300	ND	ND
Chloromethane	300	ND	ND
Dibromochloromethane	300	ND	ND
Dibromomethane	300	ND	ND
1,2-Dichlorobenzene	300	ND	ND
1,3-Dichlorobenzene	300	ND	ND
1,4-Dichlorobenzene	300	ND	ND
Dichlorodifluoromethane	300	ND	ND
1,1-Dichloroethane	300	ND	ND
1,2-Dichloroethane	300	ND	ND
1,1-Dichloroethene	250	480	ND
cis-1,2-Dichloroethene	300	ND	ND
trans-1,2-Dichloroethene	300	ND	ND
1,2-Dichloropropane	300	ND	ND
1,3-Dichloropropane	300	ND	ND
2,2-Dichloropropane	300	ND	ND
cis-1,3-Dichloropropene	300	ND	ND
trans-1,3-Dichloropropene	300	ND	ND
Methylene chloride	1400	ND	ND
1,1,1,2-Tetrachloroethane	300	ND	ND
1,1,2,2-Tetrachloroethane	300	ND	ND
Tetrachloroethene	300	ND	ND
1,1,1-Trichloroethane	180	ND	ND
1,1,2-Trichloroethane	180	ND	ND
Trichloroethene	186	ND	ND
1,2,3-Trichloropropane	300	ND	ND
Vinyl chloride	300	ND	ND

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Client:	Radian	Date Sampled:	06/26/96
Project:	Beaumont Vapor Wells	Date Received:	06/26/96
Job No.:	M3-010	Date Analyzed:	06/26/96
Matrix:	Vapor	Batch Number:	M38260A012
Analyst:	JMR	Method Number:	8260

		VMW-6	VMW-8
	Sample ID:	012	013
Compounds	DL	ppb v/v	ppb v/v
Benzene	310	ND	ND
Toluene	270	ND	ND
Ethylbenzene	230	ND	ND
Total Xylenes	230	ND	ND

Surrogates (% recovery) Limits: 70 - 120

	VMW-6	VMW-8
Sample ID:	012	013
Dibromofluoromethane	78	98
Toluene-d8	96	96
Bromofluorobenzene	106	103

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QC Sample Report - EPA Method 8260

Matrix: Vapor
Batch #: M38260A012

Batch Accuracy Results

Sample ID: Laboratory Control Sample

Analyte	Spike Concentration ng/cc	% Recovery LCS	Acceptance Limits % Recovery	Pass/Fail
1,1-Dichloroethene	0.020	101	59 - 172	Pass
Benzene	0.020	101	66 - 142	Pass
Trichloroethene	0.020	97	71 - 137	Pass
Toluene	0.020	104	59 - 139	Pass
Chlorobenzene	0.020	106	60 - 133	Pass

Analytical Notes:

Batch Precision Results

Sample ID: 008
Duplicate Sample ID: 009

Analyte	Sample Recovery ppb v/v	Duplicate Recovery ppb v/v	Relative Percent Difference (RPD)	Upper Control Limit RPD	Pass/Fail
1,1-Dichloroethene	ND	ND	0%	25%	Pass
1,1,1-Trichloroethene	ND	ND	0%	25%	Pass
Toluene	ND	ND	0%	25%	Pass

Analytical Notes:

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Centrum Analytical Laboratories, Inc.

CERTIFIED HAZARDOUS WASTE TESTING LABORATORY • CHEMICAL AND BIOLOGICAL ANALYSES

Client: Radian International
16845 Von Karman Ave.
Irvine, CA 92514

On-Site Date: 06/27/96
Job Number: M3-011

Project: Beaumont Vapor Wells

CASE NARRATIVE
MOBILE LABORATORY REPORT

The following information applies to samples which were received for analysis by Centrum Analytical Mobile Environmental Laboratory Number Three(MEL #3) on 06/27/96 :

The samples were received at the project site in good condition and were either analyzed immediately.

This report is a re-issue. The data herein is a revised reporting of the results for these analyses and supersedes any other version issued previously. The date of re-issue is 7/22/96.

Unless otherwise noted below, the Quality Control acceptance criteria were met for all samples for every analysis requested.

Report approved by:

Robert R. Clark, Ph.D.
Laboratory Director

ELAP # 2134

DL : Detection Limit – The lowest level at which the compound can reliably be detected under normal laboratory conditions.
ND : Not Detected – The compound was analyzed for but was not found to be present at or above the detection limit.
NA : Not Analyzed – Per client request, this analyte was not on the list of compounds to be analyzed for.

RADIAN INTERNATIONAL LLC

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EPA 8010 Compounds (Volatile Halocarbons) by GC/MS

Client:	Radian International	Date Sampled:	06/27/96
Project:	Beaumont Vapor Wells	Date Received:	06/27/96
Job No.:	M3-011	Date Analyzed:	06/27/96
Matrix:	Vapor	Batch Number:	M38260A013
Analyst:	TPW	Method Number:	8260

	Sample ID:	Blank	Syringe#1 Blank(014)	VEW-6 015	Syringe#2 Blank(016)	VEW-6 017	Syringe#3 Blank(018)
Compounds	DL	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v
Bromobenzene	300	ND	ND	ND	ND	ND	ND
Bromodichloromethane	300	ND	ND	ND	ND	ND	ND
Bromoform	300	ND	ND	ND	ND	ND	ND
Bromomethane	300	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	300	ND	ND	ND	ND	ND	ND
Chlorobenzene	300	ND	ND	ND	ND	ND	ND
Chloroethane	300	ND	ND	ND	ND	ND	ND
Chloroform	300	ND	ND	ND	ND	ND	ND
Chloromethane	300	ND	ND	ND	ND	ND	ND
Dibromochloromethane	300	ND	ND	ND	ND	ND	ND
Dibromomethane	300	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	300	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	300	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	300	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	250	ND	ND	ND	ND	350	ND
cis-1,2-Dichloroethene	300	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	300	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	300	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	300	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	300	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	300	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	300	ND	ND	ND	ND	ND	ND
Methylene chloride	1400	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	300	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	300	ND	ND	ND	ND	ND	ND
Tetrachloroethene	300	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	180	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	180	ND	ND	ND	ND	ND	ND
Trichloroethene	186	ND	ND	ND	ND	240	ND
1,2,3-Trichloropropane	300	ND	ND	ND	ND	ND	ND
Vinyl chloride	300	ND	ND	ND	ND	ND	ND

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EPA 8010 Compounds (Volatile Halocarbons) by GC/MS

Client:	Radian International	Date Sampled:	06/27/96
Project:	Beaumont Vapor Wells	Date Received:	06/27/96
Job No.:	M3-011	Date Analyzed:	06/27/96
Matrix:	Vapor	Batch Number:	M38260A013
Analyst:	TPW	Method Number:	8260

	Sample ID:	Blank	Syringe#1 Blank(014)	VEW-6 015	Syringe#2 Blank(016)	VEW-6 017	Syringe#3 Blank(018)
Compounds	DL	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v
Benzene	310	ND	ND	ND	ND	ND	ND
Toluene	270	ND	ND	ND	ND	ND	ND
Ethylbenzene	230	ND	ND	ND	ND	ND	ND
Total Xylenes	230	ND	ND	ND	ND	ND	ND

Surrogates (% recovery) Limits: 70 - 120

Sample ID:	Blank	Syringe#1 Blank(014)	VEW-6 015	Syringe#2 Blank(016)	VEW-6 017	Syringe#3 Blank(018)
Dibromofluoromethane	98	95	98	97	98	99
Toluene-d8	96	95	95	96	97	95
Bromofluorobenzene	102	103	101	102	102	99

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EPA 8010 Compounds (Volatile Halocarbons) by GC/MS

Client:	Radian International	Date Sampled:	06/27/96
Project:	Beaumont Vapor Wells	Date Received:	06/27/96
Job No.:	M3-011	Date Analyzed:	06/27/96
Matrix:	Vapor	Batch Number:	M38260A013
Analyst:	TPW	Method Number:	8260

		~~VEW-3~~	VEW-10	VEW-10	VEW-11	VEW-11	A/S Eff
	Sample ID:	019	020	Dup. (021)	022	Dup. (023)	024
Compounds	DL	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v
Bromobenzene	300	ND	ND	ND	ND	ND	ND
Bromodichloromethane	300	ND	ND	ND	ND	ND	ND
Bromoform	300	ND	ND	ND	ND	ND	ND
Bromomethane	300	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	300	ND	ND	ND	ND	ND	ND
Chlorobenzene	300	ND	ND	ND	ND	ND	ND
Chloroethane	300	ND	ND	ND	ND	ND	ND
Chloroform	300	ND	ND	ND	ND	ND	ND
Chloromethane	300	ND	ND	ND	ND	ND	ND
Dibromochloromethane	300	ND	ND	ND	ND	ND	ND
Dibromomethane	300	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	300	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	300	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	300	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	300	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	250	**1,500**	**250**	**250**	**6,800**	**6,600**	**380**
cis-1,2-Dichloroethene	300	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	300	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	300	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	300	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	300	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	300	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	300	ND	ND	ND	ND	ND	ND
Methylene chloride	1400	**1,700**	**1,600**	**1,600**	ND	ND	ND
1,1,1,2-Tetrachloroethane	300	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	300	ND	ND	ND	ND	ND	ND
Tetrachloroethene	300	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	180	**550**	**1,000**	**1,000**	**180**	ND	ND
1,1,2-Trichloroethane	180	**290**	ND	ND	ND	ND	ND
Trichloroethene	186	**890**	ND	ND	**1,000**	**950**	**300**
1,2,3-Trichloropropane	300	ND	ND	ND	ND	ND	ND
Vinyl chloride	300	ND	ND	ND	ND	ND	ND

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Client:	Radian International	Date Sampled:	06/27/96
Project:	Beaumont Vapor Wells	Date Received:	06/27/96
Job No.:	M3-011	Date Analyzed:	06/27/96
Matrix:	Vapor	Batch Number:	M38260A013
Analyst:	TPW	Method Number:	8260

	Sample ID:	VEW-3 019	VEW-10 020	VEW-10 Dup. (021)	VEW-11 022	VEW-11 Dup. (023)	A/S Eff 024
Compounds	**DL**	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v	ppb v/v
Benzene	310	ND	ND	ND	ND	ND	ND
Toluene	270	**320**	**290**	**270**	**270**	**270**	ND
Ethylbenzene	230	ND	ND	ND	ND	ND	ND
Total Xylenes	230	ND	ND	ND	ND	ND	ND

Surrogates (% recovery) Limits: 70 - 120

Sample ID:	VEW-3 019	VEW-10 020	VEW-10 Dup. (021)	VEW-11 022	VEW-11 Dup. (023)	A/S Eff 024
Dibromofluoromethane	98	97	98	97	98	81
Toluene-d8	95	95	95	95	94	95
Bromofluorobenzene	100	101	100	100	100	104

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Job No.:	M3-011	Date Analyzed:	06/27/96
Matrix:	Vapor	Batch Number:	M38260A013
Analyst:	TPW	Method Number:	8260

		P-C	S-C	VRW-1
	Sample ID:	025	026	027
Compounds	DL	ppb v/v	ppb v/v	ppb v/v
Bromobenzene	300	ND	ND	ND
Bromodichloromethane	300	ND	ND	ND
Bromoform	300	ND	ND	ND
Bromomethane	300	ND	ND	ND
Carbon tetrachloride	300	ND	ND	ND
Chlorobenzene	300	ND	ND	ND
Chloroethane	300	ND	ND	ND
Chloroform	300	ND	ND	ND
Chloromethane	300	ND	ND	ND
Dibromochloromethane	300	ND	ND	ND
Dibromomethane	300	ND	ND	ND
1,2-Dichlorobenzene	300	ND	ND	ND
1,3-Dichlorobenzene	300	ND	ND	ND
1,4-Dichlorobenzene	300	ND	ND	ND
Dichlorodifluoromethane	300	ND	ND	ND
1,1-Dichloroethane	300	ND	ND	ND
1,2-Dichloroethane	300	ND	ND	ND
1,1-Dichloroethene	250	280	ND	ND
cis-1,2-Dichloroethene	300	ND	ND	ND
trans-1,2-Dichloroethene	300	ND	ND	ND
1,2-Dichloropropane	300	ND	ND	ND
1,3-Dichloropropane	300	ND	ND	ND
2,2-Dichloropropane	300	ND	ND	ND
cis-1,3-Dichloropropene	300	ND	ND	ND
trans-1,3-Dichloropropene	300	ND	ND	ND
Methylene chloride	1400	ND	ND	ND
1,1,1,2-Tetrachloroethane	300	ND	ND	ND
1,1,2,2-Tetrachloroethane	300	ND	ND	ND
Tetrachloroethene	300	ND	ND	ND
1,1,1-Trichloroethane	180	ND	ND	ND
1,1,2-Trichloroethane	180	ND	ND	ND
Trichloroethene	186	ND	ND	ND
1,2,3-Trichloropropane	300	ND	ND	ND
Vinyl chloride	300	ND	ND	ND

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Job No.:	M3-011	Date Analyzed:	06/27/96
Matrix:	Vapor	Batch Number:	M38260A013
Analyst:	TPW	Method Number:	8260

		P-C	S-C	VRW-1
	Sample ID:	025	026	027
Compounds	DL	ppb v/v	ppb v/v	ppb v/v
Benzene	310	ND	ND	ND
Toluene	270	ND	ND	ND
Ethylbenzene	230	ND	ND	ND
Total Xylenes	230	ND	ND	ND

Surrogates (% recovery) Limits: 70 - 120

	P-C	S-C	VRW-1
Sample ID:	025	026	027
Dibromofluoromethane	80	101	79
Toluene-d8	95	94	94
Bromofluorobenzene	102	104	103

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QC Sample Report - EPA Method 8260

Matrix: Vapor
Batch #: M3-011

Batch Accuracy Results

Sample ID: Laboratory Control Sample

Analyte	Spike Concentration ng/cc	% Recovery LCS	Acceptance Limits % Recovery	Pass/Fail
1,1-Dichloroethene	0.020	102	59 - 172	Pass
Benzene	0.020	102	66 - 142	Pass
Trichloroethene	0.020	90	71 - 137	Pass
Toluene	0.020	95	59 - 139	Pass
Chlorobenzene	0.020	103	60 - 133	Pass

Analytical Notes:

Batch Precision Results

Sample ID: 020
Duplicate Sample ID: 021

Analyte	Sample Recovery ppb v/v	Duplicate Recovery ppb v/v	Relative Percent Difference (RPD)	Upper Control Limit RPD	Pass/Fail
1,1-Dichloroethene	252	252	0%	25%	Pass
1,1,1-Trichloroethene	1008	1026	2%	25%	Pass
Toluene	292	266	9%	25%	Pass

Analytical Notes:

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QC Sample Report - EPA Method 8260

Matrix: Vapor
Batch #: M3-011

Batch Accuracy Results

Sample ID: Laboratory Control Sample Duplicate

Analytical Notes:

Analyte	Spike Concentration ng/cc	% Recovery LCS	Acceptance Limits % Recovery	Pass/Fail
1,1-Dichloroethene	0.020	100	59 - 172	Pass
Benzene	0.020	102	66 - 142	Pass
Trichloroethene	0.020	90	71 - 137	Pass
Toluene	0.020	95	59 - 139	Pass
Chlorobenzene	0.020	102	60 - 133	Pass

Batch Precision Results

Sample ID: 022
Duplicate Sample ID: 023

Analytical Notes:

Analyte	Sample Recovery ppb v/v	Duplicate Recovery ppb v/v	Relative Percent Difference (RPD)	Upper Control Limit RPD	Pass/Fail
1,1-Dichloroethene	6810	6558	4%	25%	Pass
1,1,1-Trichloroethene	183	165	10%	25%	Pass
Trichloroethene	1023	949	8%	25%	Pass
Toluene	268	268	0%	25%	Pass