EG+G - 22-09-10-09
#9502130005

MIAMISBURG
AREA OFFICE

Department of Energy

Ohio Field Office
Miamisburg Area Office
P.O. Box 66
Miamisburg, Ohio 45343-0066

JAN 9 1995

JAN 11 REC'D

Mr. Tim Fischer
U.S. EPA
HSRM-6J
77 W. Jackson
Chicago, IL 60604

Mr. Brian Nickel
Ohio EPA
401 E. Fifth Street
Dayton, OH 45402-2911

OU2

RE: U.S. DOE Mound Plant
B-Building Solvent Storage Shed Removal Action
SVS System Performance Report

Dear Mr. Fischer and Mr. Nickel:

This letter serves to transmit a copy, for your information, the B-Building SVE System Performance Summary Report, Final (Revision 0).

Should you have any questions concerning this submittal, please feel free to contact me at (513) 865-3597.

Sincerely,

Arthur W. Kleinrath

Arthur W. Kleinrath
Project Engineer, Team Leader
Environmental Management

cc w/o attachment:

Monte Williams, EG&G
Jim Zahora, EG&G
Gary Coons, EG&G
John Sands, EM-453

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F- OU2
B-BLDG

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F - OU2
B - BLDG

EG&G MOUND APPLIED TECHNOLOGIES
P.O. BOX 3000 MIAMISBURG, OHIO 45343-3000 • TEL (513) 865-4020

JAN 0 4 1995

Mr. Arthur W. Kleinrath
Project Engineer, Team Leader
U.S. Department of Energy
Miamisburg Area Office
P.O. Box 66
Miamisburg, Ohio 45343

Dear Mr. Kleinrath:

Attached for your information are three copies of the B-Building SVE System Performance Summary Report, Final (revision 0). Attached is a draft letter for your submission to the Ohio EPA and US EPA. It is intended that one(1) copy be distributed to the Ohio and US EPA for their information.

If you require additional information, please contact me at (513) 865-3867.

Sincerely,

Gary L. Coons
OU2 Manager

APPROVED: C. S. Friedman
Charles S. Friedman
Vice President
ER & WM

cc w/o enclosure:

Chuck Friedman	(EG&G)
Monte Willams	(EG&G)
Jim Zahora	(EG&G)
Keith Egan	(ICF KAISER)

SUGGESTED COVER LETTER

Mr. Tim Fischer
U.S. EPA
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77 W. Jackson
Chicago, Illinois 60604

and

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401 E. Fifth Street
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EG&G MOUND-22-09-10-09----9502130005

Environmental Restoration Program

B BUILDING SVE SYSTEM PERFORMANCE SUMMARY REPORT

MOUND PLANT
MIAMISBURG, OHIO

December 1994

FINAL

(Revision 0)

Department of Energy
Ohio Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

ENVIRONMENTAL RESTORATION PROGRAM

B BUILDING SVE SYSTEM

PERFORMANCE SUMMARY REPORT

MOUND PLANT

MIAMISBURG, OHIO

DECEMBER 1994

DEPARTMENT OF ENERGY

OHIO FIELD OFFICE

ENVIRONMENTAL RESTORATION PROGRAM

EG&G MOUND APPLIED TECHNOLOGIES

FINAL

(REVISION 0)

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LIST OF ACRONYMS

111-TCA	1,1,1-trichloroethane
AFCB	after carbon filtration system sample
CERCLA	Comprehensive Environmental Response, Conservation and Liability Act
CO_2	carbon dioxide
Composite	comprehensive sample of extractive air composite
CFM	cubic feet per minute
DOE	U.S. Department of Energy
EE/CA	Engineering Evaluation and Cost Analysis
ER	Environmental Restoration
ETG	ETG Environmental, Inc.
EPA	Environmental Protection Agency
FFA	Federal Facility Agreement
IRA	Interim Remedial Action
ID	inside diameter
NPL	National Priority List
NS	not sampled
PPM	parts per million
PVC	poly vinyl chloride
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
SAFER	Streamline Approach for Environmental Restoration
survey	Soil Vapor Survey
SVE	soil vapor extraction
trans-12-DCE	trans-1,2-dichloroethene
TCE	trichloroethene
TVOC	total volatile organic compound
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

EXECUTIVE SUMMARY

A soil vapor survey (survey) was performed in 1992 near the B Building Solvent Storage Shed at the U.S. Department of Energy's (DOE) Mound Plant, located in Miamisburg, Ohio. The survey detected volatile organic compounds (VOCs) in the shallow soils adjacent to the B Building Solvent Storage Shed (DOE 1992). The contaminants identified in 1992 included freon 113, trans-1,2-dichloroethene (trans-12-DCE), 1,1,1-trichloroethane (111-TCA), trichloroethene (TCE), and toluene. Due to the presence of elevated VOCs, a removal action was initiated under the DOE Streamline Approach for Environmental Restoration (SAFER) program. The SAFER program is designed to conduct faster, cheaper, better, and safer environmental restorations. Soil Vapor Extraction (SVE) was selected as the preferred Interim Remedial Action (IRA) alternative for remediating the VOCs in the shallow soils at the B Building Solvent Storage Shed (DOE 1993).

A SVE system was installed in May of 1994, and consisted of 17 SVE wells, five nested soil probes, a clay cap, system piping, and a pumping unit. The SVE system was operated as a pilot test for one month; the results of the test are documented in an August, 1994 report (DOE 1994).

Once the pilot test was completed, the SVE system was placed in operation. This report documents the sampling, operation, and maintenance activities performed during the period from July 1, through September 22, 1994.

Target VOC concentrations have decreased by over 98 percent with the exception of TCE at 94%. TCE concentrations continue to fluctuate between less than 5 to 6.86 ppm. Total VOC concentrations in the offgas samples generally increased for a period of time from the concentrations reported in June. Offgas samples collected on September 22, 1994 were analyzed for VOCs by U.S. EPA Test Method 8240 in an attempt to identify other non-target VOCs that may be influencing the TVOC results. However, the analysis yielded results below detection limits for each compound analyzed. Generally the carbon dioxide concentrations have remained constant since the system startup in May 1994.

The SVE system has removed an estimated 33.94 pounds of contaminants by volatilization and an estimated 88.40 pounds of contaminants were destroyed through biodegradation for a total estimate of 122.34 pounds of contaminants removed from the B Building Solvent Storage Shed area.

Due to stabilization of the offgas results from the wells and the estimated reduction of target compounds by over 94%, it is recommended that the well configuration be reconfigured to access other zones of contamination.

1. INTRODUCTION

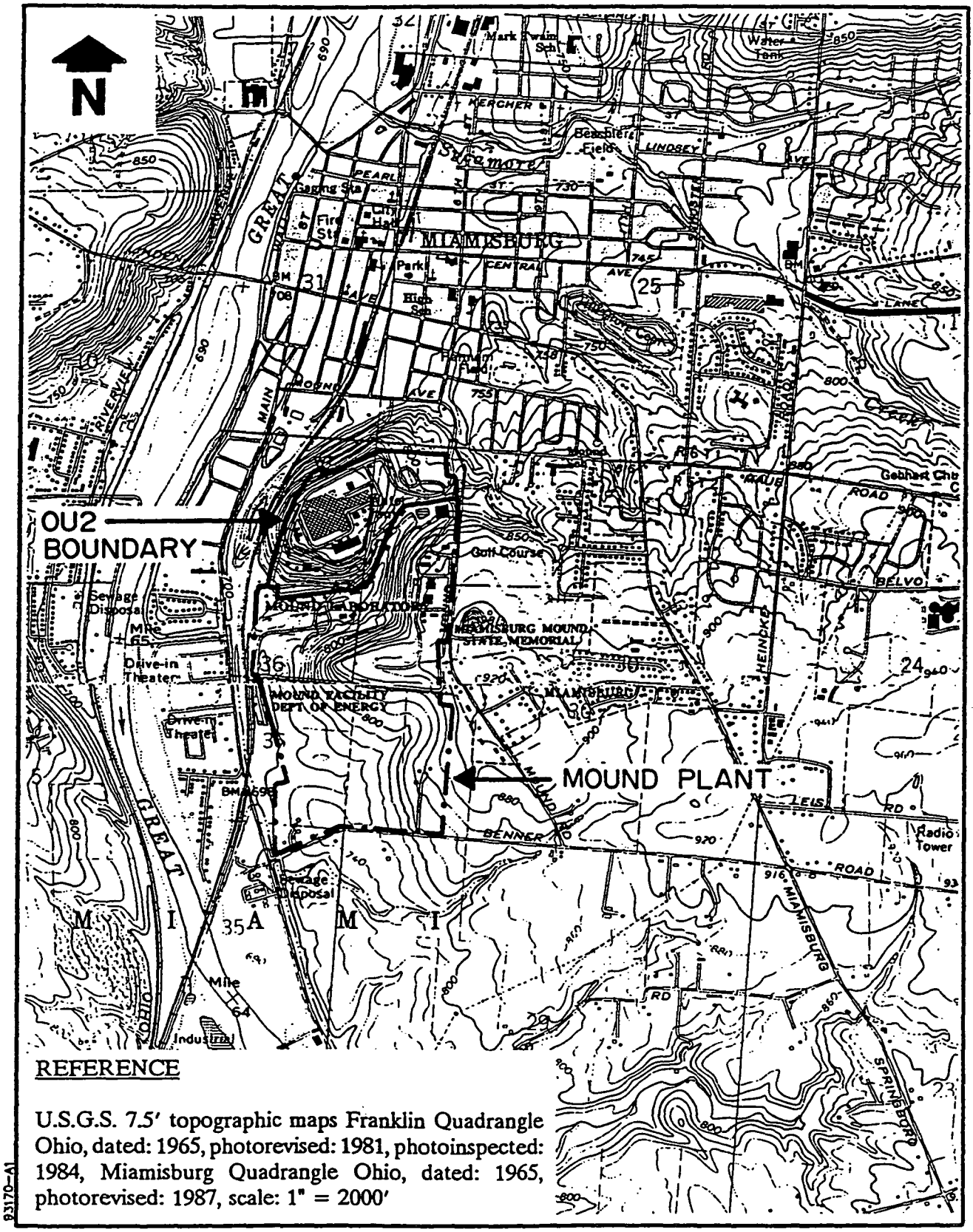
Mound Plant is a research and manufacturing facility for the production of radioactive power sources and military detonators. The facility is located in Miamisburg, Ohio (Figure 1.1). The facility is currently operated by EG&G Mound Applied Technologies for the Department of Energy (DOE). As a result of historical disposal practices and contaminant releases to the environment, Mound Plant was placed on the Comprehensive Environmental Response, Conservation and Liability Act (CERCLA), National Priority List (NPL) in November of 1989. DOE and the U.S. Environmental Protection Agency (USEPA) signed a Federal Facility Agreement (FFA) in October of 1990. In 1993 the FFA was modified to include the Ohio Environmental Protection Agency.

Mound Plant initiated an Environmental Restoration (ER) program in order to comply with the FAA. The ER program is patterned after the USEPA CERCLA program consisting of three phases. Phase I, Preliminary Assessment/Site Inspection was completed in 1986. Phase II, a Remedial Investigation/ Feasibility Study (RI/FS), is currently underway at the site. Phase III, Remedial Design/Remedial Action (RD/RA) will implement remedial alternatives chosen in the Feasibility Study of Phase II.

A soil gas survey was performed in August and September 1992 as a preliminary scoping investigation. The investigation identified the presence of soils containing elevated levels of volatile organic compounds (VOCs) in the area of the B Building Solvent Storage Shed. Due to the presence of the elevated VOCs an interim remedial action (IRA) was initiated under DOE's Streamline Approach for Environmental Restoration (SAFER) program. The goal of the SAFER program is to design and conduct faster, cheaper, better and safer environmental restorations.

An Engineering Evaluation and Cost Analysis (EE/CA) was prepared in October 1993 (DOE 1993). The EE/CA identified and evaluated potential remedial options. Soil vapor extraction (SVE) was selected as the preferred IRA alternative to begin remediation of the VOCs in the vicinity of the B Building Solvent Storage Shed.

Soil vapor extraction began as a vapor abatement technology to control the migration of VOCs into buildings. In the early 1980s, this extraction technology was adapted for site remediation. The process involves the extraction of volatile organic vapors from the soil pore spaces by forcing (blowing) air into the soil subsurface and/or by vacuum extraction. The process of blowing and/or evacuating the soil vapor creates a vapor flow, thereby enhancing volatilization and the removal efficiency of the contaminants in the subsurface. Factors that affect the operation of the SVE system include geologic characteristics, soil contamination levels, contamination characteristics, and subsurface conduits (pipes). SVE can be



REFERENCE

U.S.G.S. 7.5′ topographic maps Franklin Quadrangle Ohio, dated: 1965, photorevised: 1981, photoinspected: 1984, Miamisburg Quadrangle Ohio, dated: 1965, photorevised: 1987, scale: 1" = 2000′

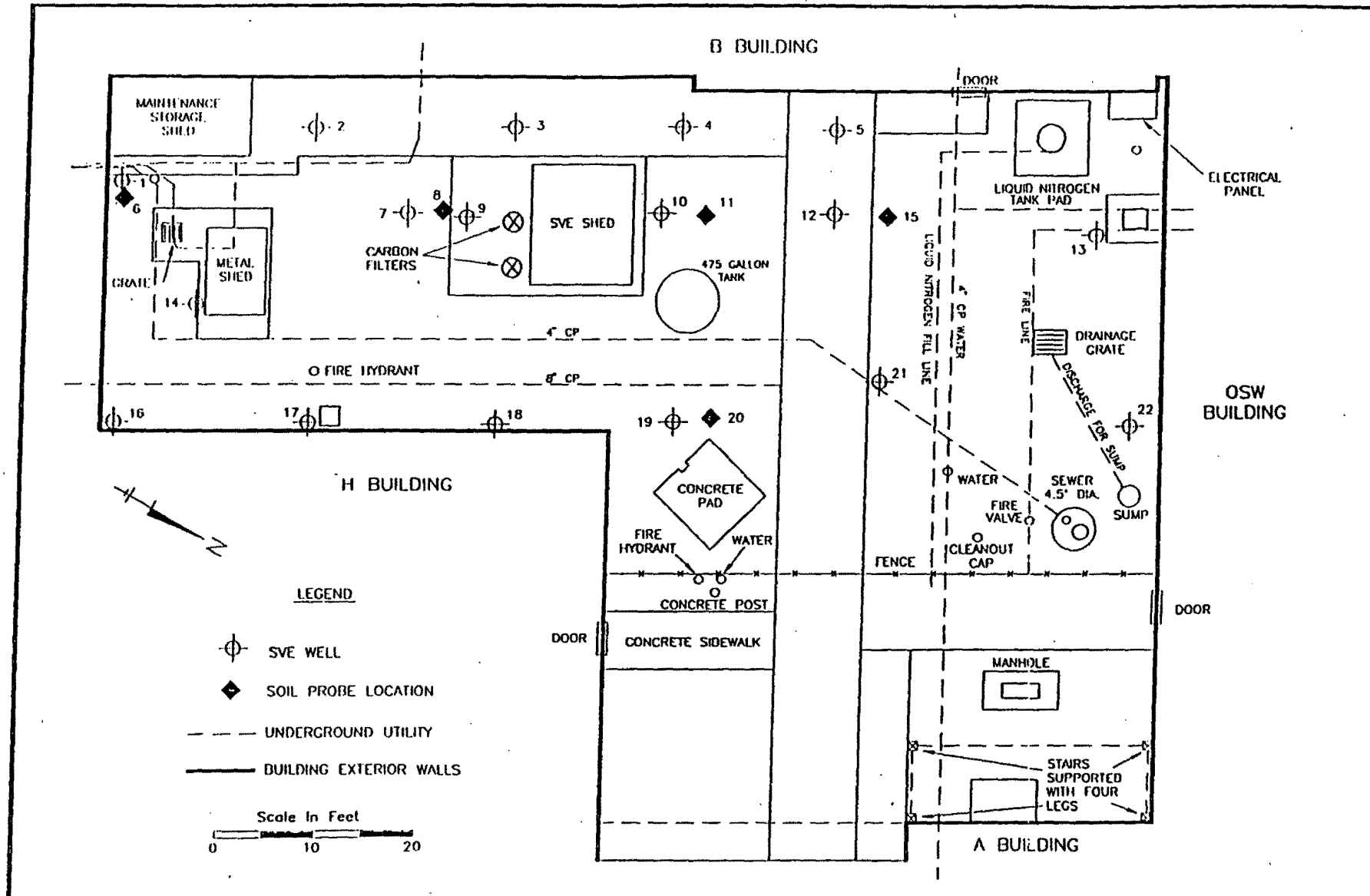
93170-A1

Figure 1.1. Site Location Map

enhanced by a process called bioventing or the use of the indigenous microorganism population to biodegrade the contamination. The microbes utilize oxygen to break down hydrocarbons into carbon dioxide and water. In the course of SVE, air is supplied accelerating the resupply of oxygen and thus the rate of biodegradation.

The B Building SVE system was installed in May 1994, and consists of 17 SVE wells, five soil probes, system piping, and a pumping unit. The system is a combination of injection wells for blowing air into the subsurface and extraction wells to remove volatilized organic compounds and carbon dioxide created during biodegradation. Figure 1.2 shows the site layout and location of the SVE wells.

This report is intended to summarize the activities and results associated with the SVE since the completion of the pilot test at the end of June. Offgas analytical results are provided for the entire period to help document the success of the system. The system configuration is presented in Section 2. Operation and maintenance activities are discussed in Section 3 of this report while analytical results are presented in Section 4. Section 5 presents a discussion of the results and conclusions and recommendations are provided in Section 6.



SOURCE: CIG ENVIRONMENTAL, INC.

Figure 1.2. Site Layout Map

2. SYSTEM CONFIGURATION

2.1. WELL AND PROBE INSTALLATION

The 17 SVE wells are constructed of 2-inch poly vinyl chloride (PVC) pipe and pea gravel. Each of the SVE wells were installed with one foot bentonite seals and completed with concrete to the ground surface. Boring logs with well construction diagrams are presented in Appendix A. As shown in the boring logs the wells were installed at depths ranging from 2 to 6 feet below ground surface.

Five soil probes were installed to provide pressure distribution and VOC concentration data. The soil probes are constructed of 1/8-inch stainless steel and are connected to the ground surface with 1/4-inch polyethylene tubing.

In order to reduce the potential of the wells pulling air from the surface rather than the contaminated soils a 6 mil plastic cover was placed over the exposed soil and covered with a 12-inch clay cap. The clay was compacted in-place using a walk-behind sheep's foot roller.

2.2. CURRENT CONFIGURATION

The current SVE system configuration consists of five extraction wells (Nos. 7, 9, 10, 12, and 14). The remaining 12 SVE wells operate as air injection wells. The current configuration and areas of influence are shown in Figure 2.1. Air flows are supplied using an ETG Environmental, Inc. (ETG) pump station equipped with separate 5 hp blowers for injection and extraction. The extraction manifold collects water withdrawn from the wells. This water is held inside the SVE system shed and transferred automatically to a 475-gallon external holding tank when full. A schematic of the SVE system configuration is presented in Figure 2.2.

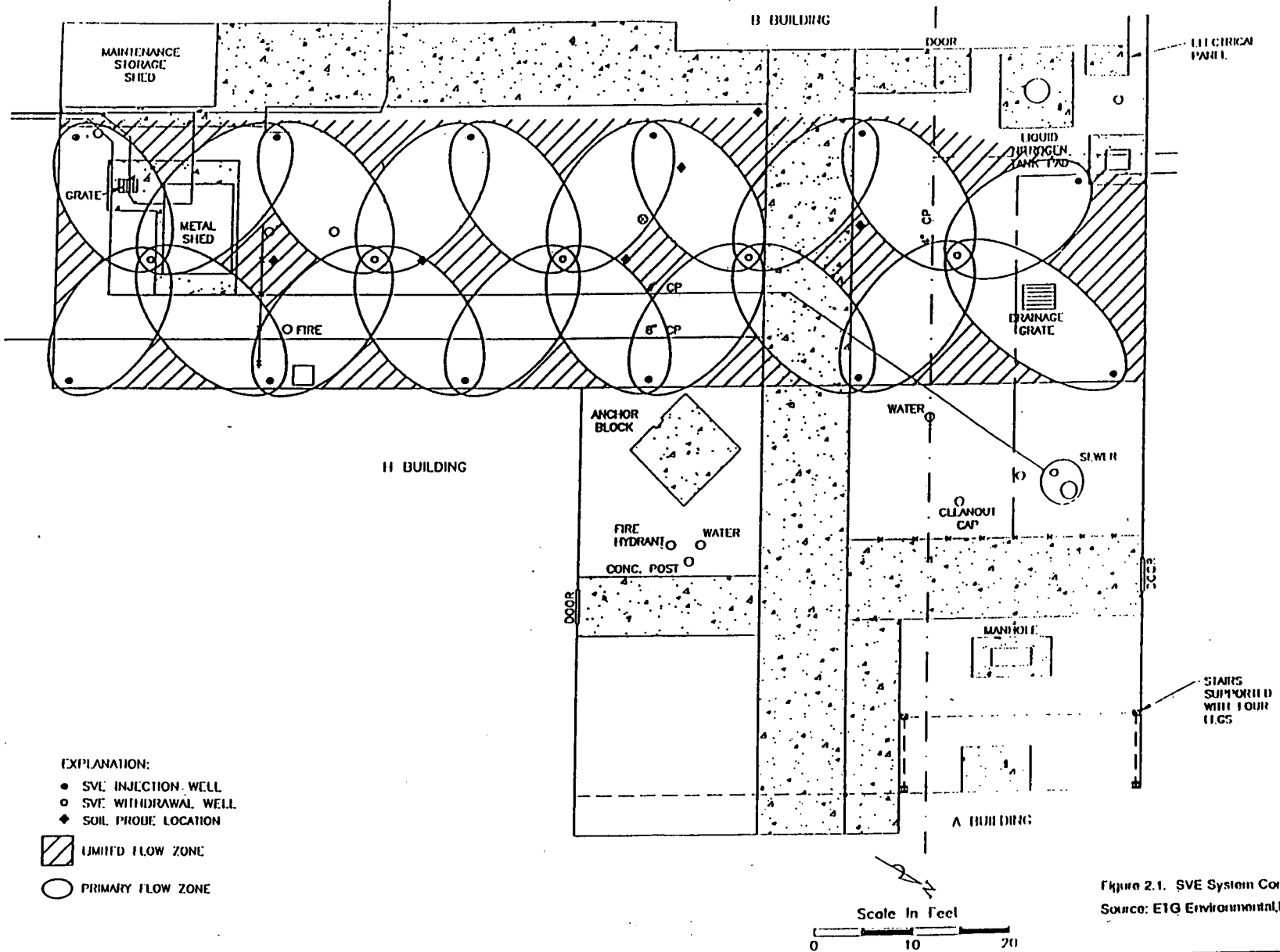


Figure 2.1. SVE System Configuration
Source: ETG Environmental, Inc.

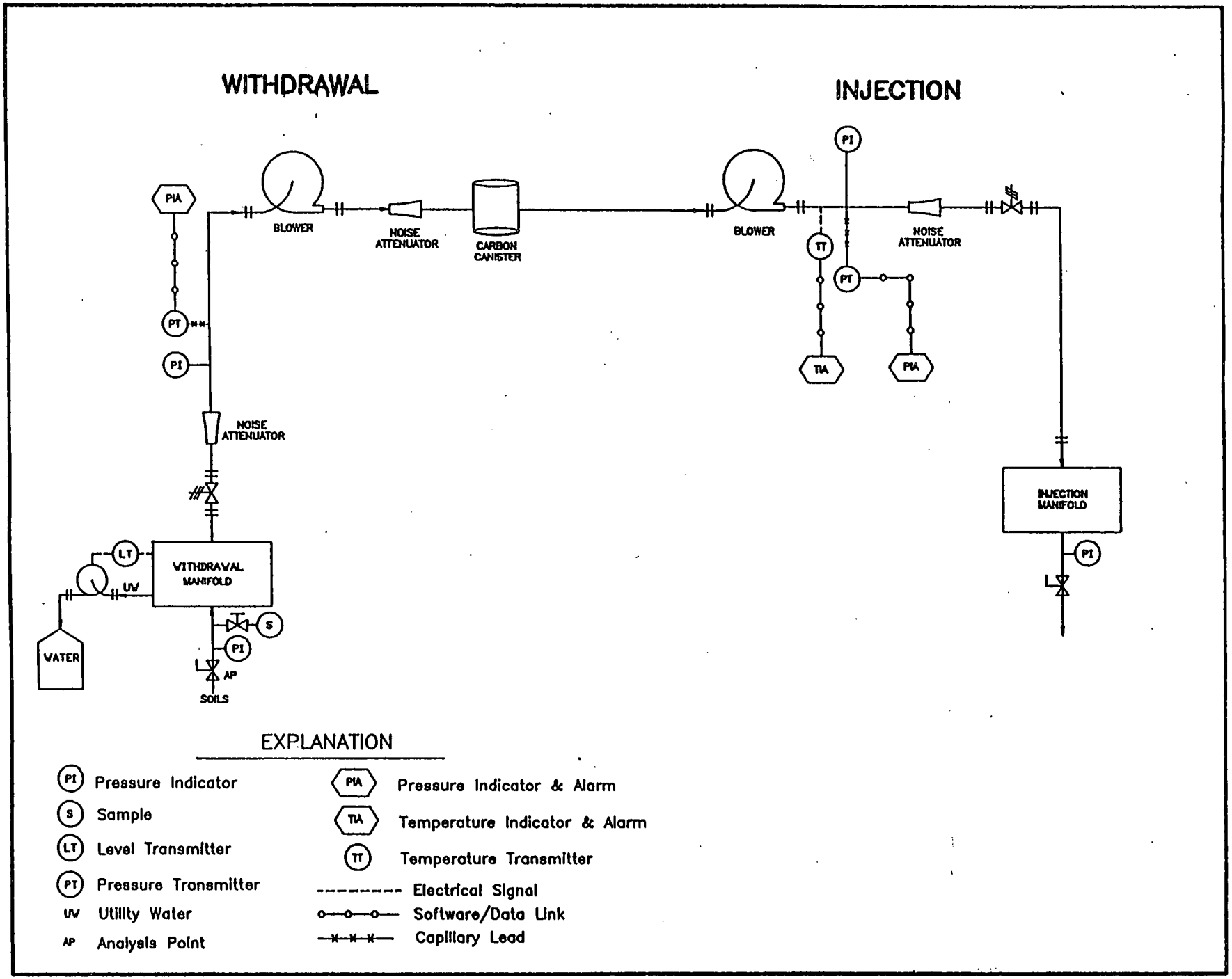


Figure 2.2. SVE System Schematic - Closed Loop Configuration

3. SYSTEM OPERATION AND MAINTENANCE

Site visits are made biweekly to check the system operation parameters and perform routine maintenance activities, as necessary. Operation parameters and maintenance activities are documented on "Site Visit Check List" forms for each site visit. Completed copies of these forms are included in Appendix B. In brief, site operation and maintenance activities consist of the following:

- A general overview of the site;
- A check on the system cap and the surface water runoff control system;
- A check on safety equipment;
- Evaluation of system equipment including well heads, pipes, fittings, water tanks, pumps, the vacuum break solenoid, valves, and light bulbs and fixtures;
- Evaluation of active taps;
- Initial temperature measurements including vacuum air, injection air and ambient air;
- Initial inlet and outlet blower pressures;
- Air flow measurements from the active taps;
- Checking the amount of water yielded and current wells yielding water;
- Preventative maintenance check on filters, pumps, manifolds, belts and blowers;
- Check on carbon canisters and;
- Final temperature measurements and blower pressures.

To date system operation and maintenance activities have been limited to an occasional oil change, greasing and surface water runoff control. The carbon canisters have been changed once.

In June, the surface water control system was upgraded to include a surface water collection sump. The sump was installed to prevent surface water from ponding in front of a low lying doorway near the OSE Building south wall and help to control surface water runoff that resulted from rainfall. The sump is equipped with a pump containing an automatic float to regulate and control pumping. Any water collected in the sump is pumped to the nearby storm sewer. To date, the sump has worked very effectively in controlling surface water runoff during heavy rains.

4. SAMPLING ACTIVITIES

Offgas samples were collected during each biweekly site visit from the five extraction wells in accordance with the approved Field Sampling Plan. Vapor samples were collected using a sampling pump, 0.25 inch tygon tubing to the sample port, and a one liter Tedlar sample bag. Samples are collected in the Tedlar bags, boxed and shipped via overnight courier to the MWR, Incorporated/ETG laboratory in Lansing, Michigan for gas chromatograph analysis using USEPA Test Method TO-14 (EPA 1984). The soil vapor samples were analyzed within 24 hours of receipt by the laboratory. Chain-of-custody forms were completed for each sampling event noting the sample identification number, analytical method, holding times, and sample contact person.

Carbon dioxide (CO_2) concentrations and air flow measurements were made during each site visit. CO_2 measurements were collected in the field using a portable Riken RI-411A CO_2 analyzer. Air flow measurements were made using a ERDCO See-Flo meter connected to the extraction line taps.

A composite sample from September 22, 1994 was also analyzed for VOCs by U.S. EPA Method 8240. This additional analysis was performed in an attempt to identify other VOCs that may be contributing to the continued increase of TVOC results.

5. SAMPLING RESULTS

CO_2 concentrations and air flow measurements are shown in Table V.1. Offgas sample results are summarized in Table V.2. The concentration ranges of 3.78 to 277.9 ppm for 1,2-DCE at the startup of the SVE system have decreased to <0.05 to 0.93 ppm on September 22, 1994. The concentrations of 1,1,1-TCA have been constantly <0.05 ppm with the exception of 0.06 and 0.07 being recorded on June 9 and 16, 1994, respectively. TCE concentrations have fluctuated between <0.05 and 6.86 ppm throughout the operation of the SVE system. Toluene has not been detected in any of the soil vapor samples collected from the extraction wells. Except for a period at the end of July, TVOC concentrations have decreased steadily from the startup of the SVE system. TVOC concentrations at startup ranged from 7.6 to 372.5 ppm and have decreased to between 1.6 and 6.8 ppm on September 22, 1994.

A plot of the cumulative yield of the target VOCs and TVOC is shown in Figure 5.1. The pounds of contaminants removed is estimated using the average contaminant concentration and air flow rate between each sampling event. The cumulative yield of each of the target compounds is presented in Table V.3. As shown in Figure 5.1 the concentrations of 1,2-DCE, 1,1,1-TCA, and toluene have generally stabilized. However, the cumulative yield of TCE and TVOCs removed from the soils continues to increase.

VOC parameters were not reported above detection limits in the September 22, 1994 composite sample analyzed by U.S. EPA Test Method 8240. The detection limits ranged from 0.1 to 21 ppm. Table V.4 shows the parameters analyzed and their corresponding detection limit.

5.1. CUMULATIVE YIELD OF COMPOUND VOLATILIZATION CALCULATION

Pounds of contaminants removed by volatilization were estimated using the average contaminant concentration and volumetric air flow rate between each two week sampling event, the molecular weight of the contaminant and the Ideal Gas Law. A sample calculation is shown below:

<u>Ideal Gas Law</u>

$$PV = nRT$$

Where:

P = Absolute pressure of gas in atmospheres

V = Volume of gas in liters

n = number of moles of gas

R = universal gas constant (0.08205 liters*atm/mol*K)

T = Temperature in degrees Kelvin (293 K = 20° C)

Table V.1. CO_2 and Air Flow Measurements

Well I.D.	Date	CO_2 Concentrations (ppm)	Air Flow Measurements*
Well 7	7/14/94	350	<15
	7/28/94	NS	NS
	8/11/94	350	5
	8/25/94	650	0
	9/8/94	400	3
	9/22/94	550	6
Well 9	7/14/94	250	20
	7/28/94	NS	NS
	8/11/94	400	50
	8/25/94	450	50
	9/8/94	350	50
	9/22/94	400	50
Well 10	7/14/94	350	<15
	7/28/94	NS	NS
	8/11/94	425	<2
	8/25/94	550	0
	9/8/94	350	1
	9/22/94	400	0
Well 12	7/14/94	300	<15
	7/28/94	NS	NS
	8/11/94	400	<2
	8/25/94	600	0
	9/8/94	400	1
	9/22/94	550	0
Well 14	7/14/94	300	65
	7/28/94	NS	NS
	8/11/94	350	60
	8/25/94	550	7
	9/8/94	350	55
	9/22/94	400	45
Comp	7/14/94	500	NA
	7/28/94	NS	NA
	8/11/94	375	NA
	8/25/94	550	NA
	9/8/94	500	NA
	9/22/94	NS	NA

Notes:

* = Air Flow Measurements in inches H_2O
Comp = Composite sample
AFCB = After Carbon Filtration System Sample
NS = Not sampled
NA = Not applicable

Table V.2. System Offgas Analytical Results

	5/25/94 15 min.	5/25/94 4 hour	5/25/94 8 hour	5/26/94	6/2/94	6/9/94	6/16/94	6/23/94	6/30/94	7/14/94	7/28/94	8/11/94	8/25/94	9/8/94	9/22/94
1,2-DCE (ppm)															
Well 7	277.9	12.7/12.4	8.47	2.66	0.6	0.11	1.15	0.74/0.75	1.41	1.02	NS	1.72	0.68	1.17	0.93
Well 9	4.73	2.79	4.18	0.57	1.1	<0.05	<0.05	0.17	0.15	<0.05	0.84	0.07	0.13	<0.05	0.05
Well 10	65.6/62.5	38.6	23.8	4.65	3.03	0.2/0.17	0.17	0.55	0.62	0.06	0.52	0.23	0.26	0.15	0.16
Well 12	27.9	69	NS	2.95	24.4	0.5	0.25	2.04	2.02	0.10	0.79	0.22	0.33	0.16	0.15
Well 14	3.78	2.73	3.7	0.87/0.84	0.71	0.12	<0.05/<0.05	0.18	0.2	<0.05	0.78	0.07	0.08	<0.05	<0.05
Comp	99.7	NS	26	4.12	20.2	0.6	0.43	1.67	1.99	0.17	0.18	0.37	0.46	0.30	0.24
Blank	0.05	NS	NS	0.31	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
AFCB	6368	NS	NS	NS	0.19	NS	0.05	NS	<0.05	NS	NS	NS	0.11	0.10	0.13
Probe 6-1.5 ft	0.1	NS	NS	NS	0.43	NS	NS	0.13	NS	NS	NS	NS	NS	NS	NS
Probe 8-1.5 ft	NS	NS	NS	NS	0.41	NS	NS	0.09	NS	NS	NS	NS	NS	NS	NS
Probe 8-3 ft	NS	NS	NS	NS	0.8	NS	NS	0.24	NS	NS	NS	NS	NS	NS	NS
Probe 11-1.5 ft	0.15/0.23	NS	NS	NS	0.66/0.45	NS	NS	0.07	NS	NS	NS	NS	NS	NS	NS
Probe 15-1.5 ft	1.91	NS	NS	NS	0.81	NS	NS	0.11	NS	NS	NS	NS	NS	NS	NS
Probe 20-3 ft	0.13	NS	NS	NS	0.46	NS	NS	0.07	NS	NS	NS	NS	NS	NS	NS

Notes

1,2-DCE = Trans-1,2-Dichloroethene and Cis-1,2-Dichloroethene
1,1,-TCA = Trichloroethane
TCE = Trichloroethene
TVOC = Total Volatile Organic Compounds
Detection Limit = 0.05 ppm
NS = Not Sampled
Comp = Comprehensive Sample of Extractive Air
AFCB = After Carbon Filtration System Sample
< = Less than Method Detection Limit

Table V.2. System Offgas Analytical Results (continued)

	5/25/94 15 min.	5/25/94 4 hour	5/25/94 8 hour	5/26/94	6/2/94	6/9/94	6/16/94	6/23/94	6/30/94	7/14/94	7/28/94	8/11/94	8/25/94	9/8/94	9/22/94
1,1,1-TCA (ppm)															
Well 7	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	0.07	<0.05	<0.05	<0.05	NS	<0.05	<0.05	<0.05	<0.05
Well 9	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Well 10	<0.05	<0.05	<0.05	<0.05	<0.05	0.06/0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Well 12	<0.05	<0.05	NS	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Well 14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Comp	<0.05	NS	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Blank	<0.05	NS	NS	<0.05	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
AFCB	<0.05	NS	NS	NS	<0.05	NS	NS	NS	<0.05	<0.05	NS	NS	<0.05	<0.05	<0.05
Probe 6-1.5 ft	<0.05	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 8-1.5 ft	NS	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 8-3 ft	NS	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 11-1.5 ft	<0.05	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 15-1.5 ft	<0.05	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 20-3 ft	<0.05	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS

Notes

1,2-DCE = Trans-1,2-Dichloroethene and Cis-1,2-Dichloroethene
1,1,-TCA = Trichloroethane
TCE = Trichloroethene
TVOC = Total Volatile Organic Compounds
Detection Limit = 0.05 ppm
NS = Not Sampled
Comp = Comprehensive Sample of Extractive Air
AFCB = After Carbon Filtration System Sample
< = Less than Method Detection Limit

Table V.2. System Offgas Analytical Results (continued)

	5/25/94 15 min.	5/25/94 4 hour	5/25/94 8 hour	5/26/94	6/2/94	6/9/94	6/16/94	6/23/94	6/30/94	7/14/94	7/28/94	8/11/94	8/25/94	9/8/94	9/22/94
TCE (ppm)															
Well 7	1.76	2.64/2.65	2.51	2.29	2.07	0.61	6.86	1.37/1.56	4.25	3.26	NS	4.87	2.06	3.04	1.93
Well 9	0.52	0.48	0.48	0.15	0.15	0.05	0.09	0.13	0.08	0.08	0.74	0.23	0.22	<0.05	<0.05
Well 10	0.13/0.11	0.18	0.2	0.15	0.84	0.35/0.30	0.84	0.8	0.4	0.29	0.28	0.76	0.80	0.33	0.38
Well 12	0.1	0.18	NS	0.19	0.89	0.34	0.71	0.65	0.45	0.34	0.84	0.66	0.89	0.38	0.24
Well 14	0.29	0.42	0.5	0.22/0.23	0.45	0.54	0.26/0.25	0.5	0.44	0.22	0.62	0.26	0.23	<0.05	<0.05
Comp	0.56	NS	0.54	0.4	1.72	0.8	1.46	1.09	0.84	0.72	0.23	1.00	1.43	0.70	0.42
Blank		NS	NS	<0.05	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
AFCB	0.06	NS	NS	NS	<0.05	NS	<0.05	NS	<0.05	<0.05	NS	NS	<0.05	<0.05	<0.05
Probe 6-1.5 ft	<0.05	NS	NS	NS	0.05	NS	NS	0.14	NS	NS	NS	NS	NS	NS	NS
Probe 8-1.5 ft	NS	NS	NS	NS	0.06	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 8-3 ft	NS	NS	NS	NS	0.18	NS	NS	0.12	NS	NS	NS	NS	NS	NS	NS
Probe 11-1.5 ft	0.09/0.14	NS	NS	NS	0.13/0.09	NS	NS	0.05	NS	NS	NS	NS	NS	NS	NS
Probe 15-1.5 ft	0.05	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 20-3 ft	<0.05	NS	NS	NS	0.06	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS

Notes

1,2-DCE = Trans-1,2-Dichloroethene and Cis-1,2-Dichloroethene
1,1,-TCA = Trichloroethane
TCE = Trichloroethene
TVOC = Total Volatile Organic Compounds
Detection Limit = 0.05 ppm
NS = Not Sampled
Comp = Comprehensive Sample of Extractive Air
AFCB = After Carbon Filtration System Sample
< = Less than Method Detection Limit

Table V.2. System Offgas Analytical Results (continued)

	5/25/94 15 min.	5/25/94 4 hour	5/25/94 8 hour	5/26/94	6/2/94	6/9/94	6/16/94	6/23/94	6/30/94	7/14/94	7/28/94	8/11/94	8/25/94	9/8/94	9/22/94
Toluene (ppm)															
Well 7	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NS	<0.05	<0.05	<0.05	<0.05
Well 9	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NS	NS	NS	NS	NS
Well 10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NS	NS	NS	NS	NS
Well 12	<0.05	<0.05	NS	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NS	NS	NS	NS	NS
Well 14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NS	NS	NS	NS	NS
Comp	<0.05	NS	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NS	NS	NS	NS	NS
Blank	<0.05	NS	NS	<0.05	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
AFCB	<0.05	NS	NS	NS	<0.05	NS	<0.05	NS	<0.05	<0.05	NS	NS	<0.05	<0.05	<0.05
Probe 6-1.5 ft	<0.05	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 8-1.5 ft	NS	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 8-3 ft	NS	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 11-1.5 ft	<0.05	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 15-1.5 ft	<0.05	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Probe 20-3 ft	<0.05	NS	NS	NS	<0.05	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS

Notes

1,2-DCE = Trans-1,2-Dichloroethene and Cis-1,2-Dichloroethene
1,1,-TCA = Trichloroethane
TCE = Trichloroethene
TVOC = Total Volatile Organic Compounds
Detection Limit = 0.05 ppm
NS = Not Sampled
Comp = Comprehensive Sample of Extractive Air
AFCB = After Carbon Filtration System Sample
< = Less than Method Detection Limit

Table V.2. System Offgas Analytical Results (continued)

	5/25/94 15 min.	5/25/94 4 hour	5/25/94 8 hour	5/26/94	6/2/94	6/9/94	6/16/94	6/23/94	6/30/94	7/14/94	7/28/94	8/11/94	8/25/94	9/8/94	9/22/94
TVOC (ppm)															
Well 7	372.5	48.9/48.1	62.9	27.7	7.6	2.9	15.5	15.3/15.6	15.1	8.4	NS	16.8	6.8	8.8	6.8
Well 9	7.6	4.7	7.38	1.7	3.4	<1.0	<1.0	2.2	1.9	1.2	5.6	1.9	1.7	1.2	1.4
Well 10	76.9/73.1	45	28.7	6.4	6.5	1.7/1.6	2.3	5.6	3.1	1.9	4.1	3.9	3.5	2.3	2.1
Well 12	32.4	85.1	NS	4.8	31.5	2.1	2.5	6	5	2.4	5.5	3.9	3.6	2.4	2.1
Well 14	8.1	5.4	6.7	2.4/2.4	2.6	1.9	1.4/1.4	4.3	2.9	1.8	5.4	2.8	2.1	1.5	1.6
Comp	134.8	NS	38	8.8	29.1	3.3	4.2	8.3	6.3	3.4	4.9	6.6	4.8	3.5	2.7
Blank	<1.0	NS	NS	1	<1	NS	NS	<1	NS	NS	NS	6.6	NS	NS	NS
AFCB	9	NS	NS	NS	1.2	NS	<1.0	NS	1.8	1.8	NS	6.6	1.8	1.8	1.8
Probe 6-1.5 ft	1	NS	NS	NS	1.3	NS	NS	1.4	NS	NS	NS	6.6	NS	NS	NS
Probe 8-1.5 ft	NS	NS	NS	NS	1.5	NS	NS	1	NS	NS	NS	6.6	NS	NS	NS
Probe 8-3 ft	NS	NS	NS	NS	8.5	NS	NS	9.2	NS	NS	NS	6.6	NS	NS	NS
Probe 11-1.5 ft	2.0/2.0	NS	NS	NS	1.9/1.7	NS	NS	1.8/1.7	NS	NS	NS	6.6	NS	NS	NS
Probe 15-1.5 ft	3.6	NS	NS	NS	2	NS	NS	1.4	NS	NS	NS	6.6	NS	NS	NS
Probe 20-3 ft	1	NS	NS	NS	1.7	NS	NS	1.4	NS	NS	NS	6.6	NS	NS	NS

Notes

1,2-DCE = Trans-1,2-Dichloroethene and Cis-1,2-Dichloroethene
1,1,-TCA = Trichloroethane
TCE = Trichloroethene
TVOC = Total Volatile Organic Compounds
Detection Limit = 0.05 ppm
NS = Not Sampled
Comp = Comprehensive Sample of Extractive Air
AFCB = After Carbon Filtration System Sample
< = Less than Method Detection Limit

Figure 5.1. Cumulative Yield Calculation Results

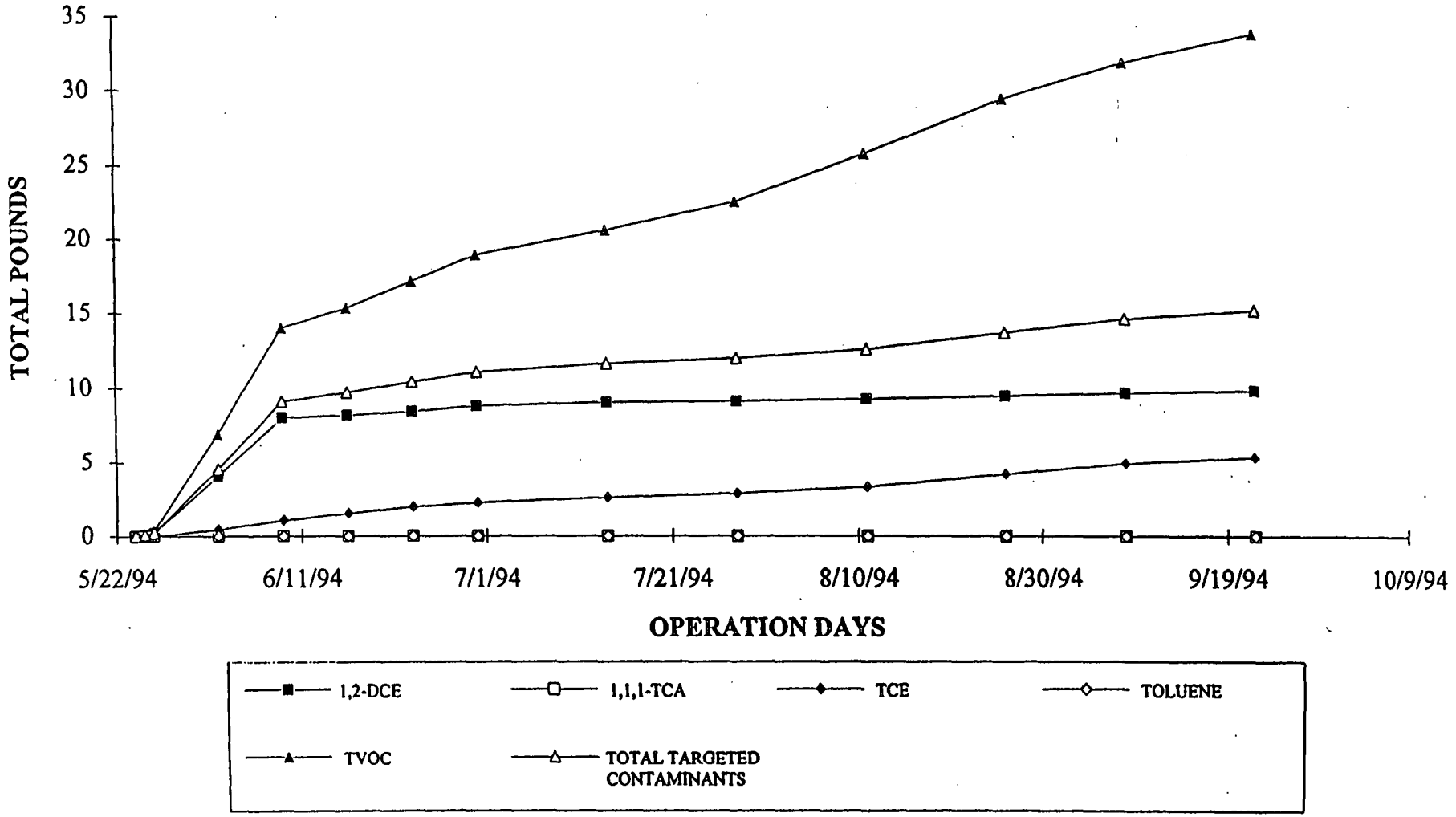


Table V.3. Cumulative Yield of Contaminants in Pounds

Sample Date	12-DCE	111-TCA	TCE	Toluene	TVOC Volatilization	Hydrocarbon Biodegradation	Total VOCs Removed
5/24/94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/25/94	0.02	0.00	0.00	0.00	0.03	0.02	0.05
5/25/94	0.10	0.00	0.00	0.00	0.16	0.34	0.5
5/26/94	0.2	0.00	0.01	0.00	0.36	1.04	1.4
6/2/94	4.07	0.00	0.46	0.00	9.93	3.91	10.84
6/9/94	8.01	0.00	1.06	0.00	13.99	9.62	23.61
6/16/94	8.16	0.00	1.52	0.00	15.31	13.94	29.25
6/23/94	8.41	0.00	1.98	0.00	17.10	21.28	38.38
6/30/94	8.79	0.00	2.25	0.00	18.89	32.95	51.84
7/14/94	9.03	0.00	2.60	0.00	20.57	43.46	64.03
7/28/94	9.10	0.00	2.88	0.00	22.49	49.78	72.27
8/11/94	9.24	0.00	3.34	0.00	25.79	51.02	76.81
8/25/94	9.47	0.00	4.21	0.00	29.46	59.79	89.25
09/08/94	9.66	0.00	4.94	0.00	31.94	74.43	106.37
09/22/94	9.81	0.00	5.36	0.00	33.94	88.40	122.34

Notes:

1,2-DCE = Trans-1,2-Dichloroethene and Cis-1,2-Dichloroethene
1,1,1-TCA = 1,1,1-Trichloroethane
TCE = Trichloroethene
TVOC Volatilization = Estimated value of total VOCs removed from the soil due to volatilization
Hydrocarbon Biodegradation = Estimated value of hydrocarbons removed due to biodegradation
Total VOCs Removed = Sum of TVOC volatilization and hydrocarbon biodegradation

Table V.4. Volatile Organic Compounds - September 22, 1994

Volatile Analysis (EPA Test Method 8240)	Result	MDL (ppm)
Acetone	ND	21.
Benzene	ND	.31
Bromodichloromethane	ND	.15
Bromoform	ND	.1
Bromomethane	ND	.26
2-Butanone (MEK)	ND	17.
Carbon Disulfide	ND	16.
Carbon Tetrachloride	ND	.16
Chlorodibromomethane	ND	.12
Chlorobenzene	ND	.22
Chloroethane	ND	.38
2-Chloroethyl Vinyl Ether	ND	2.3
Chloroform	ND	.2
Chloromethane	ND	.48
1,1-Dichloroethane	ND	.25
1,2-Dichloroethane	ND	.25
1,1-Dichloroethene	ND	.25
trans-1,2-Dichloroethene	ND	.25
1,2-Dichloropropene	ND	.22
cis-1,3-Dichloropropene	ND	.22
trans-1,3-Dichloropropene	ND	.22
Ethlybenzene	ND	.23
2-Hexanone	ND	12.
Methylene Chloride	ND	.29
4-Methyl-2-Pentanone	ND	12.
Styrene	ND	.23
1,1,2,2-Tetrachloroethane	ND	.15
Tetrachloroethene	ND	.15
Toluene	ND	.26
1,1,1-Trichloroethane	ND	.18
1,1,2-Trichloroethane	ND	.18
Trichloroethene	ND	.19
Vinyl Acetate	ND	14.
Vinyl Chloride	ND	.39
Total Xylenes	ND	.69

Notes:

ND = Not Detected
MDL = Method detection level
ppm = parts per million

Known Parameters:

1 ppm gas = 1 $\mu L/L_{air} = 10^{-6}\ L_{gas}/L_{air}$

Volumetric Contaminant Flow (t) = CFM(28.316L_{air}/cubic ft) ($PPM_{ave}10^{-6}\ L_{gas}/L_{air}$)

Volumetric Contaminant Flow (t) = CFM*PPM_{ave}*28.316 x $10^{-6}\ L_{gas}$/minute

Where:

CFM = Cubic feet per minute

PPM_{ave} = Average concentration of the contaminant between sampling events

5.2. CUMULATIVE YIELD OF HYDROCARBON BIODEGRADATION CALCULATION

To estimate pounds of VOCs removed via biodegradation, the average carbon dioxide concentration and the volumetric flow rate between each two week sampling event was used. It was assumed, for the purpose of estimating biodegradation removal, that bacteria in the soil consume petroleum hydrocarbons, producing carbon dioxide and water (Vogel, et al 1987). The following formulas were used to determine the hydrocarbon biodegradation.

Governing Chemical Reaction

Bacteria in soil consume petroleum hydrocarbons in the soil, producing carbon dioxide and water following the general reaction listed below.

$$CH_2 + 1.5\ O_2 = CO_2 + H_2O$$

Where

CH_2 represents the most basic portion of the petroleum molecule.

Ideal Gas Law

The formula, PV = nRT is used to calculate the moles of CO_2 produced per day.

Where:

P = Absolute pressure of gas in atmospheres

V = Volume of gas in liters

n = number of moles of gas

R = universal gas constant (0.08205 liters*atm/mol*K)

T = Temperature in degrees Kelvin (293 K = 20° C)

Known Parameters

Concentration of CO_2 in atmosphere = 350 ppm (Ambient CO_2)

1 mole CH_2 = 14 grams

SVE extraction flow rate = 150 standard cubic feet per minute (scfm)

1 ft^3 air = 28.3 liters

1,440 minutes = 1 day

1 ppm gas = 1 $\mu L/L_{air}$

1 liter gas = 1 x 10^6 μL

pressure = 1 atm

1 pound = 454 grams

Calculation of Hydrocarbons Removed as CO_2

Δ CO_2 = Measured CO_2 in comp. sample - 350 ppm (Ambient CO_2)

vol of CO_2/day = Δ CO_2 (ppm) • 28.3 L/ft^3 * 150 ft^3/min • 1,440 min/day

vol of CO_2/day = Δ CO_2 (ppm) • 6.11x10^6 (L/day)

Convert volume into liters,

vol of CO_2/day (L) = vol of CO_2/day (μl) * 1 x 10^{-6} L/μl

and calculate moles of CO_2/day

moles/day (n) = P V/R T

= (1 • V)/(0.08205 * 293)

= V/24.04

Convert moles CO_2/day into grams of hydrocarbons (CH_2)/day

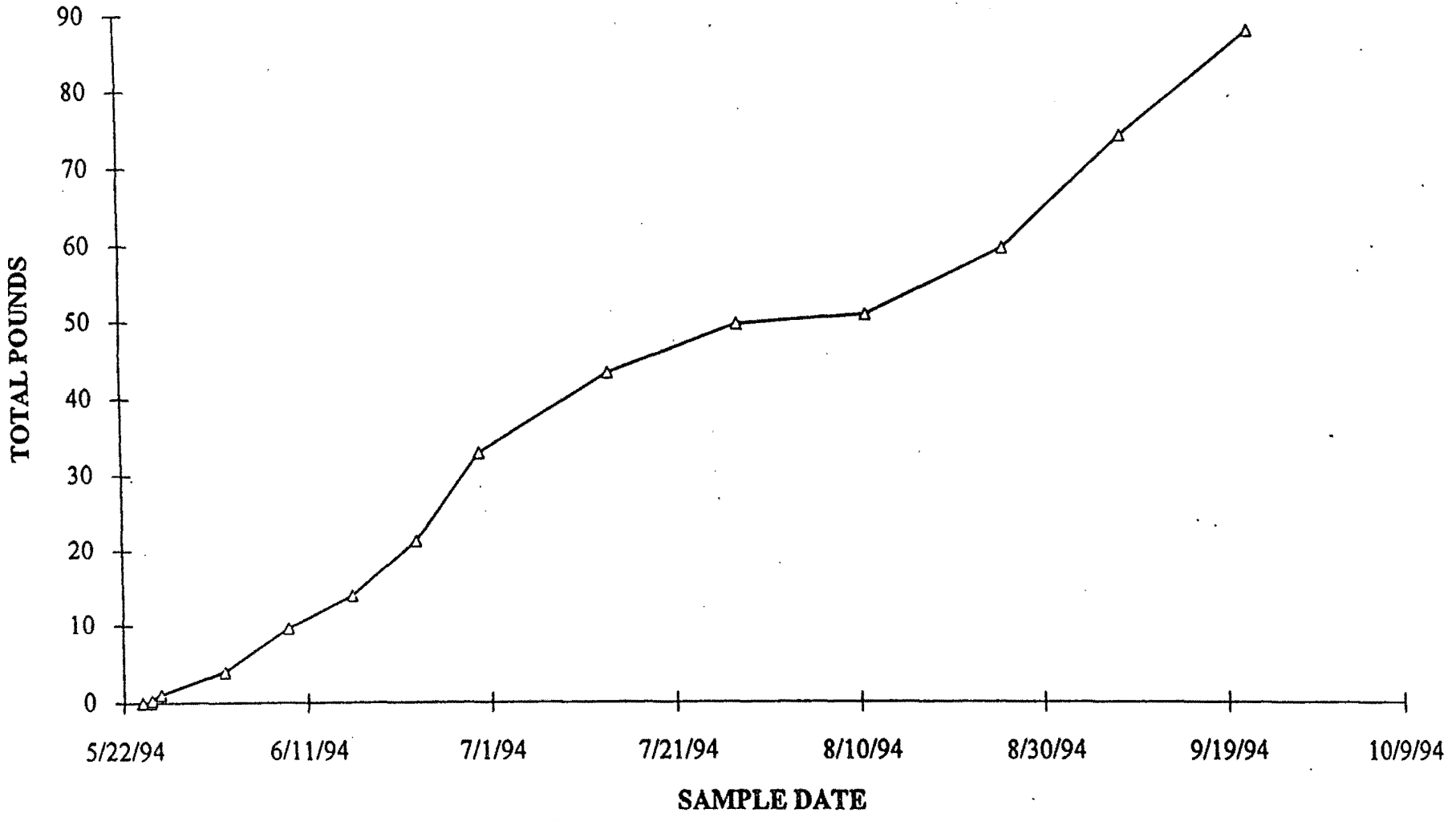
Hydrocarbon biodegradation is estimated using the calculation shown below. However, a molecular weight of 14 is used with the assumption that each molecule of CO_2 above ambient air levels represents a hydrocarbon unit of CH_2 which has been biodegraded. The cumulative yield of hydrocarbon biodegradation is shown in Table V.3 and plotted in Figure 5.2.

moles/day • 14 grams/mole = grams/day hydrocarbons destroyed by bacterial action

Convert grams/day into pounds/day

(grams/day) / (454 grams/pound) = pounds/day hydrocarbons destroyed by bacterial action

Figure 5.2. Cumulative Hydrocarbon Biodegradation



5.3. ESTIMATED SOIL CONCENTRATIONS

Based on the soil vapor concentrations, the concentration of 1,2-DCE and TCE in the soil can be estimated using the following equation (ICF KE 1992):

$$C_t = \frac{C_g}{P_b}\left[\left[\frac{P_b \times K_d}{H}\right] + \left[\frac{\Theta_W}{H}\right] + \left[\Theta_T - \Theta_W\right]\right]$$

where:

C_t = Total volatile chemical concentration in soil as ng/g
C_g = Concentration of volatile chemical concentrations as soil vapor in ng/mL
P_b = Bulk density of the soil in g/mL
K_d = Soil water distribution coefficient in mL/g
H = Henry's Law Constant (dimensionless)
Θ_w = Waterfilled porosity (dimensionless)
Θ_T = Total porosity (dimensionless)

According to the EPA, (EPA 1993) K_d can be estimated by the following equation:

$$K_d = 0.63\ (K_{ow})\ (f_{oc})$$

where f_{oc} is the weight fraction of organic carbon in the soils and K_{ow} is the octanol-water partition coefficient. The weight fraction of organic carbon, f_{oc}, was estimated as 0.31 (Lyman, et.al. 1982). By using this estimation method, the following K_d values were estimated for each target compound detected in the offgas samples.

Trichloroethene	68	mL/g
cis-1,2-Dichloroethene	1.42	mL/g

Values for C_g are known (DOE 1992). Values for P_b and Θ_T were obtained from an engineering manual (Hough 1969). The values of P_b and Θ_T were selected based on the known soil types for the B Building solvent storage shed area. The most conservative values were used to yield the highest soil

concentrations. The value for θ_w was selected to give a conservative result, however, the value of θ_w has little affect on the outcome.

The values chosen to estimate the soil concentration prior to SVE are:

C_g = Maximum of values reported (DOE 1992) (1,2 DCE = 155 ng/mL and TCE = 187 ng/mL)
P_b = 1.41 g/mL
K_d = Values as estimated above (1,2 DCE = 1.42 mL/g and TCE = 68 mL/g)
H = Henry's Law Constant for each chemical (USEPA 1993) (1,2 DCE = 0.19 and TCE = 0.42)
θ_w = 0.01
θ_T = 0.52

The values for C_g were obtained by using the maximum soil vapor concentrations reported in the B Building Solvent Storage Shed area. This yields a maximum soil concentration for the area of 1.2 and 30.3 mg/kg for 1,2-DCE and TCE, respectively, prior to the installation of the SVE system.

Using present offgas concentrations in the above formulas, the current soil concentrations for 1,2-DCE and TCE in the area of the SVE system are estimated at 0.03 and 1.7 mg/kg, respectively. Comparing the estimated pre-SVE system concentrations of 1,2-DCE and TCE, (1.2 and 30.3 mg/kg, respectively), to the current estimated concentrations yield an estimated reduction for 1,2-DCE and TCE of 98 and 94 percent, respectively. The accuracy of these predicted values was based on a sensitivity analysis and is estimated as ± 80%. This degree of inaccuracy is largely based on having to use estimated values for bulk density, porosities, and the distribution coefficient.

Based on estimating the soil concentrations, concentrations of target compounds have been reduced by 94 to 98%. By using the offgas concentrations at the start of the project and the last sample event provides another method to determine the percent reduction of the target compounds. This method indicates that target compounds have been reduced by approximately 99%.

6. CONCLUSIONS AND RECOMMENDATIONS

Offgas analytical results suggest target VOC concentrations have decreased by over 98 percent with the exception of TCE. TCE concentrations have fluctuated throughout the operation of the SVE system. The cumulative yield of TVOCs began to increase in July as the yield of target compounds appeared to stabilize. The reason for this increase is likely the presence of other non-target volatile organic compounds within the B Building Solvent Storage Shed area. An attempt to identify the presence or absence of these non-target VOCs offgas samples was performed by gas chromatography mass spectrometry, however, the parameters analyzed yielded results below detection limits. Since August, the TVOC concentrations have begun to decrease again.

Estimates by ETG of the cumulative yield of contaminants due to volatilization to date is 33.94 pounds. These estimates were based on average offgas concentrations of the target compounds. The estimated yield of contaminants by biodegradation is 88.40 pounds and is based on the increase in CO_2 over ambient conditions. It should be noted that this estimate is prone to bias inherent to the assumptions (every CO_2 molecule over ambient conditions is considered equal to one molecule of CH_2 biodegraded) used in the calculations. Other physical and environmental sources of CO_2 are present in the area of the SVE system that may be contributing to the CO_2 concentrations (i.e., two sewer lines, a sewer ejector, a sewage lift station, and the limestone rock).

The total estimate of 122.34 pounds removed (33.94 + 88.40) is used to monitor the operational performance of the SVE system and is not an absolute value. Prior to the SVE startup, no estimate of the total mass of contamination in the storage shed area was made and thus, the estimate of pounds removed can not be used to judge the success of the system. A better indicator of system performance are the offgas analytical results. Comparing the most recent offgas results to the results at the start of the project indicates that the target VOC concentrations have been reduced by approximately 99%. However, it must be noted that the pre-SVE system concentrations were collected under ambient conditions while the present offgas concentrations were collected under the influence of a vaccum created by the SVE system. Comparing the predicted soil concentrations at the start of the SVE to the predicted concentrations at the end of September indicates that TCE has been reduced by 94% and 12-DCE by 98%. All of the indicators demonstrate the SVE system is successful in the remediation of soils.

Due to the consistent fluctuation of TCE and apparent stabilization of the remaining target compounds, it is recommended that the SVE system be reconfigured. The reconfiguration will enhance the remediation of VOCs by changing air flow directions and accessing areas of contamination that were not affected by the current configuration. Figure 6.1 shows the proposed reconfiguration and zones of

influence. A decision flow chart is shown in Figure 6.2 showing the process for evaluating the SVE systems performance.

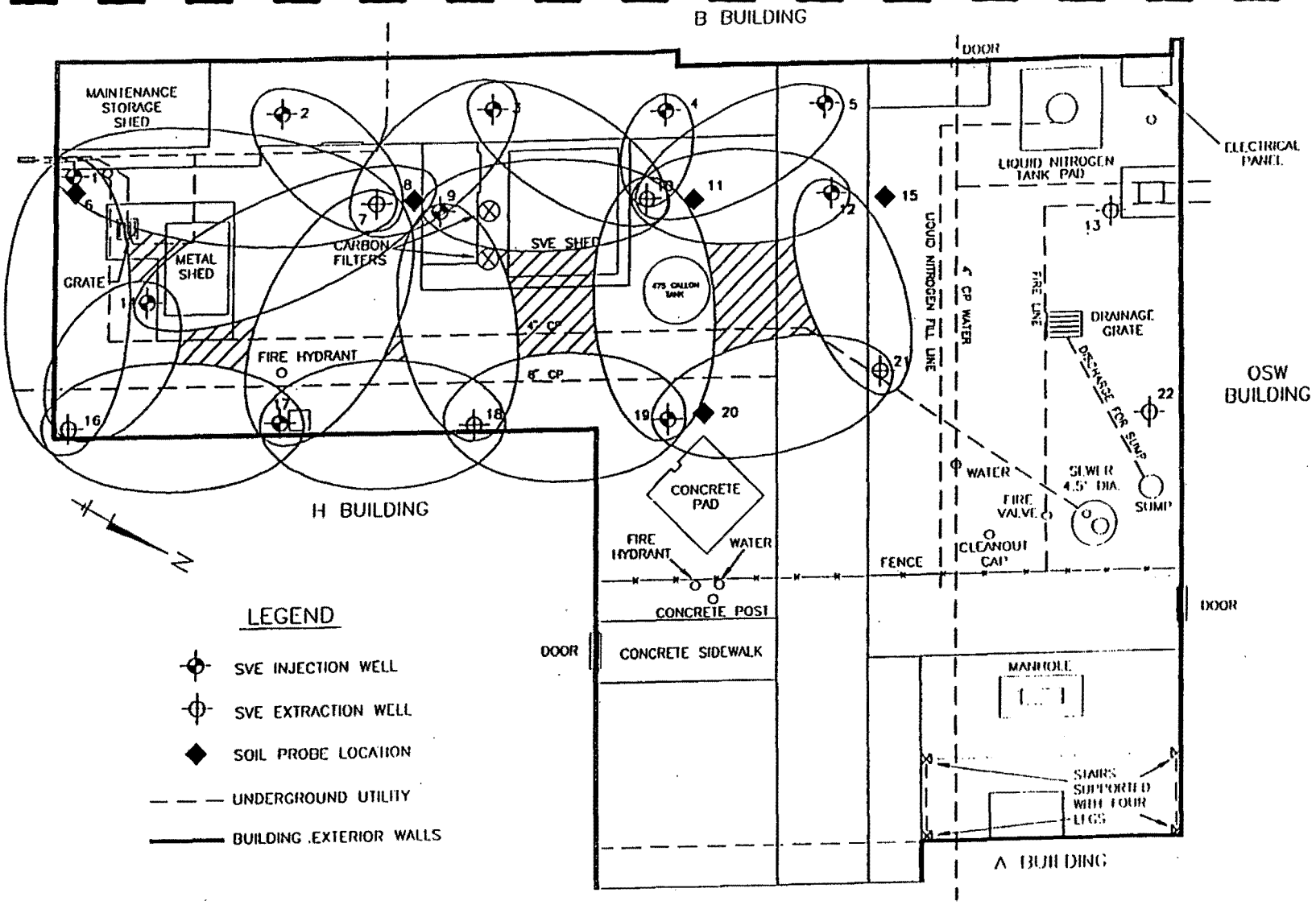
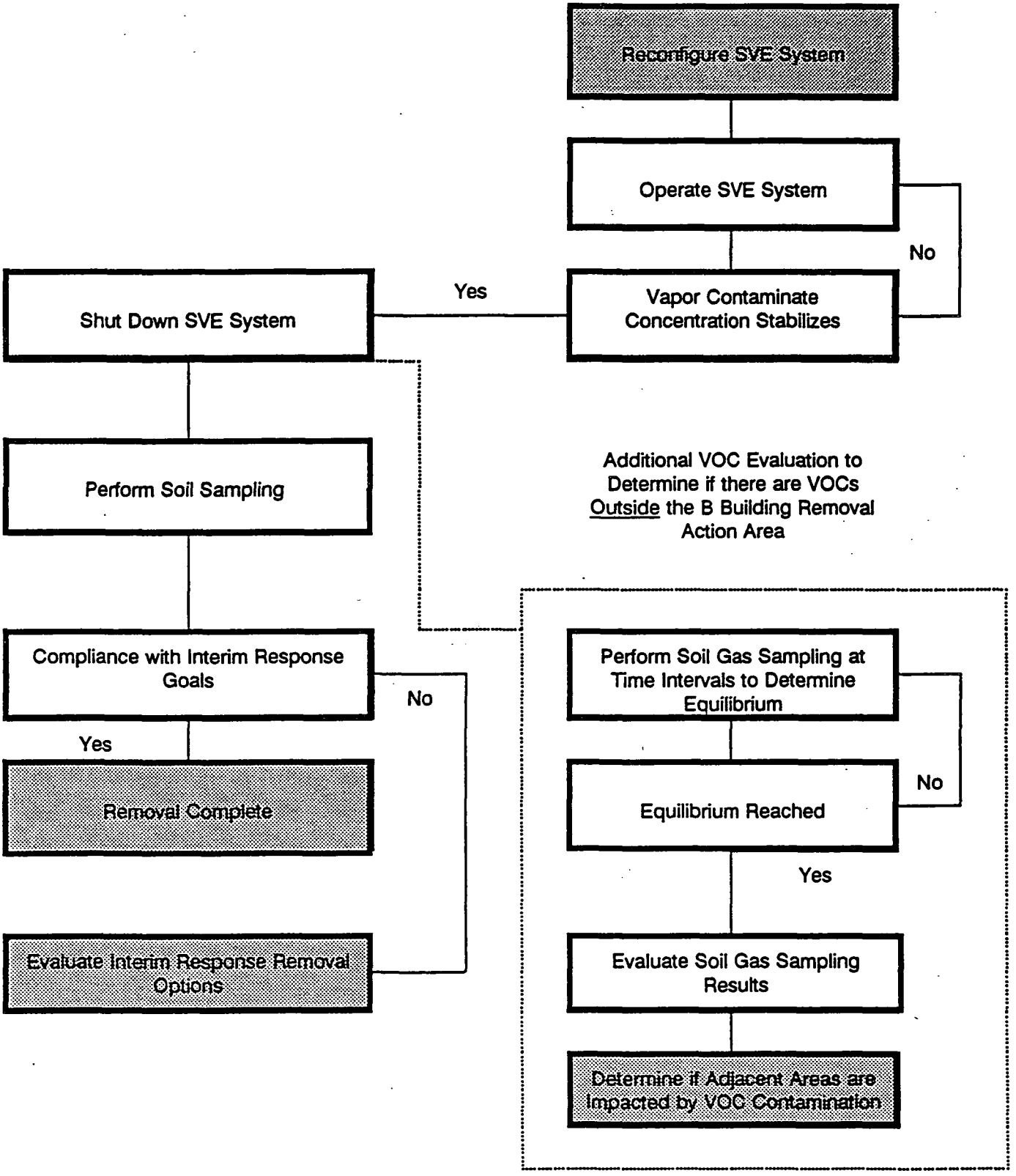


Figure 6.1. Proposed Reconfiguration and Zones of Influence

SOURCE: ETG ENVIRONMENTAL, INC.

Figure 6.2. B Building Solvent Storage Shed SVE System Decision Flow Chart



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APPENDIX A

BORING LOGS WITH WELL CONSTRUCTION DIAGRAMS

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 1

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER

DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/11/94

BORING METHOD: 4 1/4 HSA

SAMPLING METHOD: SPLIT SPOON

FIELD SCREENING EQUIP.: MICROTIP

ANALYTICAL METHOD: 8240

NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE BENTONITE PEASTONE	0	SM	2" SAND, DARK BROWN SILT, AND GRAVEL 8" DARK BROWN TO REDDISH BROWN, SOFT SILTY CLAY		3.4	
	1					
	2					
	3		END OF BORING @ 3.5'			
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 2

PROJECT NUMBER: 2019	LOGGED BY: J. GUENTHER
DRILLING CO: GOSMAN CONSTRUCTION	DATE DRILLED: 5/11/94
BORING METHOD: 4 1/4 HSA	
SAMPLING METHOD: SPLIT SPOON	
FIELD SCREENING EQUIP.: MICROTIP	
ANALYTICAL METHOD: 8240	
NOTES:	

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE BENTONITE PEASTONE	0	SM	2" SILT AND GRAVEL, MEDIUM STIFF, DARK BROWN		9.8	
	1		2" SOFT, DARK BROWN, SILTY SAND			
			10" WEATHERED SHALE AND LIMESTONE			
	2					
	3		END OF BORING @ 3.5'			
	4					
	5	CL				
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 3

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER

DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/11/94

BORING METHOD: 4 1/4 HSA

SAMPLING METHOD: SPLIT SPOON

FIELD SCREENING EQUIP.: MICROTIP

ANALYTICAL METHOD: 8240

NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE BENTONITE PEASTONE	0	ML	18" SAND AND SILT COURSE GRAVEL WET, VERY STIFF		6.2	
	1					
	2					
	3		END OF BORING @ 3.5'			
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 4

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER

DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/11/94

BORING METHOD: 4 1/4 HSA

SAMPLING METHOD: SPLIT SPOON

FIELD SCREENING EQUIP.: MICROTIP

ANALYTICAL METHOD: 8240

NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE	0		6" STIFF SILTY CLAY WITH IRON OXIDIE STAINING			
BENTONITE	1	GM	6" LIMESTONE FRAGMENTS			
PEASTONE	2		END OF BORING @ 2.5'			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 5

PROJECT NUMBER: 2019	LOGGED BY: J. GUENTHER
DRILLING CO: GOSMAN CONSTRUCTION	DATE DRILLED: 5/11/94
BORING METHOD: 4 1/4 HSA	
SAMPLING METHOD: SPLIT SPOON	
FIELD SCREENING EQUIP.: MICROTIP	
ANALYTICAL METHOD: 8240	
NOTES:	

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE BENTONITE PEASTONE	0	GM	2" COURSE SAND AND GRAVEL			
	1		18" WEATHERED SHALE AND LIMESTONE			
	2		END OF BORING @ 2.0'			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 7

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER

DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/10/94

BORING METHOD: 4 1/4 HSA

SAMPLING METHOD: SPLIT SPOON

FIELD SCREENING EQUIP.: MICROTIP

ANALYTICAL METHOD: 8240

NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE BENTONITE PEASTONE	0	SM	2" LIGHT BROWN COURSE SAND AND GRAVEL 4" DARK BROWN SAND AND GRAVEL 10" BLACK FINE SAND WITH MINOR GRAVEL(20%)		4 ppm	
	1					
	2					
	3					
	4		AUGER REFUSAL @ 4'			
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 9

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER
DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/11/94
BORING METHOD: 4 1/4 HSA
SAMPLING METHOD: SPLIT SPOON
FIELD SCREENING EQUIP.: MICROTIP
ANALYTICAL METHOD: 8240
NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE	0		1" COURSE SAND AND GRAVEL			
			8" STIFF, BLACK, SILTY CLAY		2.1 PPM	
BENTONITE	1	ML	2" LIMESTONE			
			3" DARK GRAY WEATHERED SHALE AND LIMESTONE			
PEASTONE	2		END OF BORING @ 2.5'			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 10

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER
DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/9/94
BORING METHOD: 4 1/4 HSA
SAMPLING METHOD: SPLIT SPOON
FIELD SCREENING EQUIP.: MICROTIP
ANALYTICAL METHOD: 8240
NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE	0		6" SAND AND COURSE GRAVEL			
BENTONITE	1	GM	6" STIFF SILTY CLAY WITH MINOR WEATHERED SHALE AND LIMESTONE FRAGES			
PEASTONE	2		AUGER REFUSAL @ 2.5'			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 12

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER
DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/11/94
BORING METHOD: 4 1/4 HSA
SAMPLING METHOD: SPLIT SPOON
FIELD SCREENING EQUIP.: MICROTIP
ANALYTICAL METHOD: 8240
NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE	0	GM	3" COURSE DARK BROWN SAND AND GRAVEL			
BENTONITE	1		12" WEATHERED SHALE AND LIMESTONE			
PEASTONE	2					
	3		END OF BORING @ 3.0'			
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 13

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER

DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/11/94

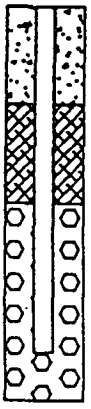
BORING METHOD: 4 1/4 HSA

SAMPLING METHOD: SPLIT SPOON

FIELD SCREENING EQUIP.: MICROTIP

ANALYTICAL METHOD: 8240

NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
 CONCRETE BENTONITE PEASTONE	0		5" DARK BROWN COURSE SAND AND GRAVEL			
	1	GM	6" DARK BROWN MEDIUM STIFF SLITY CLAY W\LIMESTONE FLOATERS		1.2 PPM	
	2					
	3					
	4		AUGER REFUSAL @ 4'			
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 14

PROJECT NUMBER: 2019	LOGGED BY: J. GUENTHER
DRILLING CO: GOSMAN CONSTRUCTION	DATE DRILLED: 5/11/94
BORING METHOD: 4 1/4 HSA	
SAMPLING METHOD: SPLIT SPOON	
FIELD SCREENING EQUIP.: MICROTIP	
ANALYTICAL METHOD: 8240	
NOTES:	

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE	0	GM	2" DARK BROWN, SOFT, SILT AND GRAVEL			
BENTONITE	1		2" DARK GRAY TO OLIVE, WEATHERED SHALE AND LIMESTONE		1 PPM	
PEASTONE			4" FRACTURED CRYSTALLINE LIMESTONE			
	2		END OF BORING @ 2.5			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 16

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER
DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/11/94
BORING METHOD: 4 1/4 HSA
SAMPLING METHOD: SPLIT SPOON
FIELD SCREENING EQUIP.: MICROTIP
ANALYTICAL METHOD: 8240
NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE	0		2" COURSE GRAVEL AND COBBLES			
			2" DARK BROWN STIFF SILTY CLAY		1 PPM	
BENTONITE	1	ML	4" LIGHT BROWN, SOFT, MOIST, SILTY CLAY			
PEASTONE	2		2" CRYSTALLINE LIMESTONE			
			AUGER REFUSAL @ 2.5'			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 17

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER
DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/11/94
BORING METHOD: 4 1/4 HSA
SAMPLING METHOD: SPLIT SPOON
FIELD SCREENING EQUIP.: MICROTIP
ANALYTICAL METHOD: 8240
NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE	0	GM	2" COURSE GRAVEL AND COBBLES		1 PPM	
			4" WEATHERED SHALE AND LIMESTONE W\ LIMESTONE FRAGMENTS (20%)			
BENTONITE	1					
	2					
PEASTONE	3		AUGER REFUSAL @ 3'			
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 18

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER
DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/10/94
BORING METHOD: 4 1/4 HSA
SAMPLING METHOD: SPLIT SPOON
FIELD SCREENING EQUIP.: MICROTIP
ANALYTICAL METHOD: 8240
NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE	0		4" COARSE GRAVEL			
			4" COARSE SAND AND GRAVEL			
	1	ML	4" COARSE, WET, RED SAND AND GRAVEL		0 PPM	
BENTONITE			4" DARK GRAY SILTY CLAY STIFF AND MOIST			
PEASTONE	2		2" FRAGMENTED LIMESTONE			
			AUGER REFUSAL 2.5'			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 19

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER

DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/9/94

BORING METHOD: 4 1/4 HSA

SAMPLING METHOD: SPLIT SPOON

FIELD SCREENING EQUIP.: MICROTIP

ANALYTICAL METHOD: 8240

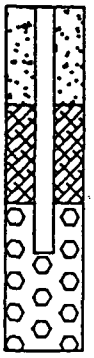
NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE	0					
	1	SM	2" DARK BROWN SAND, SILT AND GRAVEL	0–2	1 PPM	
BENTONITE			6" DARK BROWN COURSE SAND			
	2					
	3	ML	1" LIMESTONE FRAG W\MINOR WEATHERED SHALE	2–4	0.0PPM	
PEASTONE			8" WEATHERED SHALE W\MINOR GRAVEL			
	4					
	5	ML	8" FRACTURED LIMESTONE	4–6	1 PPM	
	6		AUGER REFUSAL @ 6'			
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 21

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER
DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/9/94
BORING METHOD: 4 1/4 HSA
SAMPLING METHOD: SPLIT SPOON
FIELD SCREENING EQUIP.: MICROTIP
ANALYTICAL METHOD: 8240
NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
 CONCRETE BENTONITE PEASTONE	0					
	1	ML	6" GRAVEL			
			18" VERY STIFF WEATHERED DARK BROWN SHALE		1.2 PPM	
	2					
	3					
	4					
			END OF BORING 4.5'			
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

MOUND PLANT
MIAMISBURG, OHIO
SVE WELL # 22

PROJECT NUMBER: 2019 LOGGED BY: J. GUENTHER

DRILLING CO: GOSMAN CONSTRUCTION DATE DRILLED: 5/11/94

BORING METHOD: 4 1/4 HSA

SAMPLING METHOD: SPLIT SPOON

FIELD SCREENING EQUIP.: MICROTIP

ANALYTICAL METHOD: 8240

NOTES:

WELL CONSTRUCTION	DEPTH (FT)	BORING LOG	DESCRIPTION AND COMMENTS	SAMPLES	HEAD SPACE (ppm)	RECOVERY
CONCRETE	0		3" COURSE, DENSE, SAND AND GRAVEL			
			2" DENSE, STIFF, WEATHERED SHALE, LIMESTONE AND GRAVEL		1.8 PPM	
BENTONITE	1	SM	16" FRACTURED LIMESTONE			
PEASTONE	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ETG ENVIRONMENTAL, INC.

APPENDIX B

SITE VISIT CHECK LIST FORMS

ETG Environmental, Inc.
P.O. Box 75220, Cincinnati, Ohio 45275-0220
Phone (606) 282-6137 • Fax (606) 282-6378

OPERATIONS REPORT

DATE 7-14-94

DAY S M T W TH F S

Location MIAMISBURG OH
Job No. 2019
Client MOUND
Station #
Technician JR

Weather	Sunny	Clear	Overcast	Rain	Snow
Temp	<32	32-50	50-70	70-85	>85
Wind	Still	Mod	High	Report No.	
Humidity	Dry	Mod	Humid		

UNIT WAS RUNNING PROPERLY WHEN I ARRIVED. I LOOKED THE SITE OVER AND EVERYTHING APPEARED TO BE FINE THERE WERE NO LEAKS OR BREAKS IN THE PIPE. I TOOK INITIAL READINGS AND THEY WERE ALL NORMAL. I SAMPLED OFF GAS AND TOOK CO2 READINGS.

I FIXED THE SILT FENCE AROUND THE DRAIN AND SHOVELED THE MUD FROM THE GRATES. SITE CAP IS SO SHALLOW ON MY NEXT VISIT I AM REPLACING THE SILT FENCE WITH BALE OF HAY.

I TOOK FINAL READING AND LEFT.

CO2
Cont PPM = 250
Comp = 500
12 = 300
10 = 350
7 = 350
14 = 300
9 = 250
AFCB = 250

By [signature] Page _____ Title _____

SITE VISIT CHECK LIST

Client: Mound
Date of Visit: 7-14-94
Location: Miamisburg OH
Technician: TR
Job #: 2019
Station #: 305
Electrical Service:
Station Hours: 29735

A) GENERAL APPEARENCE:

Barrier Tape and Fence Intact ✓
Site Clear of Debris ✓
No Signs of Unauthorized Entry ✓
Clean Floor in Station ✓
Site Cap Intact ✓

B) SAFETY:

Signs Present:
1) Authorized Personnel ___
2) Eye/Ear Protection ___
3) Propane/Diesel ___
4) Other ✓

Fire Extinguishers:
1) Present ~~Y~~ N
2) Card Up to Date ~~Y~~ N
3) Charged ~~Y~~ N

General:
1) Site Safety Plan ~~Y~~ N
2) Padlocks ~~Y~~ N

C) SITE WALK:

1) Well Heads (-001)
2) Pipes ↓
3) Fittings ↓
4) Water Holding Tank ↓
5) Water Pumps (-001)
6) Vaccum Break Solenoid ↓
7) Kunkel Valve ↓
8) Light Bulbs and Fixtures ↓

D) **INITIAL READINGS**

Pump Station: Active Vacuum Taps B-2 ⟶ B-6

Temps: Ambient: 70 Vac. 130 Inj. 130

Vac. Blower: Inlet 5 Hg Outlet 2 PSI

Inj. Blower: Inlet 4 Hg Outlet 1 PSI

RPM _____ Current Draw _____

RPM _____ Current Draw _____

Air Flow Measurements B-2=20 B-3=15 B-4=<15 B-5=<15 B-6=<15

Water Displacement:

Wells Yielding Water B-2 B-3 B-5

External Tank Capacity Used 175 Remaining 225

Manual Trip of Drexelbrook Sensors:

Bottom Y N

Middle Y N

Top Y N

E) **PREVENTATIVE MAINTENANCE**

Filters (Vac and Inj) Manifold (no silt or H20)

Sample Pump Belts (good shape and in place) ✓

F) **BLOWER SEALS**

Seals Checked for Leakage (GOOD) Blowers Greased (GREASED)

G) **CARBON**

Units Checked for Damage OK Hoses & Fittings (GOOD)

Spent Units on Site 2

H) FINAL READINGS

Pump Station: Active Vacuum Taps B-2 → B-6

Temps: Ambient: 80 Vac. 130 Inj. 130

Vac. Blower: Inlet 5 Hg Outlet 2 PSI

Inj. Blower: Inlet 4 Hg Outlet 1 PSI

RPM _____ Current Draw _____

RPM _____ Current Draw _____

Air Flow Measurements _____

Carbon Dioxide Measurements Cont PPM = 250

Cont = 500 AFB = B-2 = 250 B-3 = 350 B-4 = 300

B-5 = 300 B-6 = 300

I) PARTS NEEDED

J) CLIENT COMMENTS

CHAIN OF CUSTODY FOR AIR SAMPLES

Station Hour Meter: 29155

Flow Meter: 2" Dixo 15 To 150

Vacuum (Hg.): 5

Air Temp. (ground): 90

Client: Mound

Site Address: Miamisburg OH

Client Code: 2019

Project Manager: Jay Erickson

	Sample ID.	Date	Time	Indicated Flow (cfm)	Carbon Dioxide (ppm)	Analysis Requested	Notes
1	Comp	7-14-94	9:00		<300		
2	~~[illegible]~~ 12	↓	↓	<15	<300		
3	~~[illegible]~~ 10			<15	<300		
4	7			65	<300		
5	AFCB				250		
6	14			<15	300		
7	9			20	250		
8							
9							
10							
11							
12							
13							
14							

Collected By: [signature] Date: 7-14-94 Time: 9:00

Delivered By: Date: Time:

Received By: Date: Time:

Remarks:

ETG Environmental, Inc.

Providing creative environmental solutions

7707 Rickle Road, Lansing, Michigan. 48917

Phone # : (517) 322-9311 Fax #: (517) 322-2936

ETG Lab Analytical Results

Client: Mound

Client Code: 2019

Analysis Date: 07/15/94

Sample Date: 07/14/94

Units: ppm

Detection Limit: 0.05

Analyst: YL

Project Manager: Erickson

Sample	1,2-DCE	1,1,1-TCA	TCE	Toluene	TVOC[1]
AFCB	BQL	BQL	BQL	BQL	1.8
COMP	0.17	BQL	0.72	BQL	3.4
WELL 10	0.06	BQL	0.29	BQL	1.9
WELL 12	0.10	BQL	0.34	BQL	2.4
WELL 14.	BQL	BQL	0.22	BQL	1.8
WELL 7	1.02	BQL	3.26	BQL	8.4
WELL 9	BQL	BQL	0.08	BQL	1.2

Notes:
[1] Estimated value. TVOC was calculated by the average response factor of the known contaminants.
[2] 1,2-DCE includes t-1,2-DCE and c-1,2-DCE.

SITE VISIT CHECK LIST

Client: ICF Kaiser
Date of Visit: 7-28-94
Location: Miamisburg Mound
Technician: JE
Job #: 2009
Station #: 305
Electrical Service:
Station Hours: 29939.9

A) GENERAL APPEARENCE:

Barrier Tape and Fence Intact ✓
Site Clear of Debris ✓
No Signs of Unauthorized Entry ✓
Clean Floor in Station ✓
Site Cap Intact ✓

B) SAFETY:

Signs Present:
1) Authorized Personnel ___
2) Eye/Ear Protection ___
3) Propane/Diesel ___
4) Other ✓

Fire Extinguishers:
1) Present ~~Y~~ N
2) Card Up to Date ~~Y~~ N
3) Charged ~~Y~~ N

General:
1) Site Safety Plan ~~Y~~ N
2) Padlocks ~~Y~~ N

C) SITE WALK:

1) Well Heads Good
2) Pipes
3) Fittings
4) Water Holding Tank 6" Water
5) Water Pumps Good
6) Vaccum Break Solenoid
7) Kunkel Valve
8) Light Bulbs and Fixtures ___

D) INITIAL READINGS

Pump Station: Active Vacuum Taps B2 (9), B3 (14), B4 (7), B5 (10), B6 (12)

Temps: Ambient: 70 Vac. 70 Inj. 70

Vac. Blower: Inlet 5 Hg Outlet 2 PSI

Inj. Blower: Inlet 3 Hg Outlet 1 PSI

RPM _____ Current Draw _____

RPM _____ Current Draw _____

Air Flow Measurements _____

Water Displacement:

Wells Yielding Water B2 B4, B5

External Tank Capacity Used 50 Remaining 400

Manual Trip of Drexelbrook Sensors:

Bottom Y N

Middle Y N

Top Y N

E) PREVENTATIVE MAINTENANCE

Filters (Vac and Inj) Manifold (no silt or H20)

Sample Pump Belts (good shape and in place) ✓

F) BLOWER SEALS

Seals Checked for Leakage Good Blowers Greased _____

G) CARBON

Units Checked for Damage ok Hoses & Fittings Good

Spent Units on Site 2

H) FINAL READINGS

Pump Station: Active Vacuum Taps B2 -> B6

Temps: Ambient:_____ Vac._____ Inj._____

Vac. Blower: Inlet 5 Hg Outlet_____PSI

Inj. Blower: Inlet 2 Hg Outlet_____PSI

RPM_____ Current Draw _____

RPM_____ Current Draw _____

Air Flow Measurements_____

Carbon Dioxide Measurements_____

I) PARTS NEEDED

J) CLIENT COMMENTS

ETG Lab Analytical Results

Client: Mound

Client Code: 2019

Analysis Date: 07/29/94

Sample Date: 07/28/94

Units: ppm

Detection Limit: 0.05

Analyst: YL

Project Manager: Erickson

Sample	1,2-DCE	1,1,1-TCA	TCE	Toluene	TVOC[1]
COMP	0.18	BQL	0.23	BQL	4.9
WELL 10	0.52	BQL	0.28	BQL	4.1
WELL 12	0.79	BQL	0.84	BQL	5.5
WELL 14	0.78	BQL	0.62	BQL	5.4
WELL 9	0.84	BQL	0.74	BQL	5.6

Notes:
[1] Estimated value. TVOC was calculated by the average response factor of the known contaminants.
[2] 1,2-DCE includes t-1,2-DCE and c-1,2-DCE.
[3] "Well 7" was flat.

SITE VISIT CHECK LIST

Client: ICF Kaiser
Date of Visit: 8/11/94
Location: Miamisburg Mound
Technician: JE
Job #: 2019
Station #: 325
Electrical Service:
Station Hours: ~~299~~ 30271.9

A) GENERAL APPEARENCE:

Barrier Tape and Fence Intact X
Site Clear of Debris X
No Signs of Unauthorized Entry X
Clean Floor in Station X
Site Cap Intact X

B) SAFETY:

Signs Present:
1) Authorized Personnel X
2) Eye/Ear Protection
3) Propane/Diesel
4) Other ✓

Fire Extinguishers:
1) Present (Y) N
2) Card Up to Date (Y) N
3) Charged (Y) N

General:
1) Site Safety Plan (Y) N
2) Padlocks (Y) N

C) SITE WALK:

1) Well Heads Good
2) Pipes ↓
3) Fittings ↓
4) Water Holding Tank 1.5 foot water
5) Water Pumps Good
6) Vaccum Break Solenoid ↓
7) Kunkel Valve ↓
8) Light Bulbs and Fixtures X

D) INITIAL READINGS

Pump Station: Active Vacuum Taps B2 (9), B3 (14), B4 (7), B5 (10), B6 (12)

Temps: Ambient: 65°F Vac. 50°C Inj. 58°C

Vac. Blower: Inlet 5 Hg Outlet 2 # PSI

Inj. Blower: Inlet 0 Hg Outlet 3 Hg ~~PSI~~

RPM _____ Current Draw _____

RPM _____ Current Draw _____

Air Flow Measurements B2 = 50 B3 = 60 B4 = 5 B5 = <2 B6 = <2

Water Displacement:

Wells Yielding Water ~~none~~ Well 10, Well 9

External Tank Capacity Used 160 gal Remaining 315

Manual Trip of Drexelbrook Sensors:

Bottom Y N

Middle Y N

Top Y N

E) PREVENTATIVE MAINTENANCE

Filters (Vac and Inj) Manifold (no silt or H20)

Sample Pump Belts (good shape and in place)

F) BLOWER SEALS

Seals Checked for Leakage good Blowers Greased yes

G) CARBON

Units Checked for Damage ✓ Hoses & Fittings ✓

Spent Units on Site 2

H) FINAL READINGS

Pump Station: Active Vacuum Taps Sand

Temps: Ambient: _____ Vac: 50 ~~70~~°C Inj. 55 ~~75~~°C

Vac. Blower: Inlet 5 Hg Outlet 2.5 PSI

Inj. Blower: Inlet 3.5 Hg Outlet 0 PSI

RPM _____ Current Draw _____

RPM _____ Current Draw _____

Air Flow Measurements _____

Carbon Dioxide Measurements 7 = 350, 10 = 425, Comp = 375, 12 = 400
14 = 350, 9 = ~~8~~ 400
calibration 350

I) PARTS NEEDED

J) CLIENT COMMENTS

ETG Lab Analytical Results

Client: Mound
Client Code: 2019
Analysis Date: 08/12/94
Sample Date: 08/11/94
Units: ppm
Detection Limit: 0.05
Analyst: YL
Project Manager: Erickson

Sample	1,2-DCE	1,1,1-TCA	TCE	Toluene	TVOC[1]
COMP	0.37	BQL	1.00	BQL	6.6
WELL 10	0.23	BQL	0.76	BQL	3.9
WELL 12	0.22	BQL	0.66	BQL	3.9
WELL 14	0.07	BQL	0.26	BQL	2.8
WELL 7	1.72	BQL	4.87	BQL	16.8
WELL 9	0.07	BQL	0.23	BQL	1.9

Notes:
[1] Estimated value. TVOC was calculated by the average response factor of the known contaminants.
[2] 1,2-DCE includes t-1,2-DCE and c-1,2-DCE.

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To Jay Erickson	From Yixin Li
Co.	Co.
Dept.	Phone #
Fax #	Fax #

SITE VISIT CHECK LIST

Client: Mound
Date of Visit: 8/25
Location: Miamisburg, OH.
Technician: B.C.
Job #: 2019
Station #: 305
Electrical Service:
Station Hours: 30614.7

A) GENERAL APPEARENCE:

Barrier Tape and Fence Intact Y
Site Clear of Debris Y
No Signs of Unauthorized Entry N
Clean Floor in Station Y
Site Cap Intact Y

B) SAFETY:

Signs Present:
1) Authorized Personnel ✓
2) Eye/Ear Protection ✓
3) Propane/Diesel ___
4) Other ___

Fire Extinguishers:
1) Present (Y) N
2) Card Up to Date (Y) N
3) Charged (Y) N

General:
1) Site Safety Plan (Y) N
2) Padlocks (Y) N

C) SITE WALK:

1) Well Heads GOOD
2) Pipes GOOD
3) Fittings GOOD
4) Water Holding Tank GOOD (2009.)
5) Water Pumps GOOD
6) Vaccum Break Solenoid GOOD
7) Kunkel Valve GOOD
8) Light Bulbs and Fixtures GOOD

D) INITIAL READINGS

Pump Station: Active Vacuum Taps B2 thru B6

Temps: Ambient: 90° Vac. 130° Inj. 140°

Vac. Blower: Inlet -6 Hg Outlet 2 PSI

Inj. Blower: Inlet -5 Hg Outlet 1 PSI

RPM _____ Current Draw _____

RPM _____ Current Draw _____

Air Flow Measurements B1 = 35 B2 = 50 B3 = 7 B4 = 0 B5 = 0 B6 = 0

Water Displacement:

Wells Yielding Water B4

External Tank Capacity Used 200g Remaining 300g

Manual Trip of Drexelbrook Sensors:

Bottom Y ~~N~~

Middle Y ~~N~~

Top Y ~~N~~

E) PREVENTATIVE MAINTENANCE

Filters (Vac and Inj) OK

Manifold (no silt or H20) OK

Sample Pump OK

Belts (good shape and in place) OK

F) BLOWER SEALS

Seals Checked for Leakage OK

Blowers Greased YES

G) CARBON

Units Checked for Damage OK

Hoses & Fittings OK

Spent Units on Site 2

H) FINAL READINGS

Pump Station: Active Vacuum Taps SAME

Temps: Ambient:_____ Vac._____ Inj._____

Vac. Blower: Inlet_____Hg Outlet_____PSI

Inj. Blower: Inlet_____Hg Outlet_____PSI

RPM_____ Current Draw _____

RPM_____ Current Draw _____

Air Flow Measurements_____

Carbon Dioxide Measurements B2 = 450 B3 = 550 B4 = 650
B5 = 550 B6 = 600

I) PARTS NEEDED

Can for old oil.

J) CLIENT COMMENTS

SITE VISIT CHECK LIST

Client: Mound
Date of Visit: 09-22-94
Location:
Technician: Arno Nielson
Job #: 2019
Station #:
Electrical Service:
Station Hours: 3 to 2:05

A) GENERAL APPEARENCE:

Barrier Tape and Fence Intact ✓
Site Clear of Debris ✓
No Signs of Unauthorized Entry ✓
Clean Floor in Station ✓
Site Cap Intact ✓

B) SAFETY:

Signs Present:
1) Authorized Personnel ✓
2) Eye/Ear Protection ✓
3) Propane/Diesel ___
4) Other ___

Fire Extinguishers:
1) Present (Y) N
2) Card Up to Date (Y) N
3) Charged (Y) N

General:
1) Site Safety Plan (Y) N
2) Padlocks (Y) N

C) SITE WALK:

1) Well Heads OK
2) Pipes OK
3) Fittings OK
4) Water Holding Tank OK
5) Water Pumps OK
6) Vaccum Break Solenoid ✓
7) Kunkel Valve ✓
8) Light Bulbs and Fixtures OK

D) INITIAL READINGS

Pump Station: Active Vacuum Taps B2 - B6

Temps: Ambient: 130 Vac. 130 Inj. 130

Vac. Blower: Inlet 5.5 Hg Outlet 2.5 PSI

Inj. Blower: Inlet 4 Hg Outlet 0 PSI

RPM _____ Current Draw _____

RPM _____ Current Draw _____

Air Flow Measurements 10 - 0

14 - 45 12 - 0

7 - 6 9 - 50

Water Displacement:

Wells Yielding Water Well #7

External Tank Capacity Used 50 Remaining 450

Manual Trip of Drexelbrook Sensors:

Bottom Y N

Middle Y N

Top Y N

50

E) PREVENTATIVE MAINTENANCE

Filters (Vac and Inj) Manifold (no silt or H20)

Sample Pump Belts (good shape and in place)

F) BLOWER SEALS

Seals Checked for Leakage ✓ Blowers Greased NV

G) CARBON

Units Checked for Damage ✓ Hoses & Fittings ✓

Spent Units on Site ✓

H) FINAL READINGS

Pump Station: Active Vacuum Taps B2 - B6

Temps: Ambient: _____ Vac. 130 Inj. 130

Vac. Blower: Inlet 5.5 Hg Outlet 2.5 PSI

Inj. Blower: Inlet 4 Hg Outlet 0 PSI

RPM _____ Current Draw _____

RPM _____ Current Draw _____

Air Flow Measurements 10 - 0

12 - 0 14 - 45 45

7 - 6 9 - 5 50

Carbon Dioxide Measurements 10 - 400

12 - 550 14 400

7 - 550 9 - 400

Comp - 550

I) PARTS NEEDED

J) CLIENT COMMENTS

ETC Lab Analytical Results

Client: Mound
Client Code: 2019
Analysis Date: 08/26/94
Sample Date: 08/25/94
Units: ppm
Detection Limit: 0.05
Analyst: YL
Project Manager: Sparrin

Sample	1,2-DCE	1,1,1-TCA	TCE	Toluene	TVOC[1]
AFCB	0.11	BQL	BQL	BQL	1.8
COMP	0.46	BQL	1.43	BQL	4.8
WELL 10	0.26	BQL	0.80	BQL	3.5
WELL 13	0.33	BQL	0.89	BQL	3.6
WELL 14	0.08	BQL	0.23	BQL	2.4
WELL 7	0.68	BQL	2.06	BQL	6.8
WELL 9	0.13	BQL	0.22	BQL	1.7

Notes:
[1] Estimated value. TVOC was calculated by the average response factor of the known contaminants.
[2] 1,2-DCE includes t-1,2-DCE and c-1,2-DCE.

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To John Sparrin	From Yixin Li
Co.	Co.
Dept.	Phone #
Fax #	Fax #

ETG Lab Analytical Results

Client: Mound

Client Code: 2019

Analysis Date: 09/09/94

Sample Date: 09/08/94

Units: ppm

Detection Limit: 0.05

Analyst: YL

Project Manager: Spearin

Sample	1,2-DCE	1,1,1-TCA	TCE	Toluene	TVOC[1]
AFCB	0.10	BQL	BQL	BQL	1.8
COMP	0.30	BQL	0.70	BQL	3.5
WELL 10	0.15	BQL	0.33	BQL	2.3
WELL 12	0.16	BQL	0.38	BQL	2.4
WELL 14	BQL	BQL	BQL	BQL	1.5
WELL 7	1.17	BQL	3.04	BQL	8.8
WELL 9	BQL	BQL	BQL	BQL	1.2

Notes:
[1] Estimated value. TVOC was calculated by the average response factor of the known contaminants.
[2] 1,2-DCE includes t-1,2-DCE and c-1,2-DCE.

ETG Lab Analytical Results

Client: Mound

Client Code: 2019

Analysis Date: 09/23/94

Sample Date: 09/22/94

Units: ppm

Detection Limit: 0.05

Analyst: YL

Project Manager: Spearin

Sample	1,2-DCE	1,1,1-TCA	TCE	Toluene	TVOC[1]
AFCB	0.13	BQL	BQL	BQL	1.8
COMP	0.24	BQL	0.42	BQL	2.7[3]
WELL 10	0.16	BQL	0.38	BQL	2.1
WELL 12	0.15	BQL	0.24	BQL	2.1
WELL 14	BQL	BQL	BQL	BQL	1.6
WELL 7	0.93	BQL	1.93	BQL	6.8
WELL 9	0.05	BQL	BQL	BQL	1.4

Notes:
[1] Estimated value. TVOC was calculated by the average response factor of the known contaminants.
[2] 1,2-DCE includes t-1,2-DCE and c-1,2-DCE.
[3] 47% is the VOCs with boiling points <48°C. 52% is the VOCs with the boiling points between 48°C and 110°C.

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To John Spearin	From Yixin Li
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