QT9902_D5428

Engineering Report for Remedial Design at the Dearcop Farm Site Town of Gates, New York Site Number 8-28-016

Work Assignment No.: D003493-10

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Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation

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List of Acronyms

BGS	below ground surface
cfm	cubic feet per minute
CMP	corrugated metal pipe
cm/s	centimeters per second
DER	Division of Environmental Remediation
E & E	Ecology and Environment Engineering, P.C.
EPA	Environmental Protection Agency
FS	Feasibility Study
HDPE	high density polyethylene
ID	inner diameter
IRM	Interim Remedial Measure
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
OD	outer diameter
OVA	organic vapor analyzer
pCi/g	picocuries per gram
ppmv	parts per million by volume
PVC	polyvinyl chloride
RG&E	Rochester Gas & Electric
RI	Remedial Investigation
RoD	Record of Decision
scfm	standard cubic feet per minute
SITE	Superfund Innovative Technology Evaluation
SCG	standards, criteria, and guidances
SVE	Soil Vapor Extraction

List of Acronyms (Cont.)

$\mu g/m^3$	micrograms per cubic meter
USC	Utility Survey Corp
VFPE	very fine polyethylene
VOC	volatile organic compound

1 Introduction

E & E
Ecology and Environment Engineering, P.C.

NYSDEC
New York State Department of Environmental Conservation

DER
Division of Environmental Remediation

SVE
Soil Vapor Extraction

NYSDOT
New York State Department of Transportation

Pursuant to Work Assignments No. D003493-10 received December 29, 1998, Ecology and Environment Engineering, P.C. (E & E) is submitting this Engineering Report to the New York State Department of Environmental Conservation (NYSDEC), Division of Environmental Remediation (DER), for the remedial design of the Dearcop Farm site in the Town of Gates, Monroe County, New York.

This Engineering Report provides the basis of all design and operational parameters of the remedy. This includes presentation of the results of the Soil Vapor Extraction (SVE) pilot test performed in May 1998, and the impact these results have on SVE system design, including off-gas treatment. Also included in this report are the results-to-date of a search for utilities that may be present on the site, and a presentation of engineering aspects of the cap design such as stormwater runoff management.

1.1 Site Description and History

The Dearcop Farm site is an inactive 16-acre landfill located off the north end of Dearcop Drive and Varian Lane in the Town of Gates, Monroe County, New York. Residential areas border the site on the south. The site is bordered on the east by a small man-made embankment approximately 70 feet west of the New York State Barge Canal; on the north by the westbound lanes and an exit ramp from Interstate Route 490 (I-490); and on the west by Interstate Route 390 (I-390) (see Figure 1-1).

The southern six acres of the site currently are owned by Mr. William L. Dearcop and Mr. Charles R. Dearcop, Jr. The northern 10 acres of the site are owned by the New York State Department of Transportation (NYSDOT).

The I-490 and I-390 interchange is situated on the northern 10 acres. The southern six acres of the site are open in the west and central portion, with evidence of past grading.

The portion of the site south of Interstate 490 (the vacant lot area) is well vegetated with weeds, brush, and trees. Foundry sand, slag,

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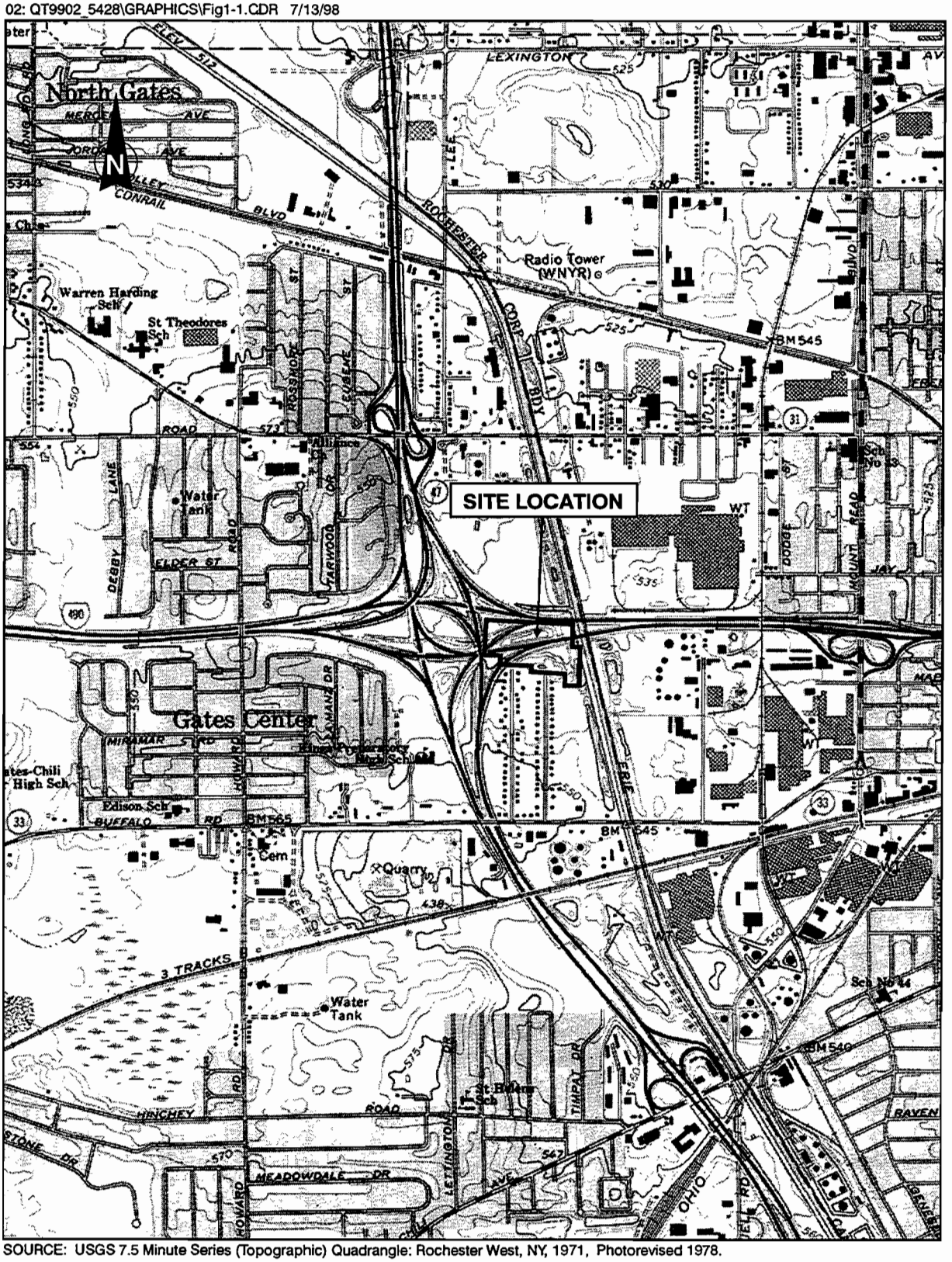

SOURCE: USGS 7.5 Minute Series (Topographic) Quadrangle: Rochester West, NY, 1971, Photorevised 1978.

SCALE 1:24,000

0 ½ 1 Mile

0 .5 1 Kilometer

Figure 1-1 SITE LOCATION MAP DEARCOP FARM SITE

scrap metal, wood, glass, and other debris can be seen at the surface in this area. The terrain is uneven, but the slope and drainage trend principally north and east to the canal. Access to the site is available from the south off Dearcop Drive and Varian Lane.

The site functioned as a disposal area from 1919 to 1970. Reportedly, the site received industrial waste between 1930 and 1970 from General Railway Signal Company; E.I. DuPont DeNemours and Company, Inc., (DuPont); the Pfaudler Company; and American Brakeshoe Company. When NYSDOT purchased the northern 10 acres in 1958, dumping in that area stopped.

The waste disposed of at the site included rubbish, office paper, wood, debris, scrap iron, foundry dirt, sandblasting sand, and sand castings.

Waste disposed of at the site by DuPont also included acids, heavy metals, waste oil and oil sludges, halogenated organics, and other compounds. These wastes were disposed of through open burning. The I-490 highway median is currently located over the former solvent burning area. A geotextile liner and 1 to 2 feet of fill material were placed over the former burn pit area during reconstruction of I-490 in the early 1990s.

A Phase II investigation report for this site was completed in April 1988 for NYSDEC by EA Engineering, Science, and Technology, Inc.

Analytical results of samples collected from three Phase II investigation monitoring wells indicated that the groundwater in the area of the site is contaminated with halogenated and aromatic volatile organic compounds (VOCs). Surface water and sediments were not found to be contaminated. A magnetometer survey detected several high anomalous zones in the landfill north of the residential area and in the median of I-490.

VOCs
volatile organic compounds

pCi/g
picocuries per gram

RI
Remedial Investigation

In June 1990, NYSDEC collected soil/sediment samples from six locations at the Dearcop Farm site. Elevated levels of radioactive isotopes were detected in a soil sample collected on July 18, 1990, from a blue-stained surface soil deposit located in the northwest section of the site. Radium-226 and radium-228 were detected at 5.1 picocuries per gram (pCi/g) and 3.4 pCi/g, respectively.

A Remedial Investigation (RI) was conducted in three phases. E & E conducted Phase I and II, while NYSDEC conducted the Phase III investigation. The RI confirmed the presence and delineated the extent of contamination.

SCGs
standards, criteria, and guidances

FS
Feasibility Study

RoD
Record of Decision

IRM
Interim Remedial Measure

NYSDOH
New York State Department of Health

Based on the results of the RI in comparison to standards, criteria, and guidances (SCGs) and potential public health and environmental exposure rates, a Feasibility Study (FS) identified certain areas and media of the site that require remediation.

A Record of Decision (RoD) was signed in 1995 calling for capping of the areas shown in Figure 1-2. In addition, SVE would be conducted in the areas detected with high soil gas contamination, as shown in Figure 1-3.

An Interim Remedial Measure (IRM) was completed in 1997. Additional sampling was performed in the select residential lots to further delineate the areas of soil contamination. Soil in the residential area contaminated with lead or cadmium above the New York State Department of Health (NYSDOH) recommended cleanup levels of 400 ppm and 10 ppm, respectively, was excavated and consolidated onto the landfill site. Localized soil areas from four residential lots were excavated. Excavated soil/fill was hauled to the on-site area and stored on site in a staging area for use in the landfill cap.

1.2 Topographic Map

As part of the Remedial Design process, an updated topographic map of the site was produced. This map is included as Figure 1-3.

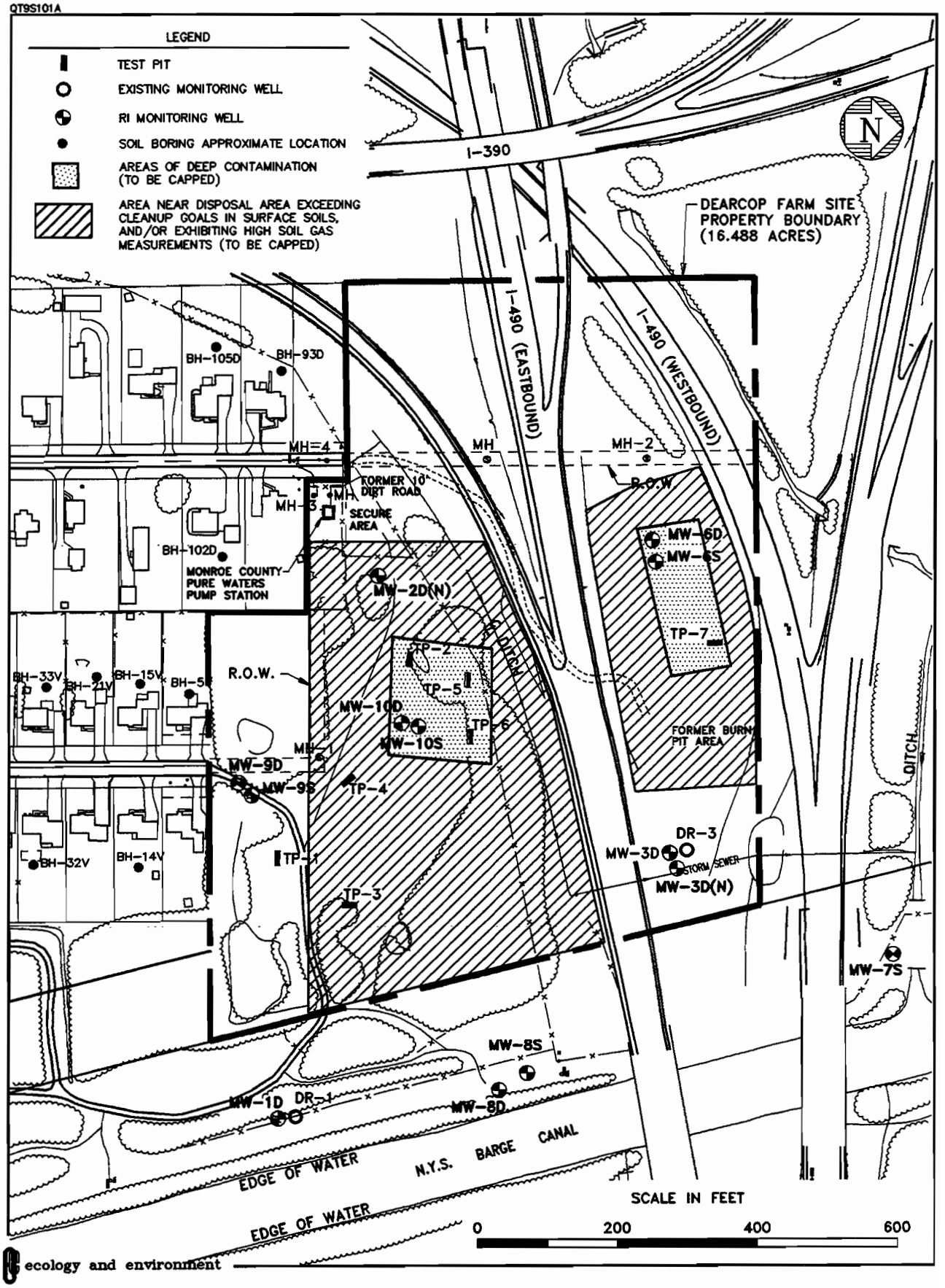

Figure 1-2 SOIL AND FILL MATERIAL AREAS NEAR DISPOSAL AREA EXCEEDING CLEANUP OBJECTIVES AND/OR EXHIBITING HIGH SOIL GAS MEASUREMENTS

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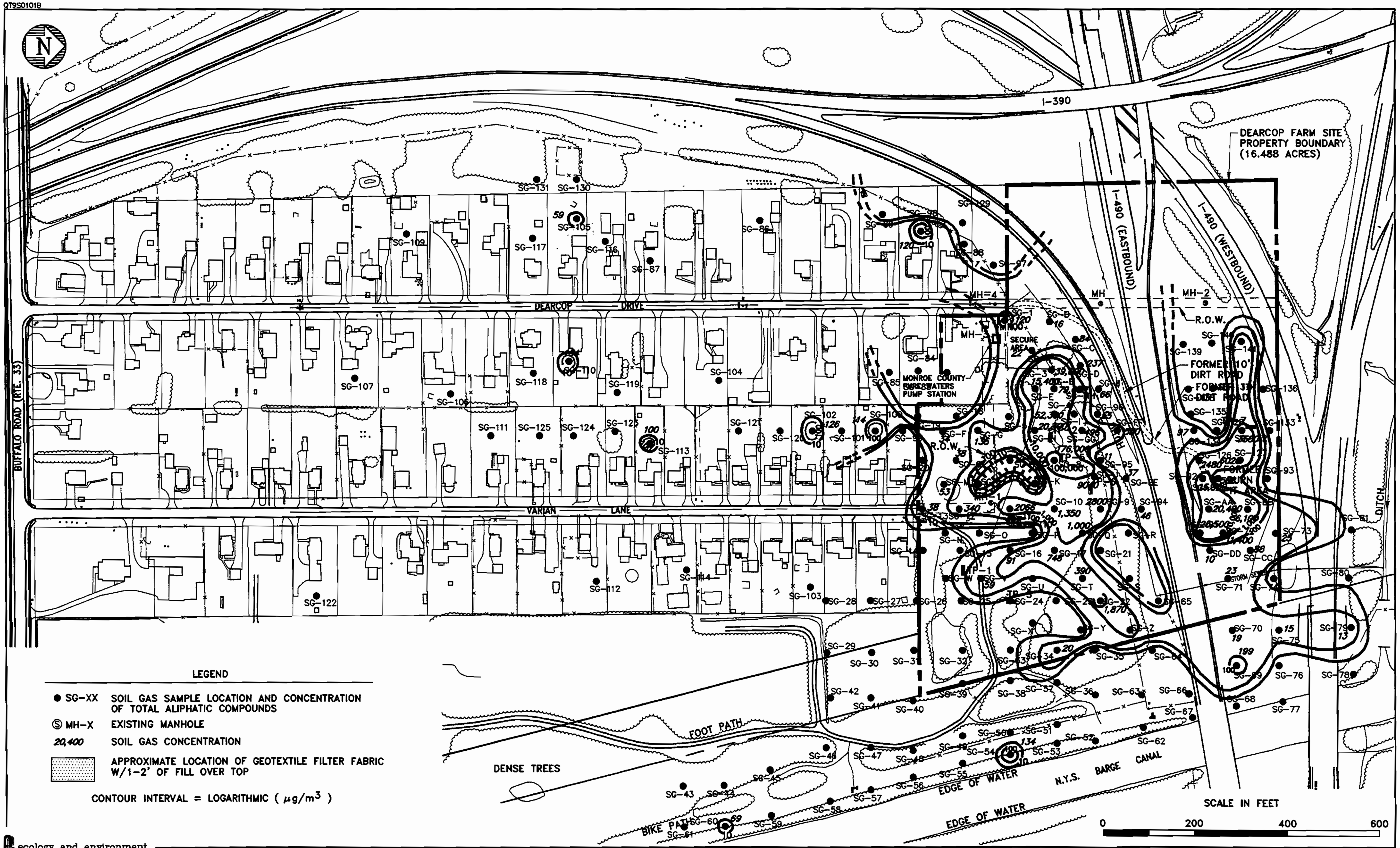

Figure 1-3 SOIL GAS TOTAL CHLORINATED ALIPHATIC PLUME BOUNDARY MAP DEARCOP FARM SITE

2 Soil Vapor Extraction Pilot Test Results

E & E and its subcontractor, Lu Engineers, conducted a soil vapor pilot extraction test at the Dearcop Farm site in May 1998. Lu Engineers submitted a work plan to E & E on May 18, 1998, in accordance with their scope of work, as included in E & E's April 1998 Remedial Design Work Plan. This work plan, approved by NYSDEC on May 13, 1998, is attached as Appendix A.

Installation of extraction and monitoring wells for the SVE study commenced on May 20, 1998. Originally, the pilot test was to be conducted at two locations on the main portion of the site (see Figure 2-1). However, during the installation of the extraction wells and the piezometers, the water table in the easternmost test location was found to be approximately 6.2 feet below ground surface (BGS) and, therefore, too shallow to install the extraction well properly. E & E contacted Gary Klein, the NYSDEC project manager, to discuss possible modifications in the approach. Based on these discussions, it was decided that the vapor extraction testing would be performed at a single location (the more northern of the two locations originally selected).

BGS
below ground surface

The proposed eastern SVE location was deemed inappropriate for SVE testing since its vadose zone was less than seven feet thick. It was decided that the vapor barrier planned for the surface surrounding the eastern extraction well would be installed around the western well instead. To allow sufficient space to install this barrier without having to remove and reinstall a fence, the western extraction well was moved several feet to the south. The holes drilled at the originally planned locations of the eastern and western extraction wells were converted to groundwater piezometers. In addition, it was decided that one additional groundwater piezometer be installed to complement the other two to determine groundwater elevations and flow directions.

2.1 Soil Vapor Extraction Well Installation and System Set-up

The extraction well (SVE-01) was installed in the location shown on Figure 2-2 to a depth of approximately 8 feet BGS and was constructed with 5 feet of screen (from 3 to 8 feet BGS).

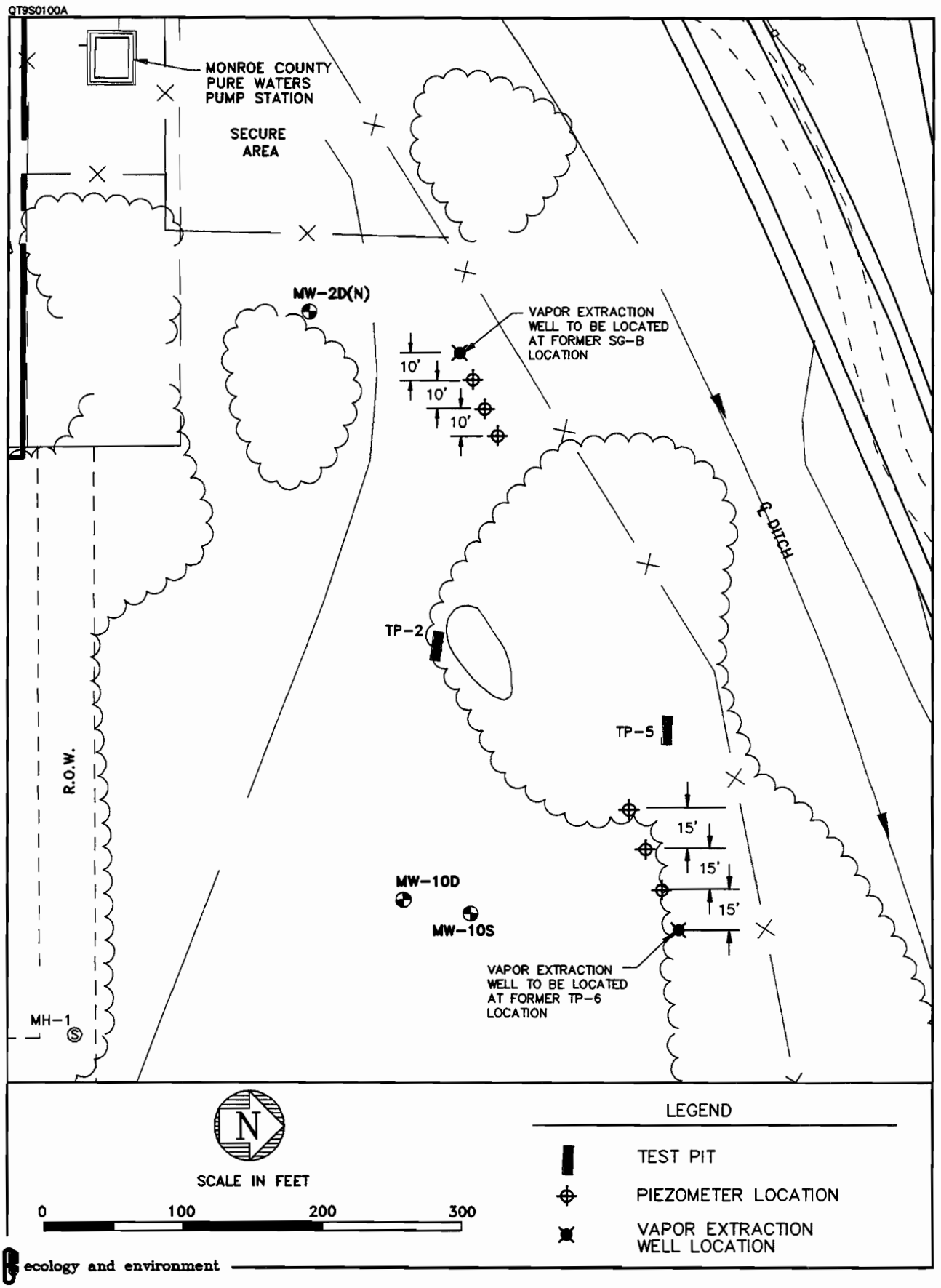

Figure 2-1 ORIGINALLY PLANNED PILOT STUDY, VAPOR EXTRACTION WELL/PIEZOMETER LOCATIONS

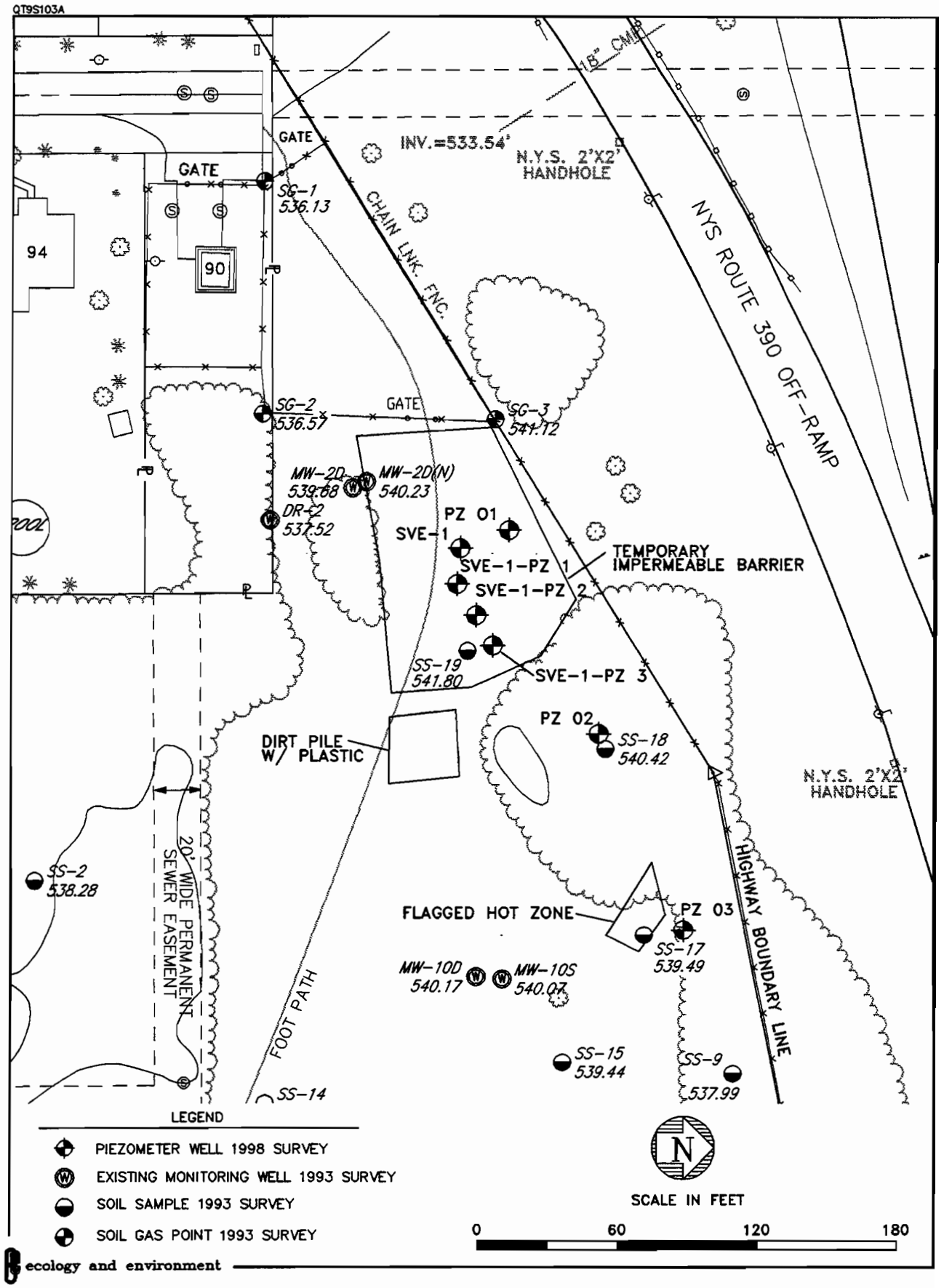

Figure 2-2 ACTUAL SOIL VAPOR EXTRACTION PILOT TEST PIEZOMETER AND WELL LOCATIONS

Additionally, nested piezometers were installed for use as vacuum monitoring points. The piezometers were installed as pairs located 15 feet, 30 feet, and 45 feet radially from the extraction well. Each pair of piezometers contained a shallow piezometer, screened from 4 to 5 feet BGS, and a deep piezometer, screened from 7 to 8 feet BGS.

ID
inner diameter

OD
outer diameter

OVA
organic vapor analyzer

PVC
polyvinyl chloride

The well and piezometers were installed using hollow-stem auger techniques with a 4.25-inch inner diameter (ID) auger. Continuous split-spoon samples were collected using carbon steel split spoon samplers of 2-inch outer diameter (OD) for lithologic characterization. In addition, at least one sample per screened interval was collected for geotechnical analyses including: grain size (ASTM D422), hydrometer (ASTM D422), moisture content (ASTM D2216), and intrinsic permeability (ASTM D5084). All samples were screened for organic vapors using an organic vapor analyzer (OVA) and for radiation using a ratemeter with a pancake probe prior to submittal to Parratt Wolff, Inc., for analysis. No radiation readings above background were recorded for the geotechnical samples collected.

The well and piezometers were completed by installing polyvinyl chloride (PVC) Schedule 40, flush threaded, casing and 0.010-inch machine slot screen with a threaded-end plug. The extraction well was completed with 2-inch ID casing and 5 feet of screen, and each piezometer was completed with 1-inch ID casing and 1 foot of screen. Because of the depths of the well and piezometers, it was not possible to leave threads on the piping for placement of threaded caps. During the test, the top of each piezometer was sealed with a PVC cap and duct tape. Each cap was equipped with a barb for attaching the vacuum measuring instrument. The barbs were not self-sealing so each was closed off with putty between measurements to prevent leakage into the test.

The annular space of each borehole was backfilled with native material to the top of the screen or 1 foot above it. Then a 1.5- to 2.0-foot bentonite-pellet seal was placed in the annular space, and the hole was cement grouted to the surface. Well completion diagrams are included in the Lu Engineers test report contained in Appendix B.

Following installation of the well and piezometers, an impermeable membrane was installed to cover the ground surface in the area of the pilot test. The membrane was made of 6 mil polyethylene sheeting and was laid out over an area with a radius of 60 feet from the extraction well. Penetrations of the membrane at the well heads and the joints were sealed with duct tape. At the outer edge, a shallow trench was installed and the membrane material was

placed in the trench. The membrane edge was then covered with the dirt from the trench.

Figure 2-3 shows the extraction test equipment set-up. A 2.0-horsepower regenerative blower was used to extract vapor from the well. The blower was powered by a gasoline-powered generator. A water knockout drum was placed in line upstream of the blower to remove any excess moisture before the vapor stream entered the blower. Upon exiting the blower, the vapor stream passed through two 170-pound granular activated carbon canisters prior to discharge to the atmosphere. The system piping was connected using heavy flexible tubing and rigid PVC. None of the joints upstream of the vapor sample point were glued because the glue may have contaminated the vapor stream samples. The system vacuum and vapor flow were controlled by adjusting a valve on the upstream side of the blower.

2.2 SVE Pilot Test Methodology

The pilot test was conducted by setting a vacuum and air flow, then recording measurements at predetermined intervals until stabilization of the vacuum readings was achieved. Following stabilization, the vacuum and vapor flow was increased and the measurements were repeated. A total of four different vacuums were tested at the Dearcop Farm site. Because of the high permeabilities encountered in the soil/fill material (see below), all four steady states were achieved during a single day of testing (May 27, 1998).

During the pilot test, vacuum, organic vapor level, vapor flowrate, barometric pressure, and temperature measurements were collected every 10 minutes for the first hour and every 15 minutes thereafter. The vacuum at the extraction well was measured using an in-line vacuum gauge with 0 to 100 inches of water scale. This gauge was located upstream of the water knockout drum. Vacuums at the piezometers were measured using a single low vacuum manometer with a range of 0 to 3 inches of water. This manometer was moved from piezometer to piezometer for each reading. The vapor flowrate through the system was measured on the discharge side of the carbon drums. The flow velocity was measured with a handheld thermoanenometer and the velocity was converted to volumetric air flow. Vapor concentrations were measured upstream of the water knockout drum and at the effluent of the drums. Temperature of the vapor stream was measured at the inlet to the blower. Barometric pressure and ambient temperatures were also recorded.

Prior to start-up of the SVE test equipment, an ambient air sample was collected for chemical analysis. Additionally, vapor samples were collected from the system upstream of the blower at the

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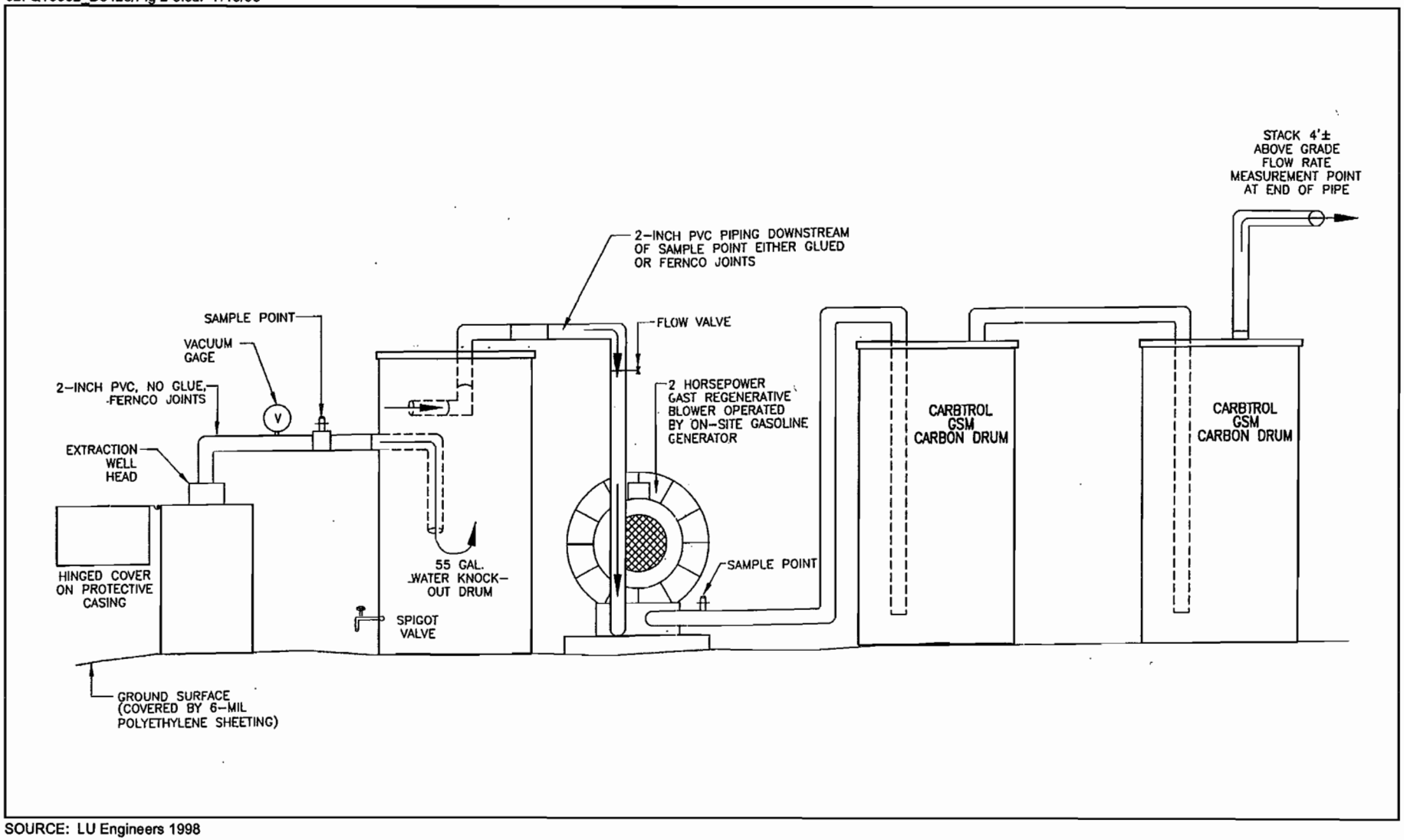

SOURCE: LU Engineers 1998

Figure 2-3 SOIL VAPOR EXTRACTION PILOT STUDY SYSTEM SCHEMATIC

beginning of each vacuum step and again once stabilization was reached for each vacuum step. All air samples were collected in 1-liter Tedlar bags. The bags were placed inside a vacuum chamber and tubing was used to connect the Tedlar bag to the vapor source. Then a vacuum pump was used to evacuate the chamber. The vacuum on the outside of the Tedlar bag allowed vapor to be sampled to enter the bag without contact with the ambient air. All vapor samples were sent to Performance Analytical Inc. in Canoga Park, California, for analysis of volatile compounds by EPA method TO-14.

2.3 SVE Test Results

2.3.1 Vapor Extraction Results

Observation of the soil cores indicated that the well and piezometers were screened in an orange to red to brown to black, medium to fine sand that contained coarse to medium to fine gravel and some silt. Fragments of waste materials (i.e., metal, roofing shingles, glass, etc.) were noted at varying depths at each location. Lithologic logs are included in the test report from Lu Engineers contained in Appendix B.

One soil sample from each well and piezometer nest location was collected within the screened interval for geotechnical and chemical (VOC) analysis. The geotechnical and analytical results summary is presented in Table 2-1 and Table 2-1a, respectively, and full laboratory reports are included in Appendix C. The geotechnical results were used in conjunction with the field data for the modeling effort discussed in Section 2.4.

In addition, one sample was taken from the well and each vapor piezometer for analysis for VOCs.

An ambient air sample was collected for chemical analysis prior to starting the system. Analytical results are presented in Table 2-2.

Following system set-up, the system was started briefly to establish the maximum achievable vacuum. This vacuum at the vapor extraction well equaled approximately 20 inches of water. For the first test run, the system was set to pull a vacuum of approximately 3 inches of water measured at the extraction well. The vapor flow through the system was approximately 31 cubic feet per minute (cfm) and steady state was achieved during the first 10 minutes of the test. The test at this vacuum was run for approximately 75 minutes. All flow and vacuum measurements recorded during the test are included in the Lu Engineers report in Appendix B. Two vapor samples were collected during Test 1 for chemical analysis. One sample was collected immediately upon starting the system

cfm
cubic feet per minute

Table 2-1 Geotechnical Results, Soil Vapor Extraction Pilot Test, Dearcop Farm Site

Measure	Sample Location			
	SVE-1	PZ-1	PZ-2	PZ-3
Sample Depth Interval (feet BGS)	4.0 - 6.0	4 - 7.8	6 - 8	4 - 6
Moisture Content (percent)	26.5	5.0	10.3	21.7
Permeability (centimeters per second)	1.24×10^{-4}	8.19×10^{-4}	6.6×10^{-4}	1.38×10^{-5}

Key:

BGS = Below ground surface.
PZ = Piezometer.
SVE = Soil vapor extraction.

Table 2-1 (Cont.)

Sample	Depth (feet)	Sieve Size - Percent Passing Sieve												
		1 ½"	1"	3/4"	1/2"	3/8"	1/4"	#4	#10	#30	#40	#60	#100	#200
SVE-1	4.0 - 6.0	—	—	100	99.6	96.4	89.7	86.4	81.4	70.8	66.4	45.2	24.8	14.7
PZ-1	4.0 - 7.8	100	94.0	94.0	93.1	92.0	90.5	89.7	87.0	83.1	79.3	46.4	19.6	9.3
PZ-2	6.0 - 8.0	100	98.1	96.0	95.6	94.5	93.1	92.2	90.6	85.3	81.7	53.9	25.9	12.0
PZ-3	4.0 - 6.0	—	—	—	100	99.4	98.4	98.1	97.5	96.3	95.0	79.0	58.5	42.0

Table 2-1a Soil Sample Chemical Analysis Results

Compound	Samples						
	SVE1	SVE1DL	SVE1PZ1	SVE1PZ1DL	SVE1PZ2	SVE1PZ2D	SVE1PZ3
Chloroethane	ND	ND	ND	ND	2 J	ND	ND
Methylene chloride	5 J	14 BJD	7 B	8 DJ	3 BJ	2 BJ	3 BJ
Acetone	13 B	27 BJD	4 BJ	31 BDJ	6 BJ	4 BJ	5 BJ
Carbon disulfide	ND	ND	ND	ND	ND	ND	3 J
1,1-Dichloroethene	1 J	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	150	170 D	64	72 DJ	16	8	28
1,2-Dichloroethene (total)	71	120 D	25	53 DJ	5 J	3 J	31
1,2-Dichloroethane	9	15 JD	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	17	14 JD	25	12 DJ	3 J	2 J	4 J
Carbon tetrachloride	ND	ND	3 J	500 DJ	ND	ND	ND
Trichloroethene	89	130 BD	420 BE	ND	23 BJ	17 B	41 BJ
Tetrachloroethene	5 J	5 JD	7	7 DJ	ND	ND	ND
Toluene	89	100 D	3 J	10 DJ	3 J	1 J	9
Ethylbenzene	ND	ND	ND	ND	2 J	1 J	ND
Xylene (total)	6	4 JD	5 J	ND	12	5 J	3 J
Dichlorobutene isomer	9 J	ND	ND	ND	ND	ND	ND
Octane isomer	6 J	ND	ND	ND	ND	ND	ND
Dichlorobutene isomer	13 J	ND	ND	ND	ND	ND	ND
Unknown	7 J	29 J	7 J	ND	ND	ND	ND

Results Qualifiers:

B = Found in blank.
D = Sample was diluted prior to analysis.
J = Estimated value less than quantitation limit.
ND = Not detected.

Samples:

SVE1 = Vapor extraction well.
SVE1DL = Vapor extraction well, diluted sample.
SVE1PZ1 = Piezometer 1.
SVE1PZ1DL = Piezometer 1, diluted sample.
SVE1PZ2 = Piezometer 2.
SVE1PZ2D = Piezometer 2, diluted sample.
SVE1PZ3 = Piezometer 3.

Table 2-2 Vapor Sample Analytical Results, Soil Vapor Extraction Pilot Test, Dearcop Farm Site (All results in $\mu g/m^3$)

	Test Number									
	Ambient Air	Test 1		Test 2			Test 3		Test 4	
Sample Number	AMB-1	SVE-1	SVE-2	SVE-3	SVE-4	SVE-5	SVE-6	SVE-7	SVE-8	SVE-9
Vinyl chloride	ND	ND (ND)	ND	ND	ND	ND	50	ND	40 TR	ND
1,1-Dichloroethene	ND	ND (ND)	ND	ND	ND	ND	36 TR	ND	ND	ND
Methylene chloride	13	ND (ND)	ND	ND	ND	ND	ND	ND	ND	5.9
trans-1,2-Dichloroethene	ND	ND (ND)	ND	ND	ND	ND	42 TR	ND	ND	ND
1,1-Dichloroethane	ND	9,800 (9,600)	7,300	6,900	6,700	5,300	3,600	3,600	1,900	35
cis-1,2-Dichloroethene	ND	860 (820)	730	680	680	530	400	390	230	7.7
1,1,1-Trichloroethane	2.7 TR	8,800 (8,700)	7,600	7,20	7,400	5,900	4,000	4,000	2,100	53
Benzene	ND	ND (ND)	ND	ND	ND	ND	ND	ND	ND	2.8 TR
Trichloroethene	5.3	8,600 (8,300)	11,000	11,000	11,000	9,100	7,900	6,600	3,700	400
Toluene	24	110 TR (120 TR)	ND	ND	ND	110 TR	ND	220	30 TR	18
Ethylbenzene	3.1 TR	ND (ND)	ND	ND	ND	ND	ND	ND	ND	3.0 TR
m-tp-xylene	7.0	ND (ND)	ND	ND	ND	ND	ND	150 TR	ND	9.1
O-xylene	ND	ND (ND)	ND	ND	ND	ND	ND	ND	ND	2.8 TR

Key:

ND = Not detected.
ND (ND) = Sample result (Laboratory duplicate sample result).
TR = Below indicated reporting limit.
$\mu g/m^3$ = Micrograms per cubic meter.

and the second sample was collected after steady state was achieved. Analytical results are summarized in Table 2-2. The laboratory report is included in Appendix C, and the results of the Data Usability Summary Report for these analyses by ChemWorld Environmental, Inc. are included in Appendix F.

The second test was run at a vacuum of approximately 6 inches of water. During the test, the vacuum at the extraction well increased to 6.5 inches of water. Vapor flow at this vacuum was approximately 52 cfm. Again, steady state was reached quickly (within 20 minutes), and the test was run for approximately 80 minutes. A total of three vapor samples were collected during Test 2. One sample was collected at the beginning of the test. One sample was collected during the test, and one sample was collected at the end of the test. Sample results are presented in Table 2-2.

The third-step vacuum was initially set to run at 11.25 inches of water. The vacuum increased to 11.75 inches of water at the well. A vapor flow of approximately 81 cfm was achieved at this vacuum. Vacuum measurements at the piezometers varied from 0.075 to 0.13 inches of water. The measurements stabilized in approximately 10 minutes, and the test was run for 60 minutes. Two vapor samples were collected during Test 3 for chemical analysis, one at the start of the test and one at the end of the test. Analytical results are included in Table 2-2.

The fourth and final step test was run at an extraction well vacuum of 15 inches of water. The vacuum did not change throughout the 70 minutes of the test. A vapor flow of between 95 and 98 cfm was measured. Vacuums at the piezometers stabilized within 10 minutes and ranged from 0.095 to 0.16 inches of water. Two vapor samples were collected during Test 3 for chemical analysis, one at the start of the test and one at the end of the test (see Table 2-2).

2.3.2 Groundwater Elevation Measurement Results

As part of the revised scope of the SVE study, three groundwater piezometers were installed to measure the groundwater table. Figure 2-4 shows the shallow groundwater table in May 1998 based on measurements from the three new piezometers and other shallow wells on the site. A summary of the May 1998 groundwater elevation measurements, together with measurements from the RI are included on Table 2-3. Shallow groundwater elevations (i.e., from overburden/bedrock interface wells), and surface water elevations (i.e., from the Barge Canal) measured in March, April, May, June, August, and November 1993, and May 1998 indicate an average shallow groundwater elevation fluctuation of 9.0 feet (due to seasonal canal filling and emptying) and canal fluctuation of 8.0 feet. Although there is a significant seasonal groundwater

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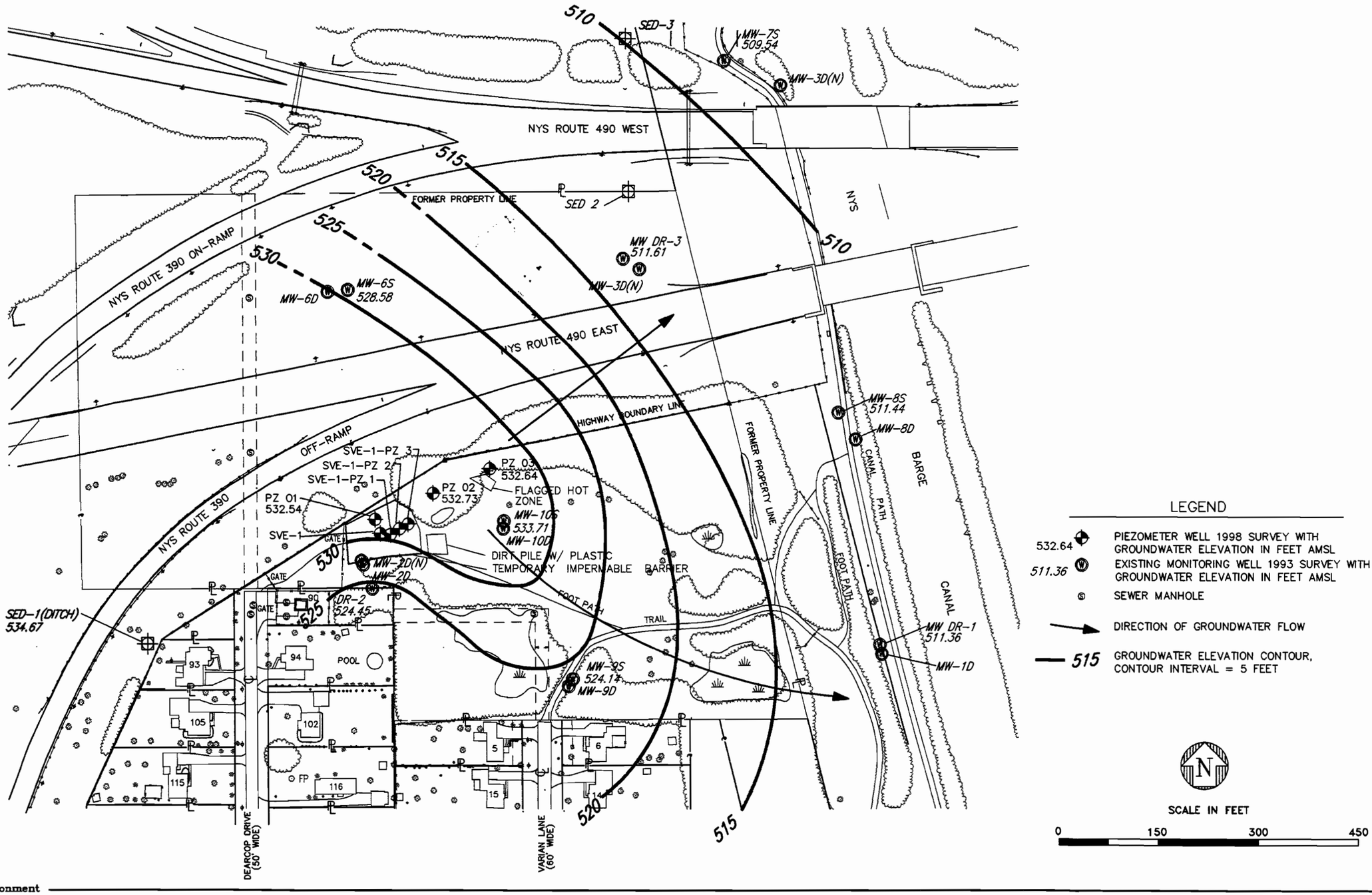

LEGEND

- 532.64 ◆ PIEZOMETER WELL 1998 SURVEY WITH GROUNDWATER ELEVATION IN FEET AMSL
- 511.36 Ⓦ EXISTING MONITORING WELL 1993 SURVEY WITH GROUNDWATER ELEVATION IN FEET AMSL
- SEWER MANHOLE
- DIRECTION OF GROUNDWATER FLOW
- 515 GROUNDWATER ELEVATION CONTOUR, CONTOUR INTERVAL = 5 FEET

N

SCALE IN FEET

0 150 300 450

ecology and environment

Figure 2-4 GROUNDWATER CONTOUR MAP
DEARCOP FARM SITE

Table 2-3 Summary of Monitoring Well and Barge Canal Water Level Elevations, Dearcop Farm Site

	Water Elevations (Feet Above MSL)								
Well Number	3/29/93	4/13/93	4/28/93	5/17/93	6/3/93	8/23/93	11/29/93	5/22/98	Maximum Elevation Fluctuations (feet)
DR-1	503.37	502.40	509.47	510.63	511.46	511.31	502.69	511.36	9.06
MW-1D	503.58	502.11	509.49	510.69	511.46	511.32	502.74	—	9.29
DR-2	527.78	526.90	526.49	524.99	524.26	520.09	519.01	524.45	8.77
MW-2D(N)	501.79	502.46	509.43	510.48	511.33	511.27	503.00	—	9.54
DR-3	508.56	508.00	510.91	511.48	512.15	511.93	506.23	511.61	5.92
MW-3D(N)	503.71	502.15	509.56	510.71	511.41	511.30	502.35	—	9.26
MW-4S	539.95	538.57	537.50	536.04	534.75	530.36	529.06	531.65	10.89
MW-5S	525.94	522.71	522.64	522.29	522.30	520.84	521.98	528.46	7.62
MW-5D(N)	502.19	510.55	513.40	514.43	515.18	514.40	510.24	—	12.24
MW-6S	522.55	521.91	522.76	522.40	522.48	520.28	519.03	528.58	9.55
MW-6D	503.70	502.15	509.53	510.67	511.42	511.29	502.72	—	9.27
MW-7S	503.88	503.08	509.70	510.85	511.89	511.68	504.20	509.54	8.81
MW-8S	503.67	502.29	509.58	510.56	511.50	511.38	502.72	511.44	9.21
MW-9S	526.20	526.07	525.86	524.94	524.29	519.73	519.53	524.14	6.67
MW-9D	503.48	501.99	509.38	510.53	511.16	510.85	502.55	—	9.17
MW-10S	519.70	524.85	526.62	526.39	526.24	524.08	526.88	533.71	14.01
MW-10D	503.68	502.14	509.55	510.68	511.33	511.26	502.65	—	9.19
Barge Canal	—	—	509.52	510.54[a]	511.36[b]	511.25[b]	504[c]	511.89[e]	7.89[d]
PZ-1	—	—	—	—	—	—	—	532.54	—
PZ-2	—	—	—	—	—	—	—	532.73	—

Table 2-3 (Cont.)

Well Number	Water Elevations (Feet Above MSL)								
	3/29/93	4/13/93	4/28/93	5/17/93	6/3/93	8/23/93	11/29/93	5/22/98	Maximum Elevation Fluctuations (feet)
PZ-3	—	—	—	—	—	—	—	532.64	—

[a] Canal water elevation measured from the Rt. 33 bridge based upon the surveyed elevation at a paint mark on the bridge of 544.87 feet above MSL.
[b] Canal water elevation measured from paint mark on west bank below south side of I-490 eastbound bridge. The paint mark elevation is 516.55 feet above MSL.
[c] Approximate elevation due to low water level estimated from footnote b.
[d] Approximate change due to footnote c.
[e] Canal water elevation measured from the south side of the I -490 eastbound bridge.

Key:

MSL = Mean sea level.

fluctuation, groundwater flow beneath the site remained relatively the same throughout the seasons (i.e., towards the Barge Canal to the northeast, east, and southeast).

2.4 Discussion of Results

The VOC data from soils collected from the extraction well borehole indicate that the well was indeed located in an area of VOC contamination, principally by chlorinated solvents and toluene. In addition to the volatiles detected in this soil sample, OVA readings of 90 ppm were recorded above the open borehole following drilling. In the vapor piezometer soil samples, concentrations were elevated in PZ1 (though, in general, slightly below the vapor extraction well soils), with PZ2 and PZ3 concentrations much lower.

Throughout the testing, the highest piezometer vacuum (lowest pressure) was measured at the location 15 feet from the extraction well. Both the shallow and deep piezometer vacuums were the same at this location. The lowest vacuum (i.e., higher pressure) was measured at the shallow piezometer located 30 feet away from the well, not at the farthest piezometer nest as expected. In general, all the pressure drops measured, even at a distance 15 feet from the well, were quite low, reflecting the permeable nature of the sandy fill. Vacuum influences were recorded at 45 feet from the extraction well indicating that a radius of influence of 45 to 50 feet is achievable.

EPA
Environmental Protection Agency

cm/s
centimeters per second

Following completion of the test, the field data was entered into the Environmental Protection Agency's (EPA's) Hyperventilate computer program to determine the air permeability for the site. E & E used Hyperventilate to evaluate the data, estimating the soil permeability to vapor flow in three ways: by the flow rate at the extraction wells, by the transient pressure distribution at the piezometers, and by change in vacuum over time at the extraction well.

Hyperventilate uses air permeability to estimate expected vapor flow rates at a given vacuum. Thus, the model can be used to calculate the permeability corresponding to the observed flow rates in the SVE pilot test. Using this approach, an air permeability of approximately 150 to 250 darcy (0.15 to 0.25 centimeters per second [cm/s]) was determined to yield model flows that matched the flow rates observed during the field test.

For the second approach, piezometer vacuums were entered into the program to estimate air permeabilities. The air permeabilities calculated this way by Hyperventilate corresponded to a gravel subsurface. While the material on site was extremely permeable, it

was not all gravel. This suggested that there were limitations in using this program in this way for evaluating data from this site.

The failure of the piezometer vacuum readings to predict reasonable air permeability values may suggest that some short circuiting may have occurred during the test. Although the impermeable liner was covering the test area, the extraction well screen was shallow due to the shallow water table. Given the high permeability of the site soils, air from the surface may have diluted to the subsurface vapor more than usual. This phenomenon would explain the low vacuums measured at the piezometers and the low levels of contaminants removed during the test.

Rather than using vacuums measured at the piezometers, E & E ran Hyperventilate to use transient vacuums measured at the extraction well. Using this approach, the resulting air permeabilities estimated were in the range of 150 to 300 darcy (0.15 to 0.30 cm/s), consistent with the results estimated by considering vapor flow rates for given vacuums.

In addition to Hyperventilate, E & E utilized a program developed within E & E to estimate the air permeability. In the E & E program, the particle size at 15% passing of the sieve analysis and the aqueous hydraulic conductivity are both used to determine a vapor phase hydraulic conductivity. The Theis equation is then applied to estimate vacuum requirements and radius of influence. Using the sieve size and the aqueous hydraulic conductivity obtained by the geotechnical analysis, the vapor phase hydraulic conductivity estimated corresponded to a silt material. This value then yielded vacuum requirements much higher than those observed in the field. Again, by inputting the vapor phase hydraulic conductivity of 0.20 cm/s and assuming a radius of influence of 50 feet, the vacuum required to pull 100 cfm of air was estimated by the program at 13 inches of water. This too falls in line with the field test data.

Based on the results of the various implementations of the Hyperventilate model, and through the use of E & E's vapor extraction design model, an air permeability of 200 darcy (0.20 cm/s) was selected as the design air permeability.

These model runs also confirm the identification of a 50-foot radius of influence. Specifically, the E & E model correctly calculated a vacuum of 13 inches of water corresponding to a 50-foot radius of influence and a 100 cfm flow rate, assuming an air permeability of 200 darcy. Thus, these figures are used as the SVE design basis for well placement air extraction rate.

$\mu g/m^3$
micrograms per cubic meter

Air sample results indicated that during Test 1 an average of 27,450 micrograms per cubic meter ($\mu g/m^3$) of total contaminants was removed. At the flow rate for Test 1 of 31 cfm, a total contaminant removal rate of 0.078 pounds per day removed from the test well was established. These contaminants were primarily the chlorinated compounds trichloroethene, 1,1-dichloroethene, cis-1,1-dichloroethere, and 1,1,1-trichloroethane.

3 SVE Effectiveness Evaluation

In this section, E & E uses the design parameter values generated by the pilot study to develop a conceptual design of an SVE system for the Dearcop Farm site. Then, based on this conceptual design, the feasibility of implementing SVE at this site is evaluated. Because of the low amount of volatiles projected to be recovered by the SVE process, it is recommended in this section that SVE not be implemented at this site.

3.1 SVE Conceptual Design

Groundwater at the Dearcop Farm site is influenced by the seasonal filling and draining of the adjacent barge canal. The design, construction, and operation of the SVE system would be directly impacted by these seasonal fluctuations. Because volatile organics have been detected in the groundwater, sources of the soil vapor contaminants may be expected to be present throughout the seasonally saturated zone, as well as in the saturated zone. To achieve optimum unsaturated zone treatment, the SVE system would be installed and operated during the period of low groundwater table (November to May). It is difficult to predict the duration of SVE treatment due to the complex interacting mass transfer processes contributing to vapor removal. However, removal rates could possibly reach an asymptotic endpoint within one "season" of operation. Thus, in an attempt to achieve maximum volatiles removal, the SVE system would be installed below the summer water table, to depths just above the winter groundwater levels. The system would be left in place after treatment. If it were found that two seasons of treatment were needed, then the extraction wells would be allowed to be flooded during the summer, and reactivated in the winter when they would naturally drain following canal surface water level lowering.

There are several critical design factors associated with the development and implementation of a successful SVE system. Based on the results of the pilot test, Dearcop site soils have a sufficient air permeability to allow for drawing air (and VOC vapors, if present) through the soil. However, the air permeability of the fill material is high enough that "short circuiting" or air entering from the ground surface would occur, resulting in a decrease in the system's

efficiency. While a cap is planned as part of the remediation effort at the Dearcop site, the SVE system would be installed and operated prior to cap installation. Thus, in order to maximize VOC removal and reduce the potential for short circuiting, an interim protective barrier would have to be installed over the areas to be addressed by the SVE system.

The key design elements addressed in this conceptual design are well construction and placement, and equipment sizing and layout. Each of these are addressed in the following subsections.

3.1.1 Well Construction and Placement

3.1.1.1 Vertical vs. Horizontal Wells

Typically, SVE systems utilize vertical extraction wells. While recent developments in horizontal drilling techniques have allowed for the application of this technology to be applied to SVE systems, horizontal wells do have some limitations. With both vertical or horizontal wells, the volumetric flow rate for soil gas extraction would be relatively the same since a given volume of air is required to volatilize the contaminants. Horizontal wells can produce an uneven vacuum and/or flow distribution in soils which are not homogeneous. Frictional losses associated with long runs of horizontal wells would significantly reduce the removal efficiency at the fair end of the system. In addition, the relatively high air conductivity associated with the site soils, the installation process for a horizontal well would only increase it by loosening the surrounding soils. This loosening of surrounding soils would increase the potential for short circuiting the SVE system and reduce the area of influence.

Since the two areas considered for SVE treatment are wider than 100 feet, multiple horizontal wells would have to be installed for each area. Given that (1) the site soils have a high permeability, (2) multiple long runs of horizontal wells would have to be installed in order to address the areas to be remediated, and (3) the installation process will only decrease the effective radius of influence, a SVE system consisting of the horizontal wells may not be as effective in removing VOCs contamination as would a system consisting of vertical wells.

These factors would tend to favor the effectiveness of vertical wells over horizontal wells. To evaluate this comparison further, rough order of magnitude cost estimates for installing a vertical well system and a horizontal well system were developed.

Since the installation of an impermeable barrier immediately above the horizontal well would help increase the radius of influence and/or reduce the effects of short circuiting, a large diameter (i.e.,

10 inch) perforated pipe can be used to reduce the frictional losses associated with a long run of pipe, and an internal piping system within the horizontal well can be used as a buffer to reduce vacuum variations along the horizontal well.

For the vertical well system, it was assumed that 18 SVE wells would be installed to a depth of 13 feet BGS and that approximately 1,300 linear feet of header pipe would be required. For the horizontal well system, it is assumed that 1,300 linear feet of 10-inch diameter perforated pipe would be installed in a trench to a depth of 13 feet BGS. The trench width would be 3 feet wide, and the sidewall slopes would be at a 1 to 1 slope. Additionally, it is assumed that the horizontal piping would be surrounded by 3 feet of pea gravel, a HDPE liner would then be placed on top of the pea gravel, and the excavation would then be backfilled. Excess soil would be transported and disposed of off site as special waste. The cost for installing a vertical well system was estimated to be $97,000, and the cost for the horizontal well system was estimated to be $153,000. It should be noted that these estimates are order-of-magnitude type estimates for the installation of the collection system and do not include the cost associated with the installation and operation of blowers, buildings, off-gas treatment, and O&M. The major difference between the two system is associated with the excavation and backfilling of the horizontal well trench.

Thus, because of predicted cost and effectiveness drawbacks of horizontal wells, a SVE system consisting of vertical wells has been selected for this conceptual design.

3.1.1.2 Radius of Influence

The radius of influence can be defined as the distance from the extraction well in which a specific soil vacuum is achieved. Typically, an effective radius of influence will have a pressure drop of between 0.5 to 0.1 inches water at its perimeter. Based on the results of the pilot test reported in the previous section, the air permeability of fill has been estimated to be approximately 0.2 cm/s. With the soil having a relatively high air permeability, the modeling results indicate that an extracted air flow rate of 100 standard cubic feet per minute (scfm) will produce a minimum pressure drop of 0.1 inches of water 50 feet away. Given the relatively high air permeability associated with the Dearcop fill material and the relatively shallow depth of contamination, increasing the air extraction rate may not significantly increase the radius of influence. Therefore, an extraction rate of 100 scfm per SVE well and a 50-foot radius of influence will be used as the basis for this conceptual design.

scfm
standard cubic feet per minute

As discussed in the beginning of Section 3, SVE would have to be conducted during the winter months in order to exploit the greater depth of the vadose zone at this time, and thus treat greater volumes of contaminated soil. However, the pilot test was conducted during a period of high groundwater table, and focused on the upper fill material. The soil present in the zone that is only seasonably unsaturated will contain some native soil which is less permeable than the fill. The extraction wells would be screened, in part or in whole, in these lower permeability zones.

Therefore, there is some uncertainty associated with achieving a 50-foot radius of influence throughout the native soil layer. However, it is important to note that even if a pressure drop of 0.1 inch of water is not achieved throughout a radius of 50 feet within the native soil, air movement through this area would still be occurring providing a mechanism for VOC removal. And furthermore, even if 50 feet of influence is not achieved in the less permeable vadose zone at each extraction well, greater zones of influence would be achieved in the more permeable fill material above it. This is because whether or not a complete 50-foot radius of influence is achieved within the native soil, the vast majority of air entering the native soil on its way to the extraction well would come from the more permeable fill above it. In other words, when a well screened in the native soil draws gas at a rate sufficient to generate 50 feet of influence in the fill zone, since all the air is eventually coming from the fill zone, at least 50 feet of influence will be realized in the fill zone, regardless of whether the native soil is completely impacted.

3.1.2 Equipment Sizing and Layout

3.1.2.1 System Configuration

The Dearcop site is divided into two distinct areas by Interstate 490. In order to ensure proper operations and maintain control of the SVE system and to reduce frictional losses associated with long piping runs, two distinct SVE systems would be required. The first system (north system) would address soil contamination located in the median area, and the second system (south system) would address soil contamination south of I-490. For each distinct system, a dedicated set of equipment (i.e., blowers, knockout drums, protective shelter, etc.) will be installed. Figure 3-1 presents the conceptual locations for the SVE wells for the north and south systems.

The north system would consist of eight SVE wells screened within the native till, and the south system would consist of 10 SVE wells screened within the native till. The well construction would consist of 2-inch diameter PVC with the bottom one foot being 0.010-inch slotted well screen.

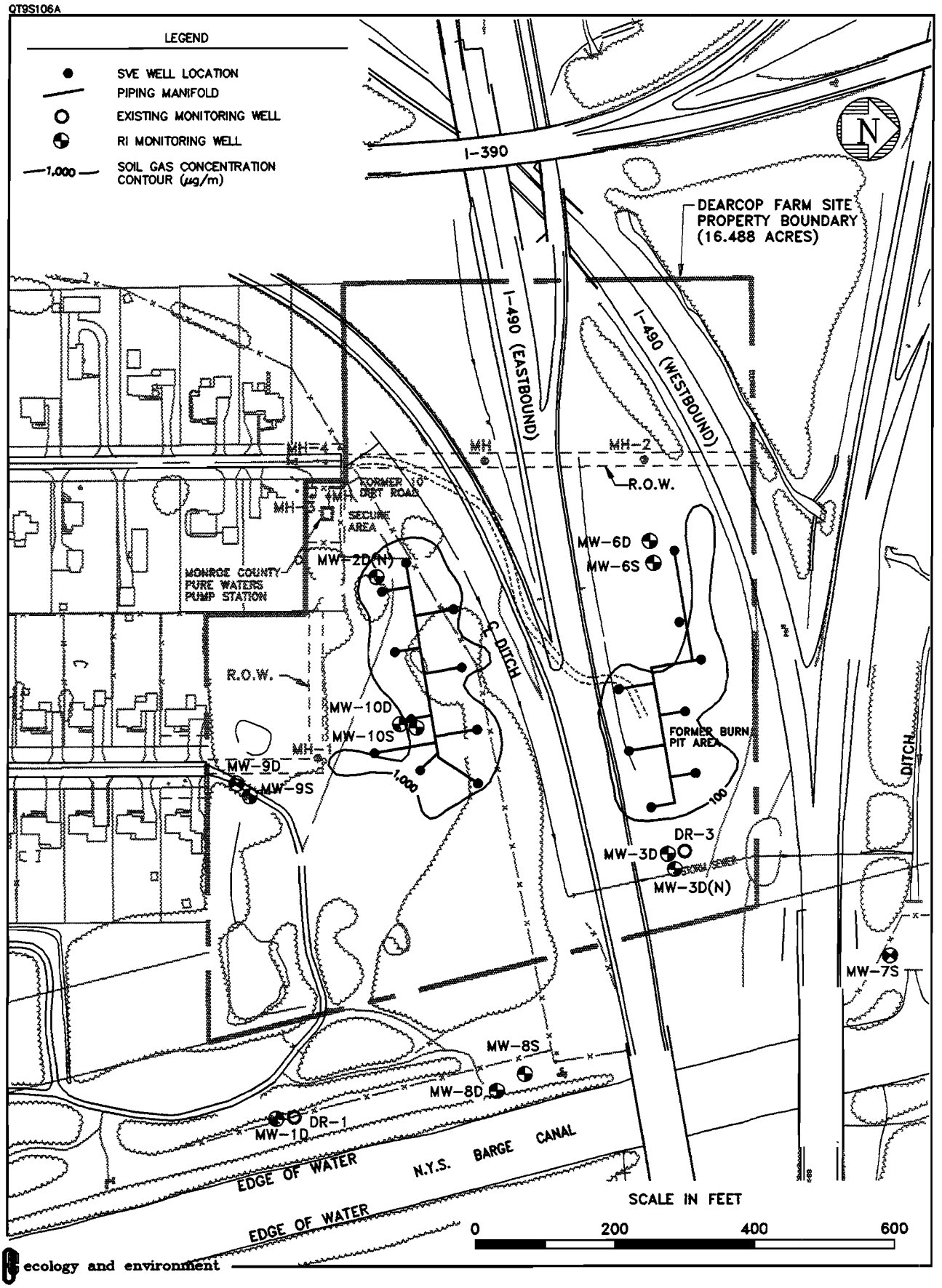

Figure 3-1 PROPOSED SVE WELL LOCATIONS

To ensure thorough coverage of the contaminant plume, the SVE wells have been conceptually located to achieve a 30% overlap with regard to their radius of influence. By screening the wells within the native till layer and using a 30% overlap, there would be sufficient air movement within the contaminant plume to achieve VOC removal.

Since the SVE system would have to be operated only during the winter months, the groundwater levels in these areas to be remediated would be at their low seasonal low points, thereby increasing the volume of soil that could be effectively treated by the SVE system. Depending upon the location, the SVE wells would be installed to either a depth of just above bedrock or to a level which is just above the seasonal low of the water table.

3.1.2.2 Equipment Requirements

While there are numerous components associated with the design, installation, and operation of a fully functional SVE system, this conceptual design focuses on only those components which would be critical to the successful operation of the system. Blower and piping sizing, knockout drums, off-gas generation, and off-gas treatment are addressed in the following subsections. Figure 3-2 provides a process flow diagram for the proposed SVE system.

Blower and Piping Sizing

Based on the pilot test data and modeling, it was estimated that at 15 inches of water vacuum, an SVE well would produce a flow rate of approximately 100 scfm. Using this data and the conceptual location of SVE wells described above, the size of the blowers and the size of piping (i.e., header system) that would be required was determined.

For the north system, eight SVE wells would be required. At 100 scfm per well, the blower would be required to pull a minimum of 800 scfm. In order to determine the vacuum requirements, the frictional losses associated with piping and internal processes (i.e., knockout drum and air filter) would have to be determined. After laying out a preliminary header system for the north system and performing a sensitivity analysis associated with the frictional losses associated with different diameter pipes, it was determined that the necessary vacuum would be 65 inches of water. This value assumes that the main header will be an 8-inch diameter, the piping that runs from the SVE well to the header will be a 4-inch diameter, and will include a 50% safety factor.

For the south system, 10 SVE wells would be required, equating to a blower extraction rate of 1000 scfm. Using the same

QT9D107B

LEGEND

FI FLOW INDICATOR

1-1/2"ø HOSE

FLANGE CONNECTION

PRESSURE GAUGE OR VACCUM GAUGE

1/2" BALL VALVE

1/2" REDUCER

NORMALLY OPEN

NORMALLY CLOSED

BALL VALVE (TRUE UNION)

GLOBE VALVE (FLANGED)

REDUCER

1/2"ø SAMPLE PORT

PRESSURE GAUGE

QUICK CONNECT FITTING

VACUUM RELIEF VALVE

VACUUM GAUGE

DISCHARGE SILENCER

JOINTS

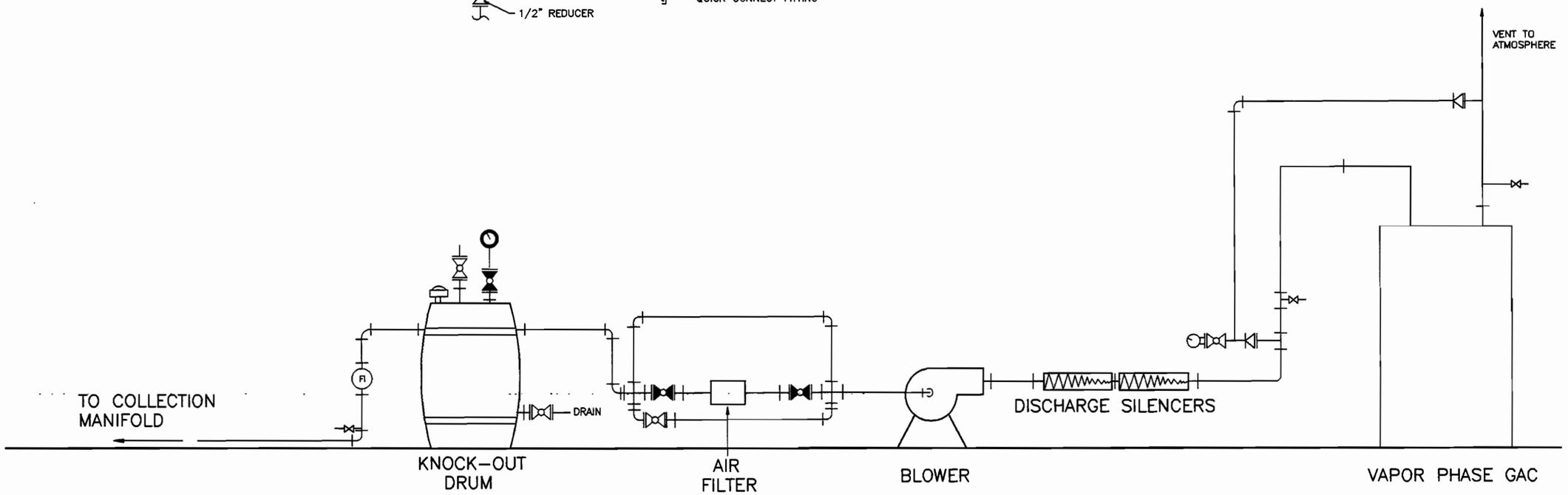

Figure 3-2 SVE TREATMENT SYSTEM COMPONENTS

methodology for the north system, it was determined that the necessary vacuum would be 60 inches of water.

A summary of the piping frictional losses for both systems is presented in Appendix D.

Knockout Drum

The knockout drum would be used to remove water from the influent soil gas in order to protect the blower. Assuming the extracted soil vapor has a temperature of approximately 40°F, and flow rates of 800 scfm and 1,000 scfm, there is a potential to collect approximately 80 gallons of water at the north system and 92 gallons at the south system for every 180 days of operation. These calculations are provided in Appendix D. Since these calculations are based on moisture content in the extracted soil vapor, in order to provide an added level of protection for the blowers, the individual knockout drums would have a minimum volume of 200 gallons.

Off-Gas Generation/Treatment

Based on the estimated flow rate for each SVE system and the pilot test information, it is estimated that during the initial start-up of the system, approximately 4.5 pounds per day of VOCs may be emitted. As the SVE systems are operated, the VOC concentration in the effluent gas would diminish. The rate at which VOC concentrations would diminish cannot be determined until the system is operating.

Temporary Vapor Cover

HDPE
high density polyethylene

A temporary high density polyethylene (HDPE) cover would be installed to enhance SVE performance and to maintain a large radius of influence.

To install the temporary cover, site clearing, grubbing, and grading as required for final cap construction for the area where SVE would be performed (note: the area to be capped is larger than the area to be treated with SVE). The HDPE would then be applied to the SVE area. To protect the HDPE, it would be covered by approximately six inches of clean native material, possibly from the on-site canal excavation soils.

3.2 SVE Feasibility Evaluation

The Dearcop Farm site RoD states: "If the pilot study determines that it is feasible, a soil vapor extraction (SVE) system will be installed in the areas of deep soil/fill contamination of the site." In this section, the feasibility of SVE treatment is evaluated. It is found that insufficient amounts of VOCs would be recovered by

SVE treatment to justify the use of this technology as a feasible technique for contaminant reduction.

There are some uncertainties in evaluating the feasibility of SVE treatment at this site based on the pilot study tests. First, the testing was completed only on the southern portion of the site. E & E and NYSDEC decided not to perform testing in the median area as this would have required extensive permitting and other restrictions from the DOT. The collection of data from just the southern portion of the site was deemed suitable for evaluating the SVE for the entire site. However, air permeability in the surficial soils was found to be greater than expected in the southern portion of the site, thus suggesting that the SVE performance in the median area, where wastes are covered by some topsoil, may produce different results. In addition, the test was performed only on the upper portions of the soil, and not in the zones that are seasonally dewatered following canal draining. Performing SVE treatment in the deeper, seasonally saturated, soils would involve withdrawing vapors from the less permeable native soils, rather than exclusively from the more permeable fill. The potential impact of both these uncertainties is that higher vapor concentrations could conceivably have been realized by drawing vapors either directly from, or (in the case of the median) from underneath, a lower permeable zone since the degree of dilution by cleaner air that apparently contributed to the low volatiles concentrations observed in the pilot test may have been reduced. However, in both cases, the presence of the high permeability fill layer would allow the transport of cleaner air to the zone of extraction, regardless of whether the extraction was taking place within a less permeable zone beneath the fill or whether less permeable topsoil covered the fill. This cleaner air would continue to dilute volatiles recovered as vapors in an SVE system. Thus, despite the uncertainties discussed above, it is appropriate to use the pilot study data to evaluate the feasibility of applying SVE treatment to this site.

The pilot study found that hydraulically, the site is well suited for SVE treatment. High soil permeabilities (about 0.20 cm/s) and the resultant high radii of influence (about 50 feet) mean that gas and vapors can be easily drawn through the soils. This is generally desirable since less permeable soils can mean small radii of influence, and thus require a very large number of vapor extraction wells to address an entire contaminated area. However, at the Dearcop site, the permeabilities are so high that while relatively few extraction wells would be needed, the amount of air that would be drawn through is relatively high. The conceptual design estimates that eight to ten wells, each drawing 100 scfm, would be required to address each of the two sections of the site, for a total

of about 1,800 scfm of extracted gas. While this is a high rate, it is not an unreasonable flow rate for the area of soil to be treated.

While the rate of gas removal is reasonable, the rate that volatiles would be recovered in the off-gas is quite small. The SVE pilot test showed that concentrations of about 12 parts per million by volume (ppmv) (measured by an OVA) to 5.8 ppmv (measured in the laboratory by GC) were present in the off-gas. This corresponds to about 4.5 pounds per day in the conceptual design. This figure is significantly lower than typically observed at locations where SVE is successfully employed. For example, initial recovery rates on similar size sites are in the range of 100 to 2,000 pounds per day (EPA 1989). These removal rates correspond to VOC concentrations in the extracted gas streams of about 100 to 2,500 ppmv, which is much larger than the concentrations obtainable at the Dearcop Farm site.

ppmv
parts per million by volume

Considering that rates of product removal typically decrease logarithmically with time, relatively low amounts of volatiles would be recovered by this system. For example, assuming that removal rates decrease logarithmically from 4.5 pounds per day at startup to 0.1 pounds per day after six months of operation (one season), a total of only 46 pounds of volatiles would be recovered. Even if no decrease in removal rate were observed, only 810 pounds would be recovered in one season (although if no decrease in rate were observed, then operation would likely be continued the following winter). Assuming these volatiles were distributed over a volume of soil defined by the approximate area treated by SVE (about 15,800 square yards) and assuming about 5 yards depth of contaminated soil, removal of 46 pounds of volatiles would reduce volatiles concentrations in these soils by only 4.7 mg/kg (higher concentration areas would be reduced more, while lower concentration areas would be reduced less). If logarithmic reductions in volatile removal rates were not observed, then the average reduction in soil concentration would be proportionately higher.

The removal of an estimated 46 pounds of volatiles with a commensurate reduction of only 4.7 mg/kg in soil concentrations would not be a significant enough extent of removal to justify the implementation cost of an SVE system. The system was estimated in the feasibility study to total about $450,000 in capital costs (excluding the off-gas control, which would not be expected to be required at such low volatile removal rates) and another $50,000 to $75,000 in operating costs. Operation of an SVE system at the Dearcop Farm site would incur about $1,000 to $10,000 for each pound of volatile recovered. In comparison, at the EPA Superfund Innovative Technology Evaluation (SITE) demonstration at Valley Manufactured Products Co., a smaller-sized application of this

SITE
Superfund Innovative Technology Evaluation

technology, presumably with less economies of scale, incurred costs of only $160 per pound of volatiles removed (including off-gas treatment). This cost was determined considering only the volatiles measured to be removed during the first two months of operation, yet using projected costs for a full five months of treatment (EPA 1989, adjusted for 1998 dollars).

Based on this review, it is clear that, while some volatiles may be removed from the subsurface by SVE at the Dearcop site, the technology cannot be considered feasible. This conclusion is made considering the low rates of removable that would be realized, and the resultant high costs per pound of volatiles removed, which are at least an order of magnitude higher than other similar applications of this technology. Therefore, SVE will not be included in the design of the remedy at the Dearcop Farm site.

4 Cap Design Basis

4.1 Capped Area

The area to be capped is shown on Figure 1-2, as specified in the RoD and the FS. This area comprises two separate plots: the area south of the I-490 (approximately 5 acres) and the area in the I-490 median (approximately 1.5 acres). These areas were identified in the RoD and the FS due to the presence of contaminants in levels above cleanup goals and the high soil gas measurements recorded in these areas.

The 5-acre parcel will be capped to prevent direct exposure to soils and to reduce infiltration to groundwater, reducing generation of newly contaminated groundwater.

The 1.5-acre parcel is less accessible to the public, and thus does not pose significant direct exposure threats. However, it will be capped to reduce infiltration to groundwater, thus reducing generation of newly contaminated groundwater.

4.2 Requirements for Capping in the Record of Decision

The RoD specified a cap consistent with the substantive requirements of 6 NYCRR Part 360-2.15, construction requirements for landfill closure and post closure criteria. The cap shall consist of two separate cap systems. One 80,000-square-foot-cap shall be placed over the median between the east and westbound lanes of I-490, and a 230,000-square-foot-cap shall be installed over the soil/fill area south of the highway.

4.3 Cap Construction Methodology

4.3.1 Consolidation of Contaminated Sediment

Contaminated sediment and some contaminated soil shall be excavated from areas which will not be covered by the cap. This excavation is required to meet site cleanup goals and allow for the achievement of proper grades and drainage. Excavated soils and sediment will be placed on the cap area for incorporation into the landfill as final cover under the cap.

CMP
corrugated metal pipe

Sediment with contaminants above site cleanup goals have been identified in existing site drainage ditches. The existing drainage ditch flows east to west and is located adjacent to the south side of the eastbound land of I-490. The ditch enters a 42-inch corrugated metal pipe (CMP) near the east side of the site where the drainage flows north across the eastbound lane of I-490. The pipe daylights approximately 50 feet south of the westbound lane of I-490 where surface water runoff from the median cap area enters the drainage. The drainage then enters a 42-inch CMP culvert under the westbound lane of I-490. Site surface runoff water ultimately discharges to the barge canal 100 feet north of the highway.

Sediment removal and verification sampling will be performed in ditch areas prior to cap construction. The ditch will be incorporated into the final cap design and will carry the majority of runoff from the capped areas. Excavated sediments will be placed on the cap area for incorporation into the landfill as final cover under the cap.

4.3.2 Site Grading

Prior to the construction of the cap, the south cap area will require clearing and grubbing. Cleared and grubbed materials will be stockpiled on site for use in site restoration. Upon completion of clearing and grubbing activities, final site cover soils will be graded to the slopes specified in the contract documents. The existing stockpile of contaminated soils generated during the residential Interim Response Measure, which is currently staged on the south area, will be distributed and graded as part of the final cover. The site's south area will be sloped to ensure positive drainage, maintain the integrity of the cap, and provide for future development and site use.

The north cap area in the I-490 median will require minimal clearing and grubbing, however, several features (e.g., monuments, signs, lights, and flagpoles) will require removal prior to site clearing and grading. Minimal site grading will be necessary in the median area as existing topography exhibits good drainage characteristics and stable (i.e., erosion free) slopes.

Site grading criteria per NYCRR Part 360-2.13(s)(1)(i)(b) specifies slopes no less than 4% and no greater than 33%. Additionally all drainage control structures must be designed, graded, and maintained to prevent ponding and erosion to the cover. The surface drainage system must be designed to a minimum peak discharge of a 24-hour, 25-year storm per NYCRR Part 360-2.15(k)(2).

4.3.3 Cap Construction

To maintain substantive compliance with NYCRR Part 360, the cap must consist of the following elements:

1. Final cover or subgrade.
2. Gas venting layer.
3. Low permeability barrier soil cover or geomembrane.
4. Barrier protection layer.
5. Topsoil/vegetative soil layer.

The final cover or subgrade usually consists of existing site soils graded to the slopes specified. Per NYCRR Part 360-2.13(p) (1 and 2), the gas venting layer can be constructed of soil or geosynthetic material which maintains a minimum coefficient of permeability of 1×10^{-3} cm/s. If a soil vent layer is used, a minimum thickness of 12 inches is required. The gas venting layer must be bound by filter fabric, except when the upper layer is bound by a geomembrane. Gas vents must be placed at a maximum separation of one per acre, installed to a depth of 5 feet BGS, and extend a minimum of 3 feet above finished grade.

The low permeability barrier soil cover must consist of a barrier soil layer 18 inches thick with a maximum permeability of 1×10^{-7} cm/s (1×10^{-4} on slopes >10%), or a geomembrane meeting Part 360-2.13(r)(1-3). Over either low permeability barrier, a minimum 18-inch barrier protection layer and 6 inches of vegetative soil layer (24 inches total) is required.

Based on these requirements, a final cover system consisting of the following has been selected:

- 6-inches of final cover,
- Geotextile filter fabric,
- Geosynthetic gas venting layer,
- 40-mil very fine polyethylene (VFPE) membrane,
- Geocomposite drainage layer,
- 18-inch barrier protection, and
- 6 inches of topsoil with vegetative cover.

VFPE
very fine polyethylene

These components are illustrated on Figure 4-1.

Existing site soils (canal spoils stockpiled on the east side of the site) will be used as final cover. However, additional cover soils from off-site sources will also be required. Contaminated soils and sediments will be consolidated and placed under clean cover soils. The final cover shall be free of any debris and protrusions, and shall be rolled prior to placement of geotextile.

Substantial generation of subsurface gas from within the landfill is considered unlikely since mainly industrial wastes such as foundry sand and glass are observed to be present. As a precaution from subsurface gas reaching nearby residents, and to minimize impact on site redevelopment, a passive gas collection and venting system will be utilized. The system will include a lateral trench and gas vents to allow the safe release of gas at the site. A minimum of seven vents will be installed on the site.

VFPE was selected as the geomembrane material based on its superior flexibility and multiaxial elongation characteristics. These characteristics, along with comparable tensile strength, and tear and puncture resistance to HDPE, make it an excellent choice for landfill covers in which there is potential for differential settling. VFPE provides excellent barrier protection from rainwater, while providing for the collection of gas from inside the landfill. VFPE also promotes good vegetative growth by blocking landfill gas seepage which enhances slope stability and provides better erosion control on the final cover.

Final site restoration will be performed with the installation of 18 inches of barrier protection soil and 6 inches of topsoil from off-site sources. All disturbed areas will be seeded and mulched. Ditches and outfalls will be lined with rip-rap, as required to mitigate erosion. All work areas will be protected to ensure development and growth of vegetation. Temporary erosion control measures will remain in place until a thick, lush vegetative cover has been established.

4.4 Stormwater Management

Stormwater control at the Dearcop Farm site is influenced by the site's topography, land use, soil content, and regional water table. The south portion of the site drains principally from south to north with a majority of site drainage flowing into the ditch located along the south side of the eastbound lane of I-490, ultimately discharging into the canal via a 42-inch CMP through the I-490 median. Mounds of soil (generated and placed during canal excavation) located along the eastern edge of the property prevent direct runoff to the canal. The north portion of the site in the median drains to

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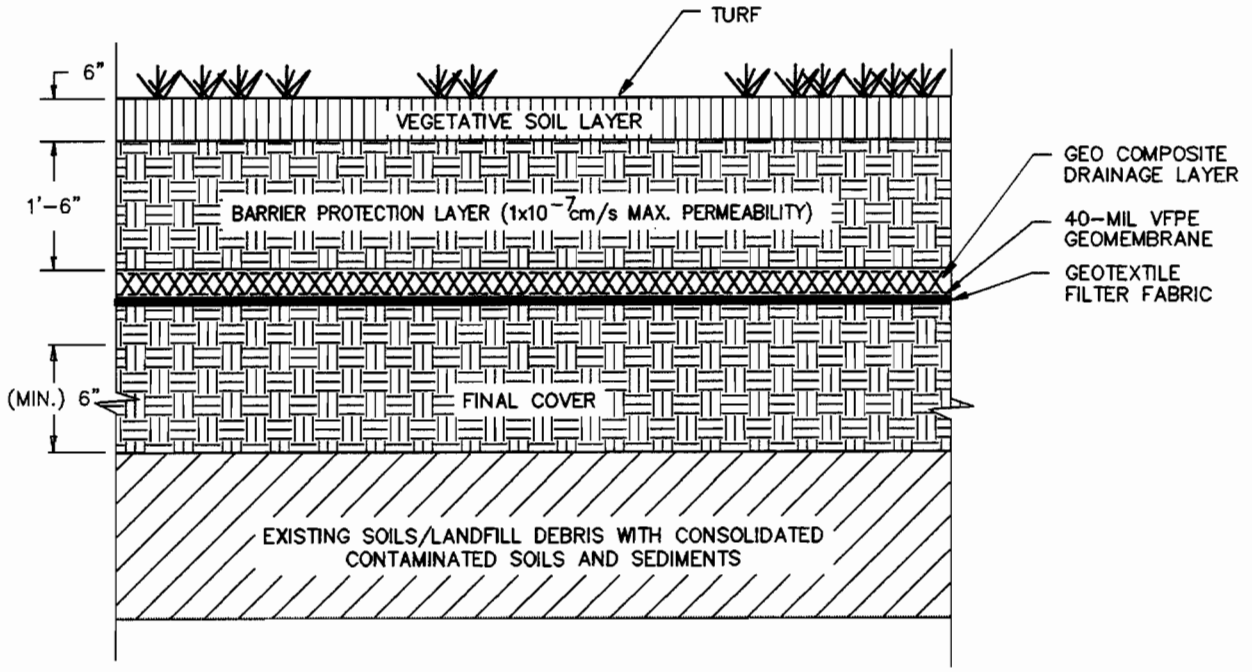

ecology and environment

Figure 4-1 CONCEPTUAL LANDFILL CAP DESIGN
DEARCOP FARM SITE

roadside ditches adjacent to both lanes of I-490, flowing east to west to the 42-inch CMP. Portions of drainage from the north side of the median area flow west to east to an existing culvert located west of the site.

A portion of the south site drains toward a pond/wetland located in the southeast corner of the property. Minor areas are drained to the storm sewers located at the north ends of Dearcop Drive and Varian Lane. In general, drainage is provided through overland flow to the I-490 drainage network, an on-site pond, and infiltration to groundwater.

The final site plan calls for drainage flow in the same direction as the existing site drainage. Generally, it is undesirable to radically change existing flow patterns in areas with adequate drainage characteristics. In this case, the majority of flow from the new landfill cap sites will ultimately drain to the existing 42-inch CMP. The I-490 westbound CMP has a capacity of 46 cfs, and the I-490 eastbound culvert has a capacity of 57 cfs. Drainage from the sites will run via overland flow to cap perimeter drainage ditches. Ditches from both cap areas will drain to the existing 42-inch CMP. The existing pond/wetland has an areal extent of 15,000 square feet and a capacity of 500,000 gallons.

The geomembrane to be installed as part of the cap will be extended beyond the landfill area into drainage ditches located adjacent to the highway. The geomembrane will be placed under the ditch and on both slopes to prevent highway runoff from potentially infiltrating the landfill at the meeting of the highway drainage ditch and cap. The ditches will either be seeded or lined with gravel.

Preliminary calculations (see Appendix E) indicate that during a 24-hour, 25-year storm, the northern area of the southern portion of the south cap will drain to the pond at a rate of approximately 0.6 cfs. At that rate of discharge, the pond has 116%, 24-hour storm capacity. This computation excludes overland flow from areas south of the site. The northern portion of the south cap will discharge 1.03 cfs to the 42-inch CMP culvert under I-490 eastbound. The anticipated flow is approximately 2% of the culvert capacity. The northern cap will discharge 0.52 cfs to the 42-inch CMP culvert under I-490 eastbound. The anticipated flow is approximately 1% of the culvert capacity; however this culvert will also carry the flows discharge from the I-490 eastbound culvert, therefore, the total anticipated flow is 1.55 cfs, or 3% of capacity. Assuming that the entire southeast quadrant of the interchange ultimately drains through the I-490 eastbound culvert, a total flow of 16.5 cfs is anticipated. The aforementioned computations do

not include infiltration of drainage diverted to other areas. The flows are conservative in that it is assumed that all runoff will flow to the three receivers. Based on the observations and calculations to date, the existing drainage features are adequately sized to support the post cap construction drainage.

4.5 Utility Corridor Locations

A utility search for the Dearcop Farm site was conducted to locate all potentially impacted facilities within the area to be capped. The Utility Survey Corp (USC) in New Windsor, New York, was contacted at 1-800-825-9283. USC identified these 13 utilities within the site vicinity:

USC
Utility Survey Corp

RG&E
Rochester Gas & Electric

- Arco Pipeline Co.,
- Time Warner Communications ,
- Mobil Pipeline Co.,
- Rochester Gas & Electric (RG&E),
- Frontier Communications,
- Sprint,
- MCI,
- Bell Atlantic,
- Monroe County Water Authority,
- Monroe County Pure Waters,
- AT&T,
- Telergy ,
- Buckeye Pipeline Co.,
- Town of Gates, and
- Sun Pipe Line Co.

E & E contacted each company to identify specific line locations. The results of the search as of July 6, 1998, are listed below.

Arco Pipeline Co.

E & E provided Arco Pipeline Co. with a site map. Arco indicated that it has no utility lines present on the site.

Time Warner Communications

E & E provided Time Warner Communications with a site map. Time Warner returned a drawing confirming the location of its utility lines.

Mobil Pipeline Co.

E & E provided Mobile Pipeline Co. with a site map. Mobile indicated that it does not have any utility lines on the site.

RG&E

E & E provided RG&E with a site map. RG&E returned a drawing confirming the location of its utility lines.

Frontier Communications

E & E provided Frontier with a site map. Frontier has not returned any information regarding the location of its utility lines.

Sprint

E & E provided Sprint with a site map. Sprint indicated that it has no utility lines present on the site.

MCI

E & E provided MCI with a site map. MCI has not returned any information regarding the location of its utility lines.

Bell Atlantic

E & E provided Bell Atlantic with a site map. Bell Atlantic indicated that it has no utility lines present on the site.

Monroe County Water Authority

E & E provided the Monroe County Water Authority with a site map. The Monroe County Water Authority returned a drawing confirming the location of its utility lines.

Monroe County Pure Waters

E & E provided Monroe County Pure Waters with a site map. Monroe County Pure Waters returned a drawing confirming the location of its utility lines.

AT & T

E & E provided AT & T with a site map. AT & T has not returned any information regarding the location of its utility lines.

Telergy
E & E provided Telergy with a site map. Telergy indicated that it has no utility lines present on the site.

Buckeye Pipeline Co.
E & E provided Buckeye Pipeline Co. with a site map. Buckeye has not returned any information regarding the location of its utility lines.

Town of Gates
E & E provided the Town of Gates with a site map. The Town of Gates has not returned any information regarding the location of its utility lines.

Sun Pipe Line Co.
E & E provided Sun Pipe Line with a site map. Sun Pipe Line returned a drawing confirming the location of its utility lines.

All utility information received to date has been compiled on Figure 4-2. The utility locations on this figure are not to scale due to the varying quality of location information provided to E & E. However, the information provided is sufficient for determining that utilities will not present challenges to the design or implementation of the cap or SVE system.

4.6 Coordination with NYSDOT
To coordinate the remedial action with NYSDOT, E & E contacted several NYSDOT personnel, including Jeff Dunlap (resident engineer), Jerard Shumann (residency's office), Howard Russel (design engineer), and Mary Ellen Papin (environmental coordinator). While final judgment cannot be made until review of actual design specifications and drawings, NYSDOT has indicated, based on verbal descriptions of the planned work, that it would not need to pose significant barriers or hurdles to implementation of the remedy. Implementation of the remedy will require land restrictions to allow for deceleration and acceleration of vehicles entering and leaving the work site. This may require imposition of time-of-work restrictions as well.

To perform the work, NYSDEC will have to apply for and obtain a "Non-Utility Permit Application" (permit form 33M) from NYSDOT. This permit will describe the land restrictions, hours of operation, and other operational details that will occur during cap construction. While some of the work details would be specific to the contractor selected, it is expected that NYSDEC would receive the permit prior to retaining the construction contractor.

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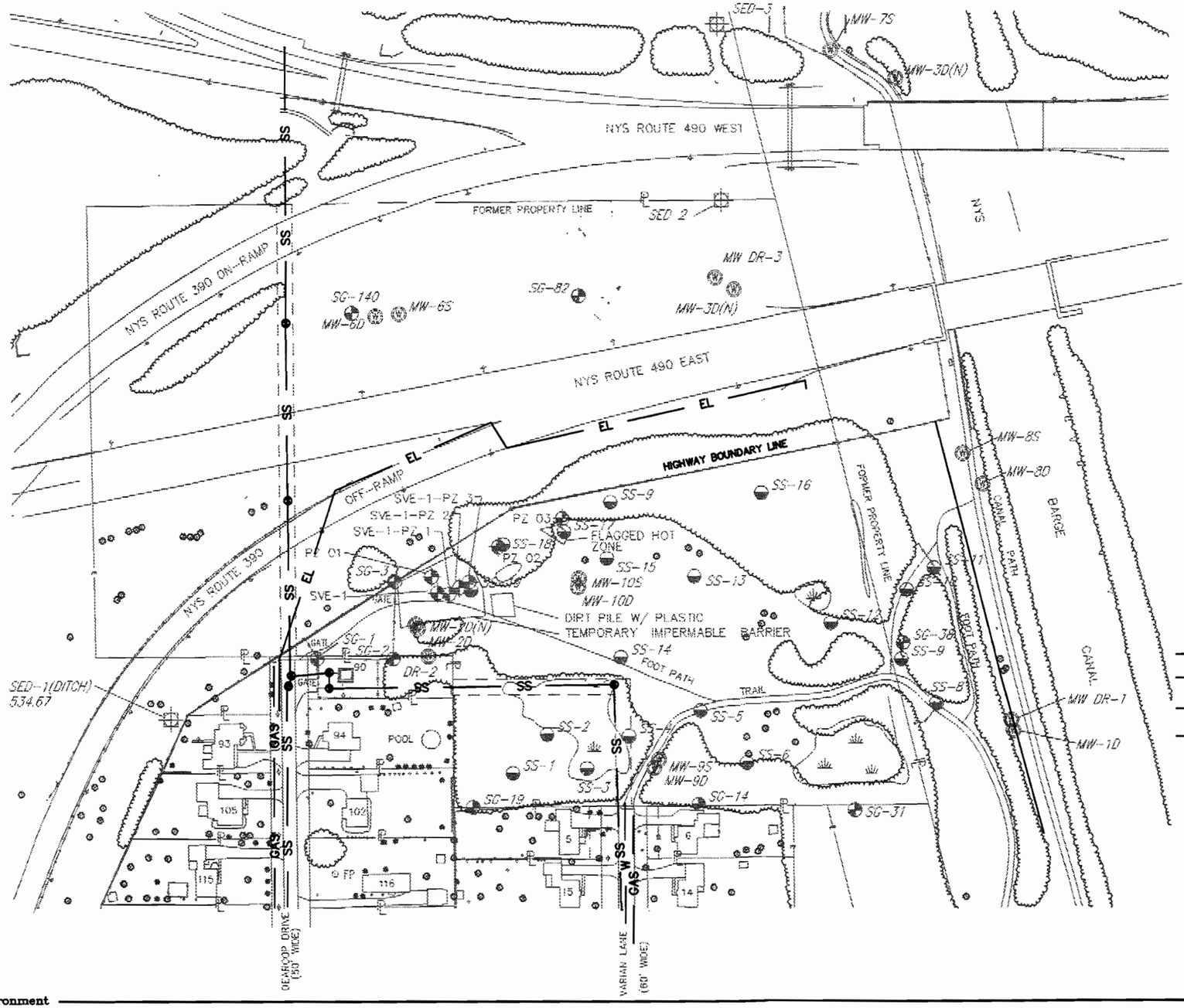


LEGEND

- PIEZOMETER WELL 1998 SURVEY WITH GROUNDWATER ELEVATION IN FEET AMSL
- EXISTING MONITORING WELL 1993 SURVEY WITH GROUNDWATER ELEVATION IN FEET AMSL
- SEWER MANHOLE
- SOIL SAMPLE 1993 SURVEY
- SOIL GAS POINT 1993 SURVEY
- SS — MONROE COUNTY PURE WATERS
- W — MONROE COUNTY WATER AUTHORITY
- GAS — RG&E GAS
- EL — RG&E ELECTRIC

NOTE: ALL LOCATIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED.

N

SCALE IN FEET

0 150 300 450

ecology and environment

Figure 4-2 UTILITY LOCATION MAP
DEARCOP FARM SITE

J lotte 3/19 MEH

A

SVE Pilot Study Work Plan by Lu Engineers

DRAFT
WORK PLAN
FOR
SOIL VAPOR EXTRACTION PILOT STUDY
AND TOPOGRAPHIC SURVEY

DEARCOP FARM
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
INACTIVE HAZARDOUS WASTE SITE #828016
TOWN OF GATES, MONROE COUNTY, NEW YORK

PREPARED FOR:
ECOLOGY AND ENVIRONMENT ENGINEERING, P.C.
368 PLEASANTVIEW DRIVE
LANCASTER, NEW YORK 14086

MAY 1998

PREPARED BY:
JOSEPH C. LU ENGINEERING AND LAND SURVEYING, P.C.
2230 PENFIELD ROAD
PENFIELD, NEW YORK 14526

PROJECT NUMBER 10616

DRAFT WORK PLAN

SOIL VAPOR EXTRACTION PILOT STUDY AND TOPOGRAPHIC SURVEY DEARCOP FARM

TABLE OF CONTENTS

FIGURES:

1.0 BACKGROUND

The Dearcop Farm Inactive Hazardous Waste Site (IHWS) is located at the northern terminus of Dearcop Road in the Town of Gates, Monroe County New York. The location of the site is indicated on Figure 1 - Site Location Map. The New York State Department of Environmental Conservation (NYSDEC) has listed this site as a result of the presence of public health concerns relating to the use of the site for disposal of various industrial wastes from the 1920's to the 1970's. Soil Vapor Extraction (SVE) has been selected by NYSDEC and Ecology and Environment Engineering, P.C. (E&E) as the appropriate remedial measure for the areas of the site including the highest levels of contamination.

A SVE pilot test will be conducted at two locations on the main portion of the Dearcop Farm Site (i.e., the area south of the Interstate 490 [I-490] eastbound lanes) to determine the feasibility of remediating contamination found in the unsaturated zone of the overburden during the Remedial Investigation (RI) (E & E 1994a and 1994b). Contamination detected during the RI consisted predominantly of purgeable halocarbon compounds (i.e., chlorinated solvents) and purgeable aromatic compounds (benzene, ethylbenzene, toluene and xylenes [BETX]).

Lu Engineers will perform SVE pilot testing at a total of two (2) areas of the site. The pilot test will include the installation of two (2) SVE wells and a total of six (6) nested piezometer wells, including three (3) around each of the SVE well locations. At one (1) of the two (2) areas to be tested, the ground surface will be covered by an impermeable membrane to prevent excessive infiltration of atmospheric air. Lu Engineers will conduct the SVE pilot study by means of a portable SVE system. The findings of the pilot testing will be presented in a trip report to be submitted to E&E. Lu Engineers is also conducting a topographic survey of the Dearcop Site which will include the newly installed wells and piezometers. A revised Site Plan will be produced based on the findings of the topographic survey.

2.0 WELL AND PIEZOMETER INSTALLATIONS

Two (2) extraction wells, each having a single array of three (3) lateral clusters of nested piezometers will be installed on site as part of this SVE pilot test. The proposed location of the wells, piezometers and the impermeable membrane is indicated on Figure 2 - Proposed Well and Piezometer Locations. Each cluster will consist of one pair of piezometers screened at different depths (i.e., shallow and deep). One extraction well, SVE-1, will be located approximately at the former location of test pit TP-6, and the array of piezometers, SVE-1P1 through SVE-1P3 (S/D), will be to the west at 15-foot spacings between clusters. The other extraction well, SVE-2 will be located near the former location of SG-B, and the array of piezometers, SVE 2P1 through SVE-2P3 (S/D) will be to the east at 10-foot spacings between clusters (See Figure 2). The cluster spacing in the arrays for each extraction well varies because the radius of influence is unknown at this time due to the heterogeneity of the fill/soil material at the site, and the lack of sufficient geotechnical data for the fill/soils at the site.

The extraction wells will be installed to a depth of approximately 13 feet below ground surface (bgs)(i.e., 1-foot above the water table which is assumed to be 14 feet bgs). The actual depth will be determined in the field based on conditions observed during the well installations and the measured water table depth from the existing site wells. Each extraction well will have a 5 foot screened interval. One pair of piezometers will be installed at each cluster, for a total of six piezometers per extraction well. Each piezometer will have a 2-foot screened interval. the shallow piezometer (S) shall be screened from 5 to 7 feet bgs, and the deep (D) piezometer will be screened from 11 to 13 feet bgs.

Both extraction wells and piezometers will be installed using hollow stem auger (HSA) drilling techniques. These techniques include the use of HSAs and standard 2-inch outer diameter (OD) carbon steel split spoon samplers (American Society for Testing Materials [ASTM] D1586-84) to collect continuous soil samples to the depth of completion. At least one soil sample per screened interval in each of the two extraction well and six piezometer boreholes will be collected for geotechnical analyses. If significant lithologic changes occur within the screened intervals (i.e., thicknesses of two feet or greater), one additional soil sample per lithologic change may also be collected. Samples will be collected and transferred to the E & E on-site representative for the following geotechnical tests: grain size (ASTM D422), hydrometer (ASTM D422), moisture content (ASTM D2216), and intrinsic permeability (ASTM D5084). Intrinsic permeability will require the use of a shelby tube for sample collection.

All samples collected for geotechnical analyses will be field screened for organic vapors and radiation with an Organic Vapor Analyzer (OVA) and a Ratemeter with a pancake probe, respectively. If organic vapors greater than 5 ppm or radiation greater than 3 times the background level are detected, the E & E representative shall be notified prior to sending the samples for analysis. Lu Engineers will be responsible for all OVA testing and E & E will conduct all radiation testing.

The extraction wells shall be completed by installing 2-inch ID polyvinyl chloride (PVC) schedule 40, flush threaded, casing and 5-feet of 0.010-inch machine slot screen with a threaded end plug. The borehole shall then be backfilled with native materials to approximately 1 to 2 feet above the top of the screen, followed by a 2-foot-thick bentonite pellet seal. The extraction wells shall then be completed by cementing in place a 4-inch OD carbon steel protective casing with locking cover and drainage pad around the PVC casing. The top of the PVC well casing must have the original thread so a threaded cap can be installed. The use of PVC glue or other cleaning solvents will not be permitted. The proposed configuration of each extraction well and piezometer is indicated in Figure 3 and 4 - Extraction Well and Piezometer Schematics.

Once well and piezometer installations have been completed at SVE-1, an impermeable membrane will be installed covering the ground surface within a 60 foot radius of extraction well SVE-1. The ground surface will be rough-graded with a bulldozer with as little disturbance to site soils as possible. Once rough grading is completed, 6 mil polyethylene sheeting will be laid out over the area. Penetrations at well heads and all joints and seams will be sealed with duct tape. The outer perimeter of the membrane will be "tucked" under the ground surface into a shallow (1.0 foot deep +/-) trench created by the bulldozer. Periodic breathing zone monitoring will be conducted

during the membrane installation process. This membrane will be left on site at the conclusion of pilot testing activities. The layout of the membrane installation is indicated on Figure 2. Details on the installation of the barrier are provided in Figure 4 - Impermeable Barrier Schematic.

3.0 SVE PILOT TEST PROCEDURES

3.1 Equipment

Air extraction from the subsurface will be conducted using a 2.0 horsepower regenerative blower. Since there is no electrical hookup readily available at the site, the pump/blower will be powered by a gasoline powered generator. The blower will be equipped with a particulate filter, vacuum gauges, and a flow valve. The pump/blower assembly will be checked for air leaks prior to beginning the test. Vapors drawn from the well will be monitored with a Century OVA 128 Portable Organic Vapor Analyzer (OVA). The vapors will be directed into two 170-pound granular activated carbon (GAC) canisters connected in series for treatment before being emitted to the atmosphere. Flow from the well head will be gaged at the effluent pipe with a air flow meter. The proposed configuration of the SVE system is indicated on Figure 5 - SVE System Schematic.

The six piezometers in each monitoring array will be equipped with a port (barbed hose connection) on the well cap to allow attachment of a vacuum gauge. The port and cap will be securely fastened to prevent air leaks. At least two or three vacuum gauges with different scale ranges (i.e., 0-3, 0-10, 0-30 inches of water) will be on hand to measure the vacuum created in the piezometers by vacuum extraction. The various scale ranges are needed to accommodate the conditions at each piezometer.

E & E has indicated that, based on conversations with NYSDEC, no air permit application is required for the SVE pilot study. Lu Engineers will use the best available control technology in conjunction with documentation and real-time air monitoring to ensure protection of human health and the environment.

3.2 Documentation and Monitoring Procedures

The SVE system will be operated and monitored to provide data that can be used to satisfy the following five goals:

- Determine the air permeability of the soil/fill in the areas tested;
- Quantify the optimal air flow rate and anticipated wellhead operating vacuum;
- Quantify extracted vapor concentrations and thus VOC extraction rates;
- Quantify the effective subsurface vacuum zone of influence of the extraction wells; and
- Generate data to provide a basis for a full-scale design of an SVE system and selection of an appropriate air emission control device.

To meet these goals, the following minimum operating requirements must be met for this pilot study.

One SVE test shall be run on each extraction well for a duration of approximately 10 to 12 hours, or to achieve a minimum of two periods of stabilization, whichever occurs first. The tests will be run separately from one another. Pump rates shall be determined by existing site conditions. An initial rate of 20 cubic feet per minute (cfm) will be used to start the test. The extraction rate may be adjusted depending on the response observed at the piezometers. Once the initial pump rate is determined in consultation with the on-site E & E representative, the test will be allowed to run until steady sate conditions are achieved. When steady state is achieved, or after 5 or 6 hours, whichever occurs first, the pump rate shall be stepped up an increment of 10 cfm or as directed by the E & E representative. Additional steps may be performed if steady state is achieved early.

Field measurements shall include: vacuum, flow rate, barometric pressure, effluent OVA readings, and other physical parameters (e.g., ambient temperatures and other weather conditions). Vacuum, flow rate, and effluent OVA measurements will be recorded at 5 to 10 minute intervals for the first hour, 15 minute intervals for the second hour, and 30 minute intervals until the test is completed. These intervals will be repeated for each vacuum testing step. Barometric pressure will be recorded at the beginning and end of each vacuum step to determine baseline shifts in apparent vacuum, and at approximate hourly intervals throughout the day. Vacuum readings should be within 5% to 95% of the gauge range in order to be considered valid. Ambient temperatures will be recorded hourly. The proposed forms for recording the testing data are attached. The piezometer data forms will be filled out for each nested piezometer location and kept on a clipboard at each piezometer.

3.3 Sampling Procedures

Soil vapor samples for chemical analysis will be collected from each extraction well in new, dedicated, 1-liter Tedlar bags provided by E & E. Approximately 10 soil vapor samples per extraction well will be collected. The samples will be collected on the upstream side of the pump/blower. Samples will be collected by attaching dedicated tubing to a port located between the well head and the flow valve, before the vapors pass through the blower. This tubing will be connected to a vacuum chamber containing the Tedlar bag. A vacuum pump will be used to evacuate the chamber resulting in a negative pressure allowing vapors to enter the bag from the extraction well without ambient air mixing.

An initial soil vapor sample will be collected at the beginning of each of the two (or more) flow rates tested, followed by hourly sampling until steady state is reached at that flow rate. One ambient air blank sample will be collected for each extraction well test on each day of sampling. The ambient air sample will be collected immediately upwind of the extraction well using the same methodology as collecting the upstream soil vapor samples described above. Analyses will be performed by E & E, not Lu Engineers.

4.0 TOPOGRAPHIC SURVEY

Lu Engineers will perform a detailed topographic survey of the site. A detailed topographic survey is required to design the new site cap, and locate SVE collection wells. The survey shall

432-8647

be conducted after a review of the existing site data and upon completion of the soil vapor extraction wells and piezometers installed for the SVE Pilot Study.

Survey crews shall verify features (utilities, pipelines, transportation infrastructure), boundaries (right-of-ways [ROWs] and property lines), and elevations shown on existing topographical maps, identify structures and/or variations in site topography, locate additional features identified in the site data review, and provide an updated site map which includes 1-foot topographic contours.

The survey will be limited to the areas previously included in the site map. The need for access to the NYSDOT ROW is anticipated in order to perform the topographic survey. Access to the bike path adjacent to the east side of the site is also necessary. It is understood that NYSDEC will arrange for property access for these periods with the appropriate agencies.

5.0 PROPOSED SCHEDULE AND STAFFING

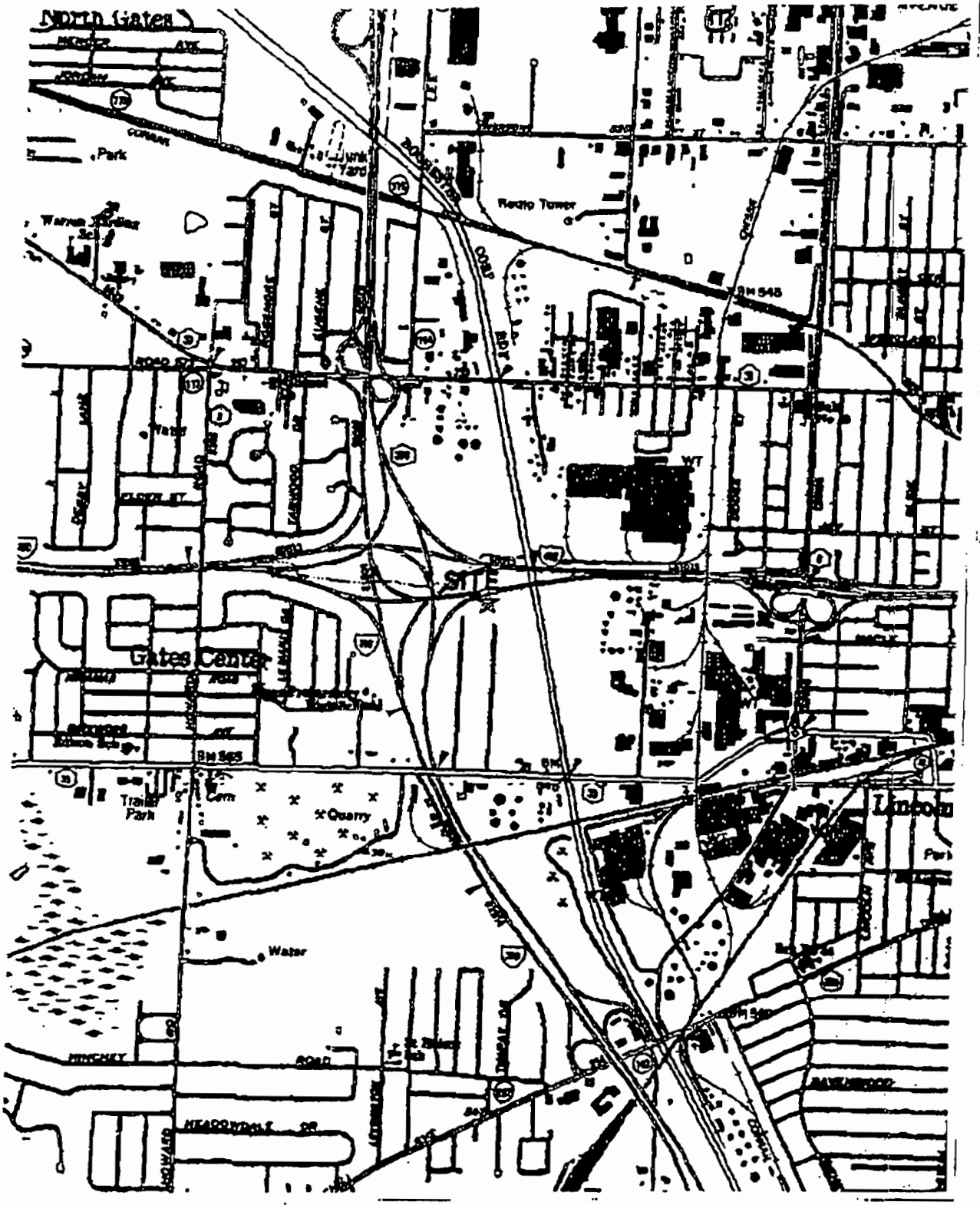
The following table indicates the proposed schedule for this project:

Activity	Begin	End	Contractor and Lu Personnel	Notes
Well Installation	**5/20/98, 08:00**	**5/22/98, 17:00**	**Nothnagle Drilling, Inc. G. Andrus and J. MacKecknie**	**Begin at SVE-1**
Barrier Installation	**5/21/98, 08:00**	**5/22/98, 17:00**	**Hickory Hill Construction. Inc. G. Andrus and J. MacKecknie**	**Install Barrier on 60 ft. radius surrounding SVE-1**
Topographic Survey	**5/21/98, 08:00**	**5/29/98, 17:00**	**C. Pascuzzo and C. Rigerman**	
SVE Pilot Testing	**5/27/98, 08:00**	**5/28/98, 17:00**	**G. Andrus and J. MacKecknie**	**Schedule may vary depending on system performance**

6.0 LIST OF DELIVERABLES

Lu Engineers will produce a trip report which includes detailed descriptions of all SVE test procedures, equipment used, all data obtained during the SVE pilot test as well as construction details on the well and piezometer installations. The trip report will also include photographs taken during site work.

Based on the topographic survey update, a new site map will be produced with 1 foot topographic contours. This map will include all relevant site features as well as newly installed wells and piezometers.



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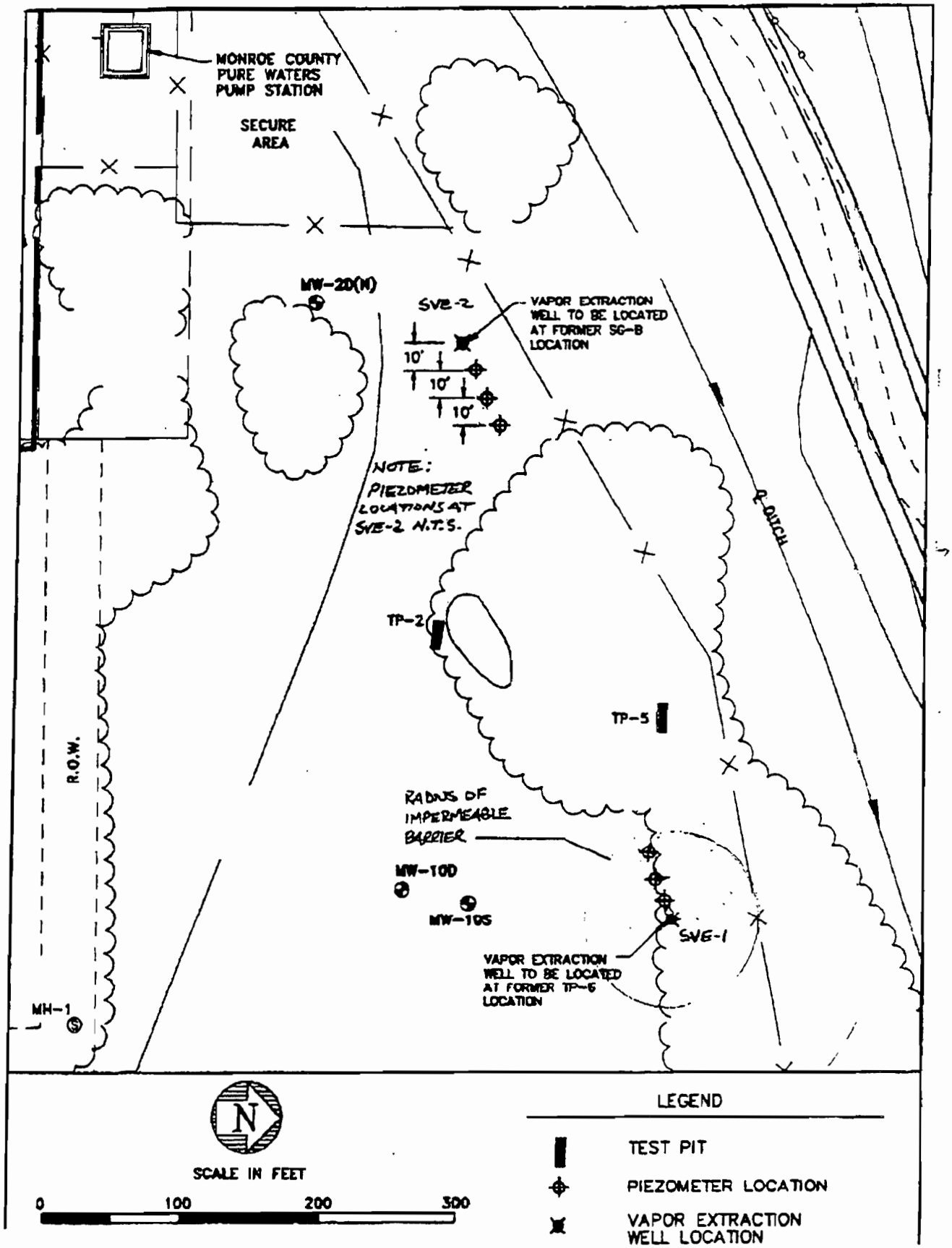
LU ENGINEERS
Civil and Environmental

SITE LOCATION MAP

SOIL VAPOR EXTRACTION PILOT STUDY
DEARCOP FARM IHWS

FIGURE 1



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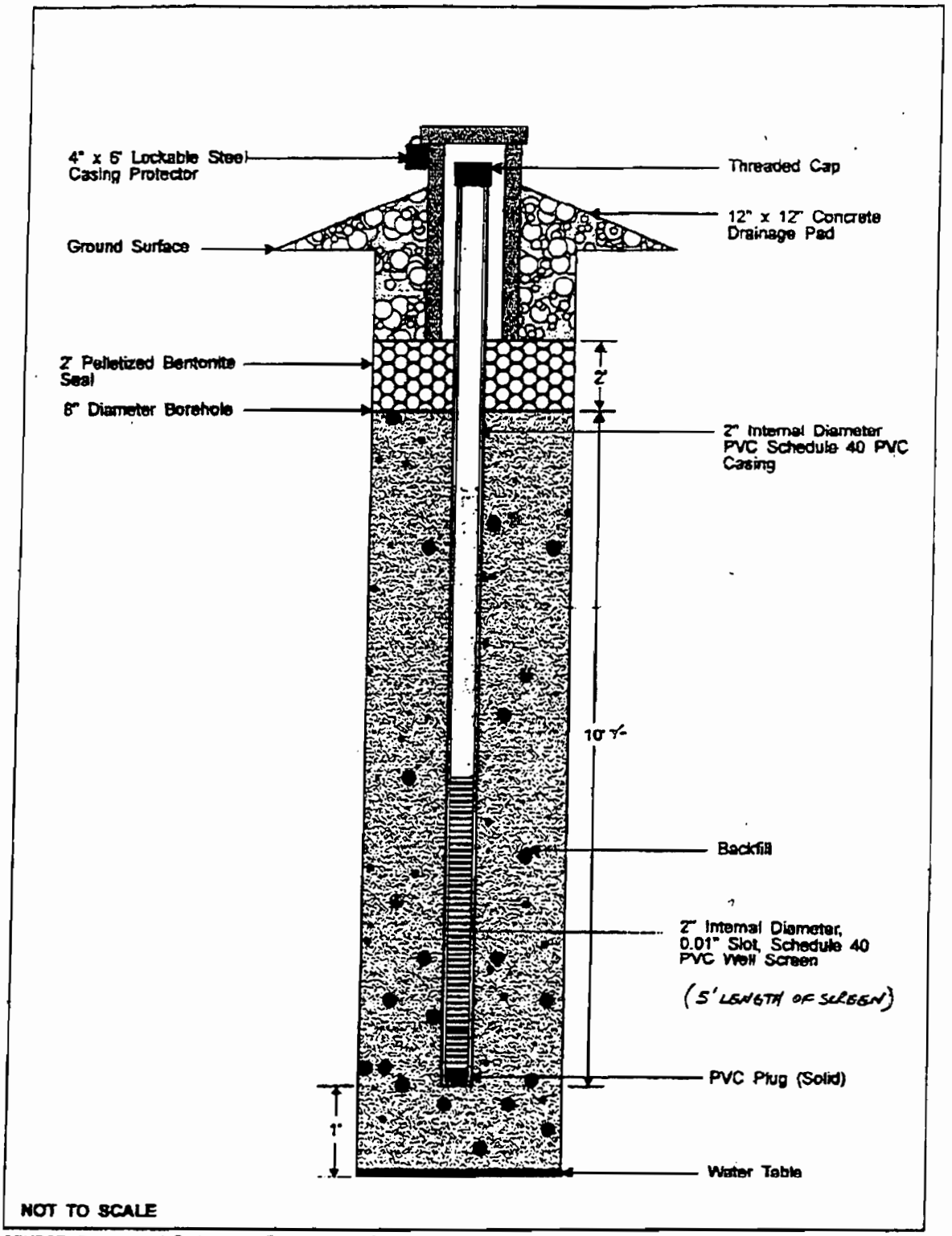
PROPOSED WELL AND PIEZOMETER LOCATIONS

SOIL VAPOR EXTRACTION PILOT STUDY
DEARCOP FARM IHWS

FIGURE 2



SOURCE: Ecology and Environment Engineering, P.C.

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LU ENGINEERS
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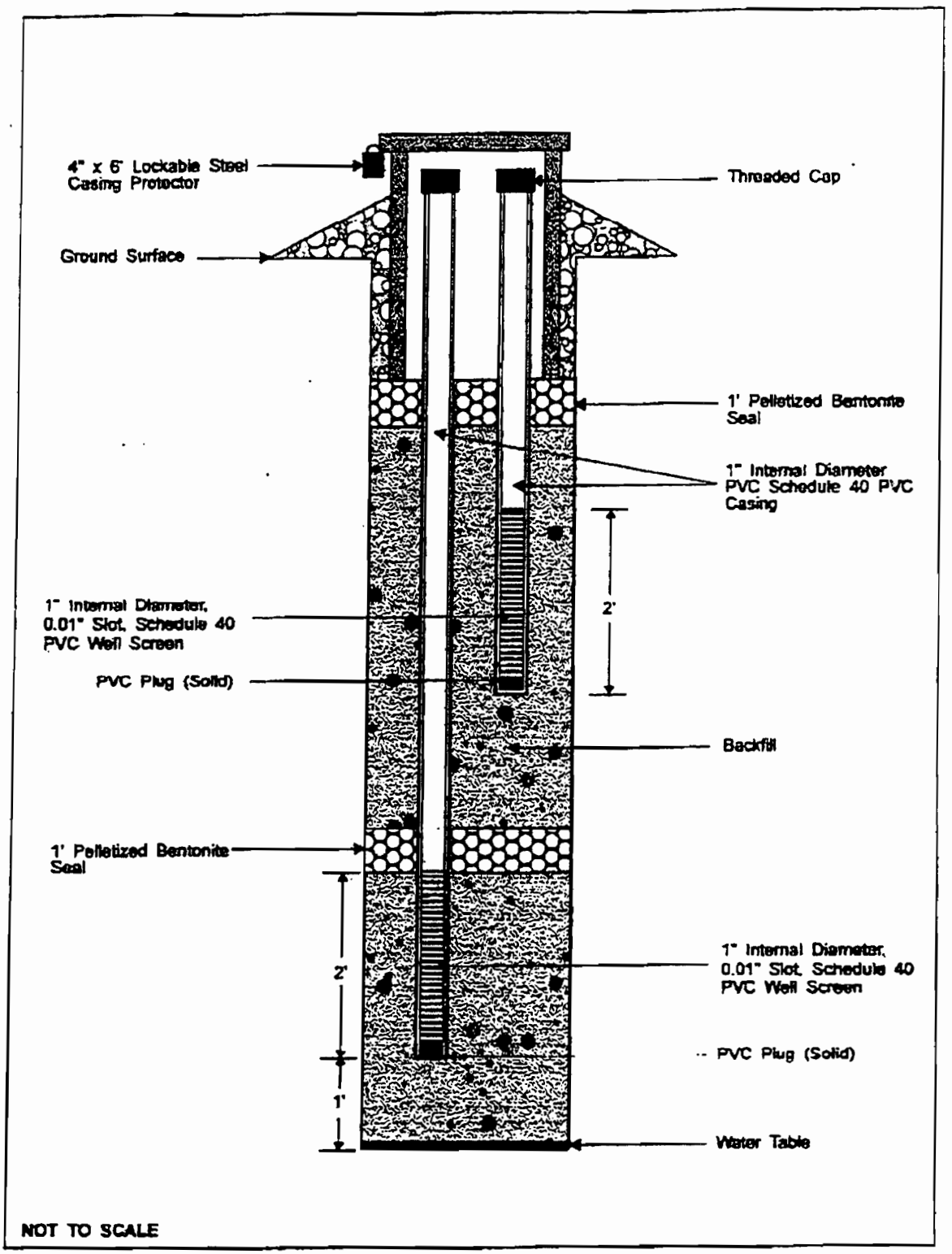
EXTRACTION WELL SCHEMATIC

SOIL VAPOR EXTRACTION PILOT STUDY
DEARCOP FARM IHWS

FIGURE 3



SOURCE: Ecology and Environment Engineering, P.C.

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LU ENGINEERS
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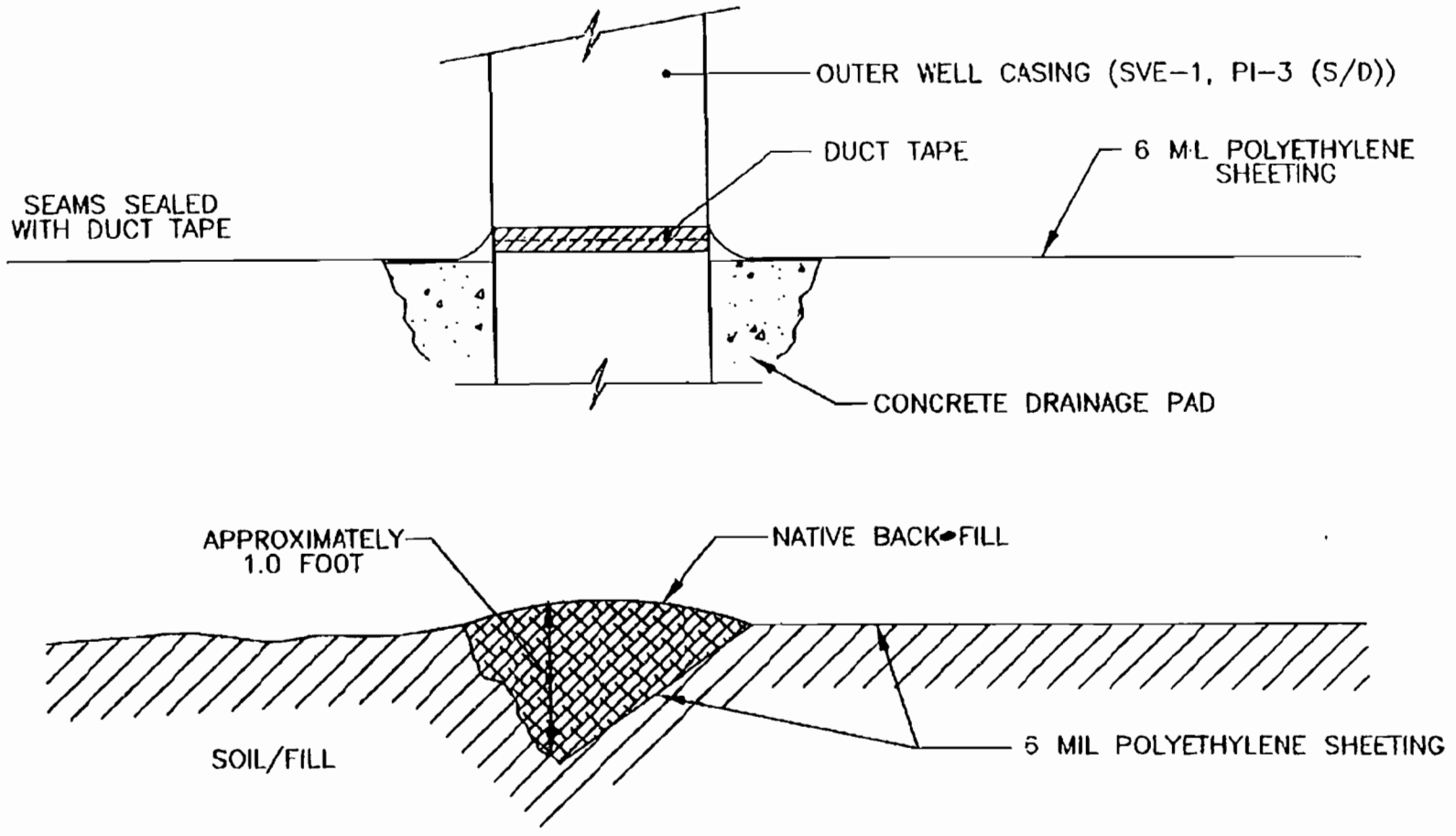
PIEZOMETER SCHEMATIC

SOIL VAPOR EXTRACTION PILOT STUDY
DEARCOP FARM IHWS

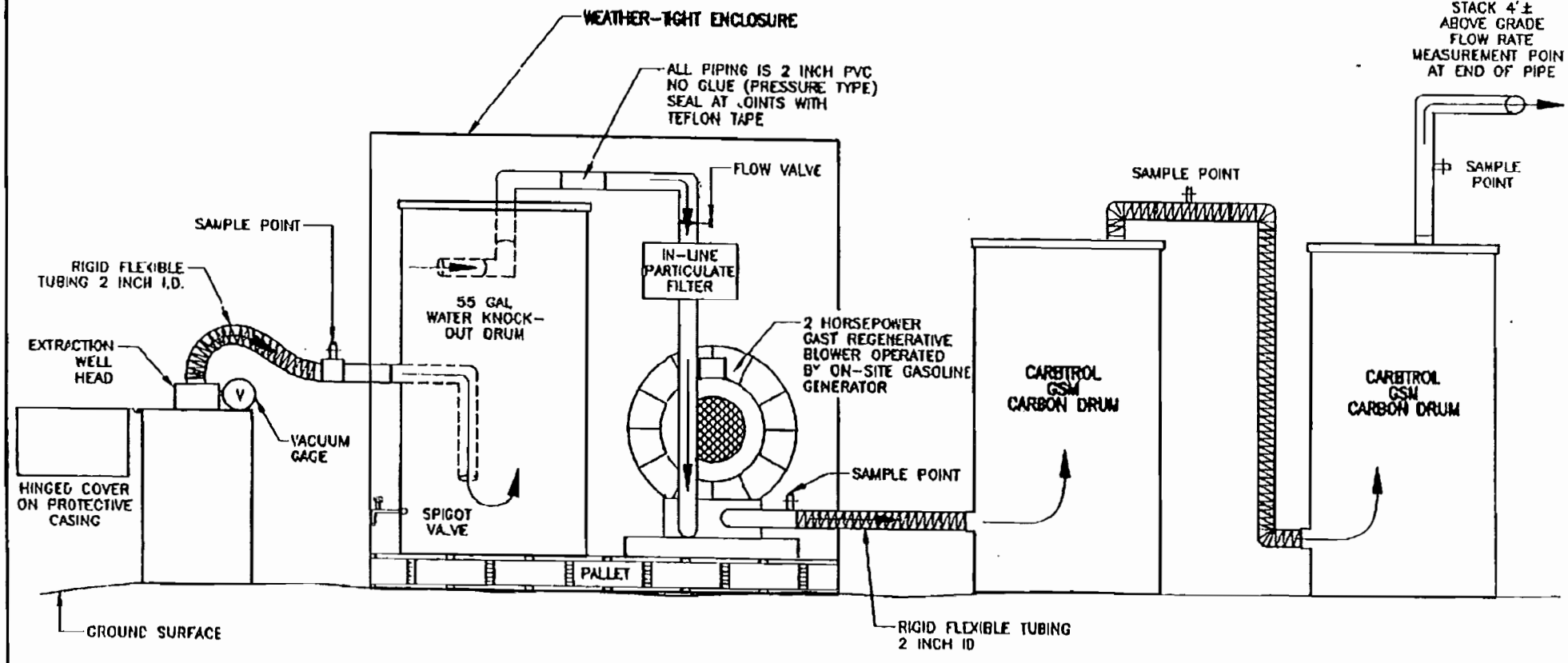
FIGURE 4



IMPERMEABLE BARRIER SCHEMATIC

DEARCOP FARM
SVE PILOT STUDY

DRAWING NO.	SCALE	DATE		
FIG. 5	NTS	MAY 1998		LU ENGINEERS Civil and Environmental



DEARCOP FARM NYSDEC IHWS

SOIL VAPOR EXTRACTION PILOT STUDY
SYSTEM SCHEMATIC

DRAWING NO.	SCALE	DATE	PROJ NO.	
FIG. 6	NTS	MAY 1998	10416	LU ENGINEERS

Soil Vapor Extraction Pilot Test

Piezometer Cluster Number: ______________
Date: ______________
Site Name: ______________
Site Location: ______________
Test Number: ______________

Time	Vacuum Reading at Well Head	
	PZ-	PZ-

Soil Vapor Extraction Pilot Test

Date: _____

Site Name: _____ Extraction Well Number _____

Site Location: _____ Test Number: _____

Initial Barometric Pressure: _____ Initial Temp.: _____

General Weather Conditions: _____

Vacuum Pump Description: _____

Time	Vacuum	Flow Rate	Effluent OVA Reading (in ppm)	Barometric Pressure	Temp. (° C)	Comments

page_____ of_____

B

SVE Pilot Study Report by Lu Engineers

LU ENGINEERS
Civil and Environmental

TRIP REPORT

Date: 6/26/98
To: Ecology and Environment
Attn: Jon Sundquist, Ph.D.
From: Greg Andrus GLA.
Jim MacKecknie
Re: Dearcop Farm NYSDEC IHWS
SVE Pilot Test, May 20 - 22 and 27, 1998

INTRODUCTION

On May 20, 1998, Lu Engineers initiated site preparation for the soil vapor extraction (SVE) pilot test. The site work involved two tasks; 1) Site Preparation, and 2) the SVE Pilot Test. Lu Engineers intended to follow the approved May 1998 work plan, but unforeseen circumstances encountered in the field necessitated modification of the scope of work. Ecology and Environment (E&E) authorized all changes to the scope of work with consultation from the New York State Department of Environmental Conservation (NYSDEC). The following sections summarize the site work.

TASK 1: SITE PREPARATION

Groundwater monitoring conducted on May 20, 1998 suggested that the water table was too shallow to conduct the SVE pilot test at the planned eastern test location. E&E requested that Lu Engineers modify the scope of work to include installation of water piezometers along the fenceline bordering the I390/490 right of way. Modification of the scope of work also included elimination of the planned eastern SVE well and piezometer array. The western SVE well and piezometers remained in the modified scope of work. The final arrangement of the impermeable barrier, piezometer and well installations as well as other features of the southern portions of the Dearcop site is indicated on the plan included as Attachment 1. Boring logs for each well and piezometer are included as Attachment 2. Representative photographs of the site preparation activities are provided as Attachment 3.

A total of three piezometers were installed by Nothnagle Drilling (Nothnagle) under the supervision of Lu Engineers to confirm depth to groundwater and provide a means of future access to the aquifer. Piezometer locations are shown on the attached plan as PZ-01, PZ-02, and PZ-03. The borings were installed using 4.25-inch hollow stem augers and split spoon sampling was conducted in accordance with ASTM Method D1586-84. All samples were screened for volatiles using an OVA and logged in the field by Lu Engineers. Table 1 summarizes the piezometer construction and sample depth.

Table 1: Piezometer Installation Summary
(all depths are in feet)

Piezometer	Boring Depth	Well Screen Interval	Sand Pack Interval	Bentonite Seal
PZ-01	24.0	9.0 - 24.0	8.0 - 24.0	6.0 - 8.0
PZ-02	21.5	8.5 - 21.5	7.9 - 21.5	4.9 - 7.9
PZ-03	19.7	4.7- 19.7	3.6 - 19.7	2.9 - 3.6

One vapor extraction well, SVE-1 was installed at the location indicated on the attached site plan. The boring for SVE-1 was installed using 4.25-inch hollow stem augers and split spoon sampling was conducted in accordance with ASTM Method 1586-84. A Shelby tube sample was obtained from a depth of 4-6 feet below grade and transferred to E&E for geotechnical analysis. E&E also obtained a soil sample for volatile organic analysis. All samples (split spoon and Shelby tube) were screened using an OVA and logged in the field by Lu Engineers. E&E conducted screening for radiation. Boring logs and well details are included Attachment 3. Table 2 provides a well installation summary.

TABLE 2: Soil Vapor Extraction Well Installation Summary
(all depths are in feet)

Well No.	Depth	Shelby Tube Interval	Sample Depth [1]	Screened Interval	Sand Pack Interval	Bentonite Seal
SVE - 1	8.0	4.0 - 6.0	5.0±	3.0 - 8.0	3.0 - 8.0	1.5 - 3.0

[1] Sample retained by E&E for volatile analysis, sample was obtained from the drilling spoils.

Upon completion of SVE-1, three nested piezometers, SVE-1-PZ01 (S/D) through SVE-1-PZ03 (S/D) were installed at 15 foot intervals extending east-northeast from SVE-1. Two piezometers, one shallow (S) and one deep (D) were installed at each cluster. Borings for each piezometer cluster were installed using 4.25-inch hollow stem augers. Split spoon samples were obtained for each boring in accordance with ASTM Method 1586-48. A Shelby tube sample was obtained for each cluster from within the screened interval of one of the two piezometers. The Shelby tube was transferred to E&E for geotechnical analysis. In addition, E&E obtained one soil sample from each boring for chemical analysis. All split spoon samples were screened with an OVA and logged in the field by Lu Engineers. Boring logs and construction details for each piezometer cluster are included as Attachment 3. Screening of the soils for radiation was completed E&E. Table 3 provides installation summaries for the SVE piezometers.

TABLE 3: SVE Piezometer Cluster Installation Summary
(all depths are in feet)

Piezometer Cluster	Boring Depth	Shelby Tube Interval	Sample Interval [1]	Screened Interval		Sand Pack Interval		Bentonite Seal	
				Shallow[2]	Deep[3]	Shallow [2]	Deep[3]	Shallow[2]	Deep[3]
SVE-01-PZ01	8.0	6.0 - 8.0	6.0 - 8.0	4.0 -5.0	7.0 - 8.0	3.8 - 5.2	6.8 -8.0	2.5 -3.8	5.2 - 6.8
SVE-01-PZ02	8.0	6.0 - 8.0	7.0 - 8.0	4.0 -5.0	7.0 - 8.0	3.8 - 5.2	6.8 - 8.0	2.5 - 3.8	5.2 - 6.8
SVE-01-PZ03	8.0	4.0 - 6.0	4.0 - 5.0	4.0 - 5.0	7.0 - 8.0	3.7 - 5.2	6.7 - 8.0	2.4 - 3.7	5.2 - 6.7

[1] Sample retained by E&E for volatile analysis, sample was obtained from the drilling spoils (sample for SVE-01-PZ01 was obtained from a damaged Shelby tube)
[2] Shallow piezometer construction
[3] Deep piezometer construction

Upon completion of piezometer cluster installation, the area surrounding SVE-1 and the piezometers was prepared for the installation of an impermeable barrier. The intent of the barrier was to seal the subsurface from atmospheric air infiltration within an approximate 65-foot radius of SVE-1. A trench approximately 1 foot deep was excavated around the perimeter of the intended barrier. Six-mil polyethylene sheeting was then spread over the ground surface. Approximately two feet of sheeting was placed in the trench and buried around the entire perimeter of the installation. A combination of duct tape and a spray-on-glue was used to attach the overlapped polyethylene sheets together. Penetrations in the barrier (i.e. wells, piezometers, etc.) were sealed using duct tape. Approximately 7775 square feet of ground surface was covered in this manner. The location of the impermeable liner is shown on the plan included as Attachment 1.

TASK 2: SOIL VAPOR EXTRACTION PILOT TEST

On May 27, 1998, Lu Engineers conducted a SVE pilot test following the approved May 1998 work plan. This pilot test utilized the vapor extraction well (SVE-1) and the three piezometer clusters (SVE-1-PZ01, SVE-1-PZ02, and SVE-1-PZ03). A 2.0 horsepower Gast, Incorporated regenerative blower was attached to the SVE-1 well head. A schematic diagram of the SVE system as temporarily installed at the Dearcop site is provided as Attachment 4. Exhaust from the system was vented through a water knockout drum and two Carbtrol, Incorporated carbon drums connected in series. The cap for each piezometer (SVE-1-PZ01S, SVE-1-PZ01D, SVE-1-PZ02S, SVE-1-PZ02D, SVE-1-PZ03S, and SVE-1-PZ03 D) was equipped with a barbed brass nipple threaded into the PVC cap. During the pilot test a Dwyer, Incorporated Mark IV vacuum gauge (manometer) was attached to the nipple via rubber tubing to determine the influence of the vapor extraction system. Representative photographs of SVE pilot testing activities and equipment are provided as Attachment 5.

Prior to initiating the SVE pilot test, an ambient air sample and vacuum readings at each piezometer was obtained. Upon SVE activation, initial soil vapor concentrations, vacuum reading and flow rates were obtained. A sample of extracted soil vapor was obtained prior to the blower with the use of a vacuum chamber of Lu Engineers design. The vacuum chamber was evacuated by means of a Dawson, Incorporated vacuum pump to reduce the pressure level in the chamber to below the level of the extraction piping at the SVE-1 well head. Vapor was drawn from the extraction line via tygon tubing

into a tedlar bag sealed inside the vacuum chamber due to the pressure differential induced by the vacuum pump. Vapor samples were retained in tedlar bags within the vacuum chamber. E&E handled all samples upon removal from the chamber.

The SVE system was initially set at a vacuum of 3.0 inches of water with a flow rate of between 24 and 32 cubic feet per minute (cfm). Discharge rates were determined by means of a Testo, Incorporated Air Velocity Meter. Data obtained from this instrument was converted to cfm units in the field via a graph, which plots feet per minute units versus cfm as calculated for laminar flow in two-inch diameter piping. Discharge rates in cfm units were determined prior to recording the data.

The following parameters were recorded on the SVE system at 10 minute intervals: time, vacuum, flow rate, effluent OVA readings (pre- and post carbon), barometric pressure, and temperature (at the well head and at exhaust). Vacuum readings were obtained at each piezometer at approximate 10-minute intervals. All information recorded is provided as Attachment 6.

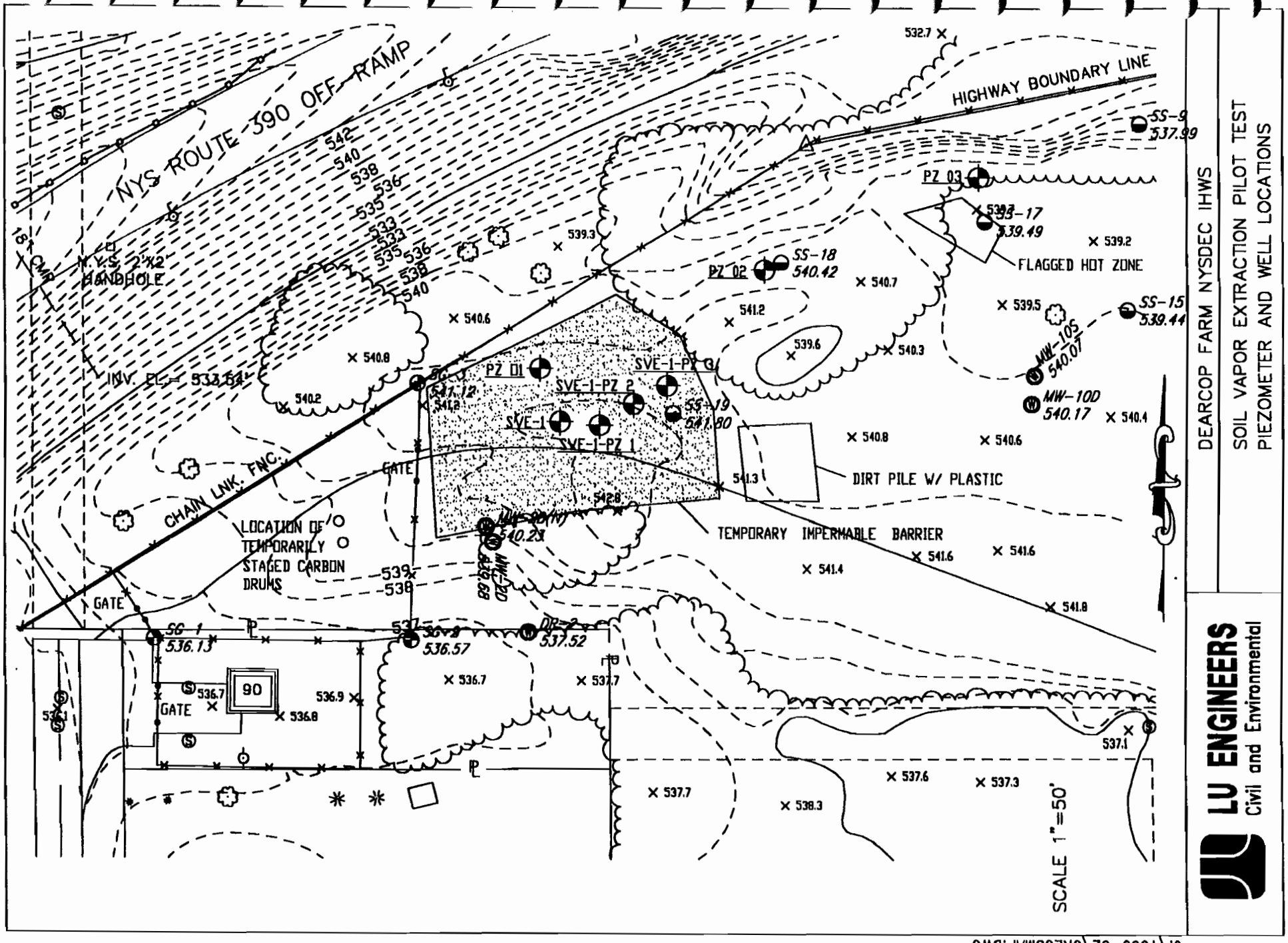
The system was operated for a total of four test periods. Each test period was defined by an adjustment to the vacuum level induced at the well head. Flow rate and vacuum level were adjusted by means of a flow control (gate) valve. Four vacuum settings (3.0, 6.5, 11.5, and 15.0 inches of water) were utilized during the course of the pilot test. After increasing the vacuum on the system, vapor samples were obtained and pertinent information was recorded as previously described. Additional soil vapor samples were obtained at the request of E&E. E&E recorded all sampling information.

Upon completion of the pilot test, the system was shut down and a last set of readings was obtained from the nested piezometers. As noted in the attached log sheets, the vacuum at the piezometers dissipated within a one-minute period.

The system was dismantled and three carbon treatment drums, two used and one unused, were left at the site. Arrangements for the appropriate disposal of the two used drums are currently underway. Copies of all disposal and transportation paperwork will be forwarded upon receipt.

ATTACHMENT 1

SOIL VAPOR EXTRACTION PILOT TEST PLAN



DEARCOP FARM NYSDEC IHWS

SOIL VAPOR EXTRACTION PILOT TEST
PIEZOMETER AND WELL LOCATIONS

LU ENGINEERS
Civil and Environmental

J:\1603-02\GRECSMAP.DWG

ATTACHMENT 2

BORING LOGS AND CONSTRUCTION DETAILS

Borehole Record for PZ-01

- Drilling Log
- Narrative Lithologic Description
- Well Development Record
- Well Development -- Parameter Measurements
- Investigation - Derived Waste Inventory Sheet

DRILLING LOG FOR PZ-01

Project Name DEARCOP FARM IHWS

Site Location GATES, NY

N. TERMINUS DEARCOP RD.

Date Started/Finished 5/22/98 | 5/22/98

Drilling Company NOTHNAGLE DRILLING

Driller's Name JAY STOCKHOLM

Geologist's Name GREG ANDRUS

Geologist's Signature

Rig Type (s) CME-75

Drilling Method (s) HSA

Bit Size (s) 4 1/4" Auger Size (s) 4 1/4"

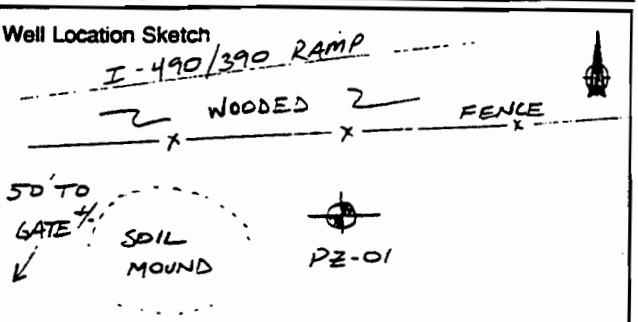
Auger/Split Spoon Refusal 24.0'

Total Depth of Borehole is 24.0'

Total Depth of Corehole is

Water Level (TOIC)		
Date	Time	Level(Feet)
5/22/98	09:00	10.1 b.g.s.

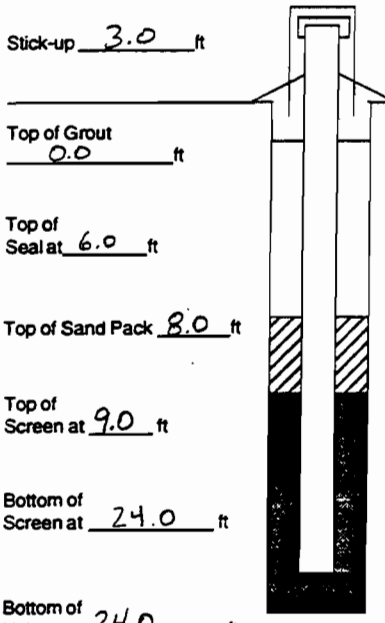
Well Location Sketch



N.T.S.

Depth(Feet)	Sample Number	Blows on Sampler		Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1											NO SAMPLING
2											
3											NO SAMPLING
4	1	1	-	SL,S,GR			5%			N/D	→ (ABOVE BACKGROUND OF 1 ppm)
5		-	1								
6	2	8	15	SL,S,GR			100%			N/D	N/D @ AUGERS
7		12	9								
8	3	5	3	CL,SL,S			100%			1 ppm	Δ LITH. @ 9.50' +/- BECOMES FINER/ NATIVE SOIL ?
9		4	5								
10	4	2	3	CL,SL,S,GR			100%			0.25ppm	Δ LITH. @ 11.0' +/ INTERBEDDED CLAY + GRAVEL + SILT
11		4	4								
12	5	9	16	CL,SL,S,GR			100%			4ppm	BECOMES SATURATED
13		20	21								
14	6	6	7	S,GR			100%			25ppm	NO ELEV. RAD. LEVELS
15											

PZ-01



SCREENED WELL

Stick-up 3.0 ft

Top of Grout 0.0 ft

Top of Seal at 6.0 ft

Top of Sand Pack 8.0 ft

Top of Screen at 9.0 ft

Bottom of Screen at 24.0 ft

Bottom of Hole at 24.0 ft

Bottom of Sandpack at 24.0

Lock Number 2342

Inner Casing Material PVC

Inner Casing Inside Diameter 2 inches

GROUND SURFACE

Quantity of Material Used:

Bentonite Pellets 5 GAL. +/-

Cement 80 lb +/-

Borehole 10.0 inches +/- Diameter

Cement/ Bentonite

Grout

Screen Slot Size 0.01"

Screen Type

☒ PVC 0.01"

☐ Stainless Steel

Pack Type/Size:

☒ Sand #00N RICCI

☐ Gravel

☐ Natural

OPEN-HOLE WELL

Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter inches

Outer Casing Diameter inches

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/ Outer Casing ft

Bottom of Inner Casing ft

Corehole Diameter

Bottom of Corehole ft

NOTE: See pages 136 and 137 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	NO SAMPLE	○	○	○
2	MTL. COMING UP AUGERS IS BLACK/BROWN SAND AND GRAVEL	⊗	○	○
3	NO SAMPLE	○	○	○
4		○	○	○
5	Black-Brown cmF SAND, little SILT, little mF GRAVEL	○	⊗	○
6	LITTLE FILL MTL. NOTED, SMALL PLASTIC FRAG.	○	○	○
7	Black-Brown/Red mF SAND, some mF GRAVEL, little SILT	○	⊗	○
8	little coarse SAND. GRAVEL IS GREEN VITRIFIED MTL.	○	○	○
9	Black-Brown mF SAND, little SILT (TO 9.5' +/-), BELOW 9.5' +/-	○	○	⊗
10	is: Brown SILT, little CLAY	○	○	⊗
11	Brown mF SAND and SILT, some mF GRAVEL (TO 11.0' +/-)	○	○	○
12	BELOW THIS IS: Brown SILT, some CLAY, little fine GRAVEL	○	○	⊗
13	Brown Fine SAND, some SILT, some cmF GRAVEL	○	○	⊗
14		○	○	○
15	Brown Fine SAND and cmF GRAVEL	○	○	⊗

PZ-01

Depth(feet)	Sample Number	Blows on Sampler		Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16	6(cont'd)	13	7	S, GR				100%			25ppm	
17	7	9	18	S, GR				100%			25ppm	
18		23	31									
19	8	13	30	S, GR				100%			32ppm	(on SPOON)
20		33	41								52ppm	(HEADSPACE)
21	9	23	100/3"	S, GR				50%			22ppm	(ON SPOON)
22		-	-								18 ppm	(HEADSPACE)
23	10	37	64	CL, SL, S, GR				90%			100ppm	
24		57	100/4"									
25												
26												
27												
28												
29												
30												
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												

PZ-01

Depth(feet).	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
16	SEE PREV. PAGE	○	○	○
17	Brown / Orange mF SAND and mF GRAVEL	○	○	⊗
18		○	○	○
19	Red / Brown SIMILAR SOIL	○	○	⊗
20		○	○	○
21	Brown → Grey SIMILAR SOIL	○	○	⊗
22		○	○	○
23	Grey SILT and cmF GRAVEL, trace CLAY, "BASAL TILL"	○	○	⊗
24	DOLOMITIC ROCK FRAGS. TOP OF BEDROCK 24' +/-	○	○	○
25		○	○	○
26		○	○	○
27		○	○	○
28		○	○	○
29		○	○	○
30		○	○	○
31		○	○	○
32		○	○	○
33		○	○	○
34		○	○	○
35		○	○	○
36		○	○	○
37		○	○	○
38		○	○	○
39		○	○	○
40		○	○	○
41		○	○	○
42		○	○	○
43		○	○	○
44		○	○	○
45				

Borehole Record for PZ-02

- Drilling Log
- Narrative Lithologic Description
- Well Development Record
- Well Development -- Parameter Measurements
- Investigation - Derived Waste Inventory Sheet

DRILLING LOG FOR PZ-02

Project Name DEARLOP FARM IHWS

Site Location GATES, NY

N. TERMINUS DEARLOP RD.

Date Started/Finished 5/20/98 / 5/20/98

Drilling Company NOTHNAGLE DRILLING

Driller's Name JAY STOCKHOLM

Geologist's Name GREG ANDRUS

Geologist's Signature

Rig Type (s) CME-75

Drilling Method (s) HSA

Bit Size (s) _____ Auger Size (s) 4 1/4"

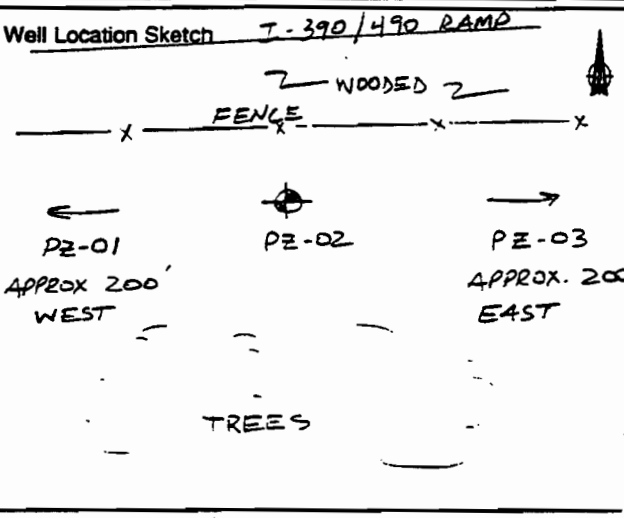
Auger/Split Spoon Refusal N/A

Total Depth of Borehole Is 21.5

Total Depth of Corehole Is

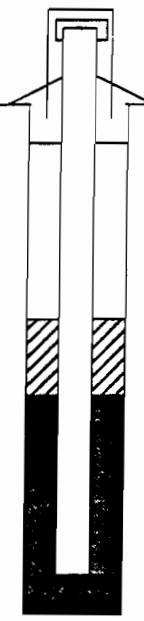
Water Level (TOIC)		
Date	Time	Level (Feet)
5/22/98	09:00	7.85' b.g.s (11.47' btc.)

Well Location Sketch T-390/490 RAMP



Depth(Feet)	Sample Number	Blows on Sampler		Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	3	1	SL, S, GR			2%			N/D	→ (ABOVE BACKGROUND OF 1 ppm)
		1	2								
2	2	4	6	S, GR			100%			N/D	(SPOON)
3		8	5								
4	3	5	4	CL, SL, S			50%			5ppm	(HEADSPACE)
5		6	2								
6	4	1	1	S			5%			1ppm	(HEADSPACE)
7		1	2								
8	5	2	3	CL, SL, S			100%			6ppm	(HEADSPACE)
9		3	4								
10	6	3	5				100%			N/D	(HEADSPACE)
11		10	24	CL, SL, S, GR							
12											NO ELEV. RAD. LEVEL DETECTED
13											
14											
15											

PZ-02



SCREENED WELL

Lock Number 2342

Inner Casing Material PVC

Inner Casing Inside Diameter 2 inches

Stick-up 3.0 ft

GROUND SURFACE

Top of Grout 0.0 ft

Top of Seal at 5.9 ft

Top of Sand Pack 7.9 ft

Top of Screen at 8.5 ft

Bottom of Screen at 21.5 ft

Bottom of Hole at 21.5 ft

Bottom of Sandpack at 21.5

Quantity of Material Used:

Bentonite Pellets 5 GAL

Cement 80 LB.

Borehole Diameter 10.0 inches

Cement/ Bentonite

Grout

Screen Slot Size 0.01"

Screen Type

☒ PVC

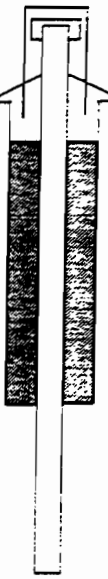
☐ Stainless Steel

Pack Type/Size:

☒ Sand #00N RICCI

☐ Gravel

☐ Natural



OPEN-HOLE WELL

Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter inches

Outer Casing Diameter inches

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/ Outer Casing ft

Bottom of Inner Casing ft

Corehole Diameter

Bottom of Corehole ft

NOTE: See pages 136 and 137 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	TOPSOIL INCLUDING WASTE MTLS (METAL, CINDER/VITRIFIED	○	○	○
2	MTL., WOOD)	⊗	○	○
3	Black / Orange mF SAND, some coarse SAND, some mF GRAVEL	⊗	○	○
4	ROOFING SHINGLES @ 3.5' b.g. +/-	○	○	○
5	Dark Brown Fine SAND and SILT, trace CLAY	○	⊗	○
6	GREEN GLASS FRAGS. @ 5.75' +/-	○	○	○
7	Brown → Black cmF SAND WITH GREEN GLASS FRAGS/SLAG?	○	⊗	○
8		○	○	○
9	Brown mF SAND and SILT little CLAY	○	⊗	○
10		○	○	○
11	Brown cmF SAND and SILT, little CLAY → GRADES ABRUPTLY INTO (@ 11.0' +/-)	○	○	○
12	Brown/Grey TILL (SILT and mF GRAVEL, little cmF SAND, trace CLAY)	○	○	○
13				
14		○	○	○
15		○	○	○

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											
45											

Borehole Record for PZ-03

- Drilling Log
- Narrative Lithologic Description
- Well Development Record
- Well Development -- Parameter Measurements
- Investigation - Derived Waste Inventory Sheet

DRILLING LOG FOR PZ-03

Project Name DEARLOP FARM IHWS

Site Location GATES, NY

N. TERMINUS DEARLOP ROAD

Date Started/Finished 5/21/98 / 5/21/98

Drilling Company NOTHNAGLE DRILLING

Driller's Name JAY STOCKHOLM

Geologist's Name GREG ANDRUS

Geologist's Signature

Rig Type (s) CME-75

Drilling Method (s) HSA

Bit Size (s) _____ Auger Size (s) 4 1/4"

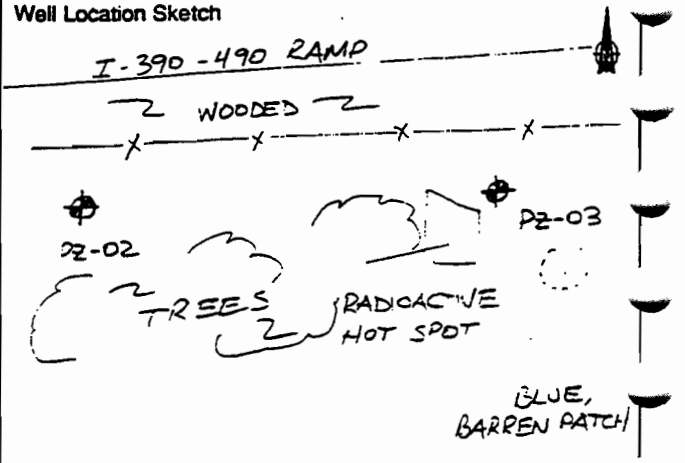
Auger/Split Spoon Refusal

Total Depth of Borehole Is 19.7'

Total Depth of Corehole Is

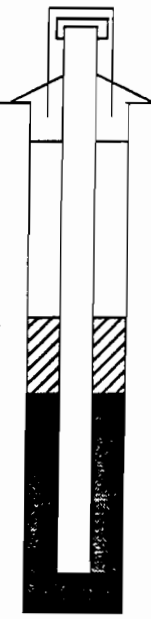
Water Level (TOIC)		
Date	Time	Level(Feet)
5/22/98	09:00 +/-	6.95 b.s.s. (12.25 b.t.c

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler	Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	1 2	SL, S			100%			N/D	(BLUE SOIL VOTE RAD READINGS
2		3 2								900 - 1100 cpm
3	2	1 1	SL, S			25%			0.5ppm	900 cpm
4		1 1								
5	3	1 1	S			45%			N/D	900 - 1000 cpm
6		2 1								
7	4	1 2	CL, S, GR			50%			15ppm	800 - 900 cpm
8		7 5								
9	5	4 4	SL, S, GR			100%			20ppm	SAME
10		8 12								
11										
12										
13										
14										
15										

PZ-03



SCREENED WELL

Stick-up 3.0 ft

Top of Grout 0.0 ft

Top of Seal at 2.6 ft

Top of Sand Pack 3.6 ft

Top of Screen at 4.7 ft

Bottom of Screen at 19.7 ft

Bottom of Hole at 19.7 ft

Bottom of Sandpack at 19.7

Lock Number 2342

Inner Casing Material PVC

Inner Casing Inside Diameter 2 inches

GROUND SURFACE

Quantity of Material Used:

Bentonite Pellets 5 gal +/-

Cement 80 lb. +/-

Borehole Diameter 10.0 inches

Cement/ Bentonite

Grout

Screen Slot Size 0.01

Screen Type

☒ PVC

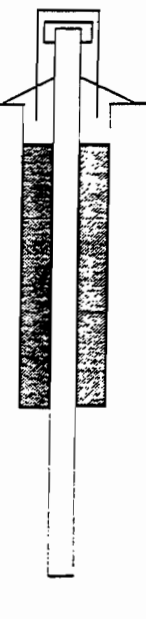
☐ Stainless Steel

Pack Type/Size:

☒ Sand ± 00 Ricci

☐ Gravel

☐ Natural



OPEN-HOLE WELL

Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter inches

Outer Casing Diameter inches

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/ Outer Casing ft

Bottom of Inner Casing ft

Corehole Diameter

Bottom of Corehole ft

NOTE: See pages 136 and 137 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	Brown → Black → Blue mF SAND, little SILT (INCLUDES >SILT	○	○	○
2	PROPORTION IN BLUE SOIL LOCATED 1.5-2.0' b.g.)	○	⊗	○
3	Similar Soil, NO BLUE MATERIAL NOTED	○	⊗	○
4		○	○	○
5	Brown Medium SAND	○	⊗	○
6		○	○	○
7	Brown mF SAND, little CLAY (lens @ 6.25-6.5' b.g.), little	○	⊗	○
8	Fine GRAVEL, PLASTIC SHEETING/FILM? MTL @ 8.0' b.g.	○	○	○
9	Brown mF SAND and SILT, some cmF GRAVEL (fill +/-)	○	⊗	○
10		○	○	○
11	NO SAMPLING 10-20'	○	○	○
12		○	○	○
13		○	○	○
14		○	○	○
15		○	○	○

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16											
17											
18											
19											
20											
21											
22											
23											
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44											
45											

Borehole Record for SVE - 01

- Drilling Log
- Narrative Lithologic Description
- Well Development Record
- Well Development -- Parameter Measurements
- Investigation - Derived Waste Inventory Sheet

DRILLING LOG FOR SVE-01

Project Name: DEARLOP FARM IHWS

Site Location: GATES, NY

N. TERMINUS DEARLOP RD.

Date Started/Finished: 5/21/98 / 5/21/98

Drilling Company: NOTHNAGLE DRILLING

Driller's Name: JAY STOCKHOLM

Geologist's Name: GREG ANDRUS

Geologist's Signature:

Rig Type (s): CME-75

Drilling Method (s): HSA

Bit Size (s): _____ Auger Size (s): 4¼"

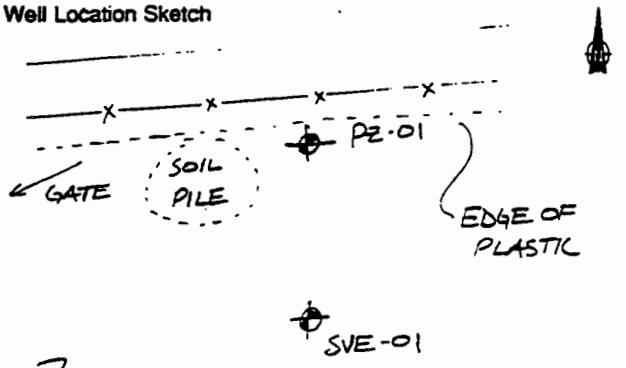
Auger/Split Spoon Refusal: N/A

Total Depth of Borehole Is: 8.0

Total Depth of Corehole Is:

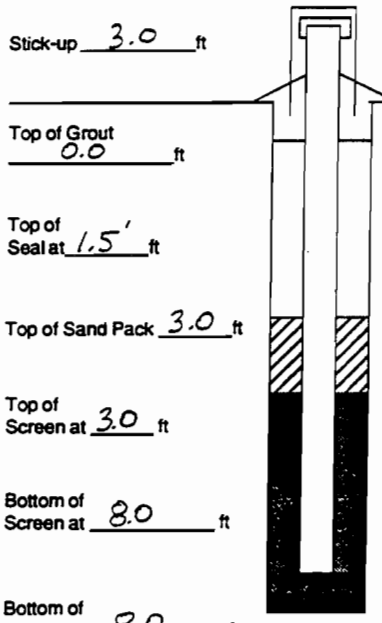
Water Level (TOIC)		
Date	Time	Level(Feet)

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler	Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	3 3 / 6 8	S, GR			100%			4 ppm	
2	2	6 5 / 6 2	SL, S, GR			10%			4 ppm	
3										
4	3		S, GR			1.5' +/-			100 ppm	SHELBY TUBE SAMPLE
5										
6	4	1 1 / 1 1	SL, S, GR			5%			25 ppm	
7										
8										
9										NO ELEV. 2AD. LEVELS
10										
11									0.0 ppm	@ WELL HEAD UPON COMPLETION
12										
13										
14										
15										

SVE-01



SCREENED WELL

Stick-up 3.0 ft

Top of Grout 0.0 ft

Top of Seal at 1.5' ft

Top of Sand Pack 3.0 ft

Top of Screen at 3.0 ft

Bottom of Screen at 8.0 ft

Bottom of Hole at 8.0 ft

Bottom of Sandpack at 8.0

Lock Number 2342

Inner Casing Material PVC

Inner Casing Inside Diameter 2 inches

GROUND SURFACE

Quantity of Material Used:

Bentonite Pellets 3 gal +/-

Cement 80 lb.

Borehole 10.0 inches Diameter

Cement/ Bentonite

Grout

Screen Slot Size 0.01"

Screen Type

☒ PVC

☐ Stainless Steel

Pack Type/Size:

☒ Sand # 00 N RICCI

☐ Gravel

☐ Natural

OPEN-HOLE WELL

Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter inches

Outer Casing Diameter inches

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/ Outer Casing ft

Bottom of Inner Casing ft

Corehole Diameter

Bottom of Corehole ft

NOTE: See pages 136 and 137 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	Brown-Black mF SAND, little cmF GRAVEL, LITTLE ORGANIC (PLANT	⊗	○	○
2	MTL. OR WASTE).	○	○	○
3	Red-Brown cmF SAND and cmF GRAVEL, some SILT	⊗	○	○
4		○	○	○
5	SHELBY TUBE SAMPLE - APPEARED TO BE: Orange-Brown cmF	○	○	○
6	SAND and cmF GRAVEL, trace SILT	○	⊗	○
7	Brown cmF SAND and cmF GRAVEL, trace SILT, trace	○	○	○
8	CLAY	○	⊗	○
9		○	○	○
10		○	○	○
11		○	○	○
12		○	○	○
13		○	○	○
14		○	○	○
15		○	○	○

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16											
17											
18											
19											
20											
21											
22											
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24											
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44											
45											

Borehole Record for SVE-01-PZ01 (S/D)

- Drilling Log
- Narrative Lithologic Description
- Well Development Record
- Well Development -- Parameter Measurements
- Investigation - Derived Waste Inventory Sheet

DRILLING LOG FOR SVE-01 - PZ01 (S/D)

Project Name: DEARCOP FARM IHWS

Site Location: GATES, NY

N. TERMINUS DEARCOP DR.

Date Started/Finished: 5/21/98 | 5/21/98

Drilling Company: NOTHNAGLE DRILLING

Driller's Name: JAY STOCKHOLM

Geologist's Name: GREG ANDRUS

Geologist's Signature:

Rig Type (s): CME - 75

Drilling Method (s): HSA

Bit Size (s): _____ Auger Size (s): _____

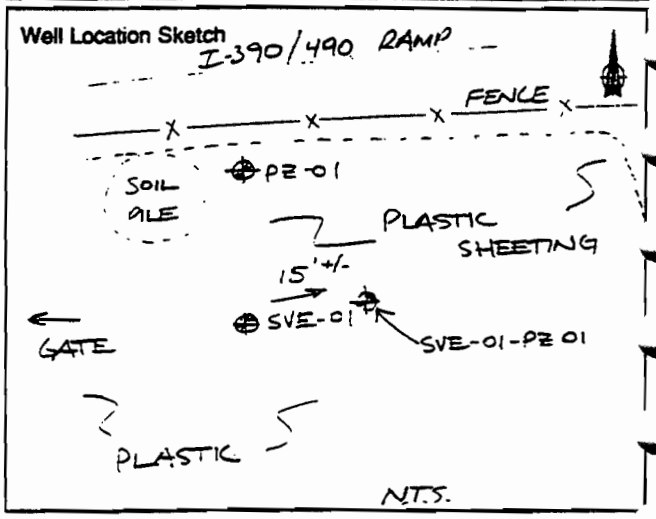
Auger/Split Spoon Refusal: N/A

Total Depth of Borehole Is: 8.0'

Total Depth of Corehole Is:

Water Level (TOIC)		
Date	Time	Level(Feet)

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler	Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	1 2	SL, S, GR			100%			1 ppm	(BACKGROUND)
2		2 3								
3	2	9 9	CL, SL, S, GR			25%			N/D	NO ELEVATED RAD. READINGS.
4		6 2								
5	3	3 2	SL, S, GR			25%			N/D	
6		2 6								
7	4		S, GR			1.5' +/-			N/D	(SHELBY TUBE SAMPLE TAKEN 4.0 - 7.8 B.G.)
8										- DUE TO NEED TO RELOCATE BORING AFTER UNSUCCESSFUL INSTALLATION ATTEMPT @ INITIAL LOC.
9										
10										
11										
12										
13										
14										
15										

SVE-01-PZ01(S/D)

NESTED PIEZOMETERS:
(SHALLOW/DEEP)

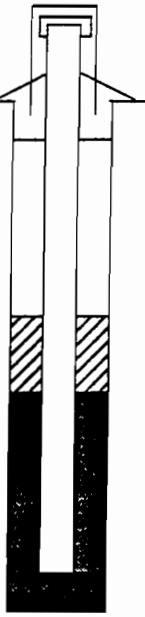
Lock Number 2342

SCREENED WELL

Inner Casing Material PVC

Stick-up 3.0' ft

Inner Casing Inside Diameter 1.0 inches



GROUND SURFACE

Top of Grout 0.0 ft

Top of Seal at 2.5/5.2 ft

Top of Sand Pack 3.8/6.8 ft

Top of Screen at 4.0/7.0 ft

Bottom of Screen at 5.0/8.0 ft

Bottom of Hole at 8.0 ft

Bottom of Sandpack at 5.2/8.0

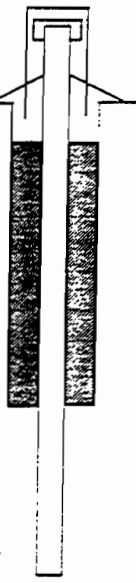
Quantity of Material Used:
Bentonite Pellets 10 gal.
Cement 80 lb
Borehole 10 inches Diameter
Cement/Bentonite
Grout
Screen Slot Size 0.01"
Screen Type
☒ PVC
☐ Stainless Steel
Pack Type/Size:
☒ Sand #00N RICCI
☐ Gravel
☐ Natural

OPEN-HOLE WELL

Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter inches



Outer Casing Diameter inches

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/Outer Casing ft

Bottom of Inner Casing ft

Corehole Diameter

Bottom of Corehole ft

NOTE: See pages 136 and 137 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	Brown Medium SAND, little fine SAND, trace SILT, trace GRAVEL	○	⊗	○
2		○	○	○
3	Brown SILT, some cmF GRAVEL, little fine SAND, trace CLAY	○	⊗	○
4		○	○	○
5	Black – Brown SILT, some cmF SAND, some cmF GRAVEL	○	⊗	○
6	GRAVEL INCLUDES GREEN/BROWN GLASS FRAGS	○	○	○
7	SHELBY TUBE CRUSHED PARTIALLY, Brown cmF GRAVEL	○	⊗	○
8	(CONCRETE, BRICK & SLAG), and cmF SAND	○	○	○
9		○	○	○
10	NOTE: USED APPROX. 350 lb. SAND TO SET SCREENS DUE	○	○	○
11	TO APPARENT VOID @ 7.0' O.S. +/-	○	○	○
12		○	○	○
13				
14		○	○	○
15		○	○	○

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											
45											

Borehole Record for SVE-01 - PZ02 (S/D)

- Drilling Log
- Narrative Lithologic Description
- Well Development Record
- Well Development -- Parameter Measurements
- Investigation - Derived Waste Inventory Sheet

DRILLING LOG FOR SVE-01-PZ02 (S/A)

Project Name DEARLOP FARM IHWS

Site Location GATES, NY

N. TERMINUS DEARLOP DR.

Date Started/Finished 5/21/98 / 5/21/98

Drilling Company NOTHNAGLE DRILLING

Driller's Name JAY STOCKHOLM

Geologist's Name GREG ANDRUS

Geologist's Signature

Rig Type (s) CME-75

Drilling Method (s) HSA

Bit Size (s) _____ Auger Size (s) 4 1/4"

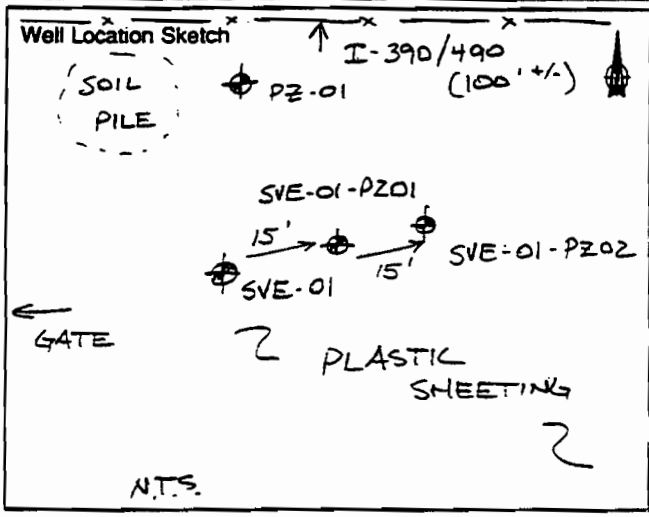
Auger/Split Spoon Refusal N/A

Total Depth of Borehole is 8.0'

Total Depth of Corehole is

Water Level (TOIC)		
Date	Time	Level(Feet)

Well Location Sketch



Depth(Feet)	Sample Number	Blows on Sampler	Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	2 2	SL, S			100%			N/D	NO ELEVATED RAD. READING DETECTED
2		6 8								
3	2	6 2	SL, S			100%			N/D	
4		5 3								
5	3	5 9	SL, S			100%			N/D	
6		4 2								
7	4	X X	N/A			1.5' +/-			N/D	SHELBY TUBE SAMPLE
8										TUBE HAD GREASY RESIDUE ON IT UPON RETRIEVAL
9										
10										
11										
12										
13										
14										
15										

SVE-01-PZ02 (S/D)

NESTED PIEZOMETERS:
(SHALLOW / DEEP)

SCREENED WELL

Lock Number 2342

Inner Casing Material PVC

Inner Casing Inside Diameter 1.0 inches

Stick-up 3.0' ft

GROUND SURFACE

Top of Grout 0.0 ft

Top of Seal at 2.5/5.2 ft

Top of Sand Pack 3.8/6.8 ft

Top of Screen at 4.0/7.0 ft

Bottom of Screen at 5.0/8.0 ft

Bottom of Hole at 8.0 ft

Bottom of Sandpack at 5.2/8.0

Quantity of Material Used:
Bentonite Pellets 10 gal +/-
Cement 80 lb. +/-

Borehole 10.0 inches Diameter

Cement/ Bentonite

Grout

Screen Slot Size 0.01"

Screen Type
- [x] PVC
- [ ] Stainless Steel

Pack Type/Size:
- [x] Sand #ONE RICE
- [ ] Gravel
- [ ] Natural

OPEN-HOLE WELL

Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter inches

Outer Casing Diameter inches

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/ Outer Casing ft

Bottom of Inner Casing ft

Corehole Diameter

Bottom of Corehole ft

NOTE: See pages 136 and 137 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	Brown-Black cm SAND, trace SILT INCLUDES LITTLE	○	○	○
2	ORGANIC MTL. OR WASTE	○	⊗	○
3	Brown-Black SIMILAR SOIL W/ HIGHER PROPORTION OF	○	○	○
4	Fine SAND, BLUE GLASS MTL IN SPOON	○	⊗	○
5	Brown-Tan cmF SAND, little SILT	○	⊗	○
6	LITTLE WASTE (SLAG/CONCR.)	○	○	○
7	SHELBY TUBE SAMPLE MATERIAL NOT EVALUATED	○	⊗	○
8		○	○	○
9		○	○	○
10		○	○	○
11		○	○	○
12		○	○	○
13		○	○	○
14		○	○	○
15		○	○	○

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16											
17											
18											
19											
20											
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44											
45											

Borehole Record for SVE-01-PZ03 (S/D)

- Drilling Log
- Narrative Lithologic Description
- Well Development Record
- Well Development -- Parameter Measurements
- Investigation - Derived Waste Inventory Sheet

DRILLING LOG FOR SVE-01-PZ03 (S/D)

Project Name DEARLOP FARM IHWS

Site Location GATES, NY

N. TERMINUS DEARLOP DR.

Date Started/Finished 5/21/98 / 5/22/98

Drilling Company NOTHNAGLE DRILLING

Driller's Name JAY STOCKHOLM

Geologist's Name GREG ANDRUS

Geologist's Signature

Rig Type (s) CME-75

Drilling Method (s) HSA

Bit Size (s) _____ Auger Size (s) 4¼"

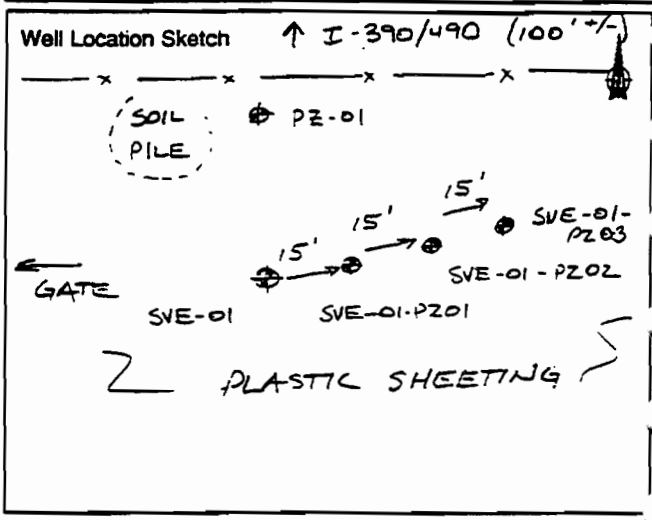
Auger/Split Spoon Refusal

Total Depth of Borehole Is 8.0'

Total Depth of Corehole Is

Water Level (TOIC)		
Date	Time	Level (Feet)

Well Location Sketch



Depth (Feet)	Sample Number	Blows on Sampler	Soil Components Rock Profile CL SL S GR	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
1	1	2 2	SL, S			80%			4 ppm	
2		5 5								
3	2	5 4	SL, S, GR			100%			1 ppm	
4		3 2								
5	3		SL, S, GR			1.5' +/-			N/D	SHELBY TUBE SAMPLE (USED 2 TUBES DUE TO FIRST ONE BEING DESTROY IN HOLE ON HARD MTL.)
6										
7	4	2 2	SL, S			<5%			N/D	
8		2 2								
9										NO ELEVATED RAD. LEVELS DETECTED
10										
11										
12										
13										
14										
15										

SVE-01 - PZ03(S/D)

NESTED PIEZOMETERS: (SHALLOW / DEEP)

Lock Number 2342

SCREENED WELL

Inner Casing Material PVC

Inner Casing Inside Diameter 1.0 inches

Stick-up 3.0 ft

GROUND SURFACE

Top of Grout 0.0 ft

Top of Seal at 2.4/5.2 ft

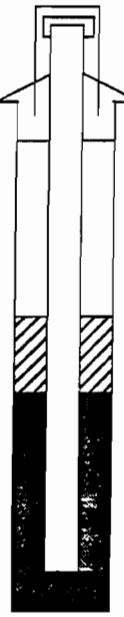
Top of Sand Pack 3.7/6.7 ft

Top of Screen at 4.0/7.0 ft

Bottom of Screen at 5.0/8.0 ft

Bottom of Hole at 8.0 ft

Bottom of Sandpack at 5.2/8.0



Quantity of Material Used:

Bentonite Pellets 10 gal

Cement 80 lb.

Borehole Diameter 10.0 inches

Cement/ Bentonite

Grout

Screen Slot Size 0.01"

Screen Type

☒ PVC

☐ Stainless Steel

Pack Type/Size:

☒ Sand #00N RICI

☐ Gravel

☐ Natural

OPEN-HOLE WELL

Stick-up ft

Inner Casing Material

Inner Casing Inside Diameter inches

Outer Casing Diameter inches

Borehole Diameter ft

Bedrock ft

Bottom of Rock Socket/ Outer Casing ft

Bottom of Inner Casing ft

Corehole Diameter

Bottom of Corehole ft

NOTE: See pages 136 and 137 for well construction diagrams

Depth-ft.	NARRATIVE LITHOLOGIC DESCRIPTION	Moisture Content: Dry	Moist	Wet
1	Brown-Black cm SAND, trace SILT	○	⊗	○
2		○	○	○
3	Red/Brown-Black cm SAND, little mf GRAVEL, trace SILT	○	⊗	○
4		○	○	○
5	SIMILAR SOIL, BLUE MTL. ON BOTTOM OF SPOON	○	⊗	○
6		○	○	○
7	Black/Blue mf SAND - (Higher Proportion of medium)	○	○	○
8	little/trace SILT, BLUE MTL. ON OUTSIDE OF	○	⊗	○
9	- SPLIT SPOON - NO ELEVATED RAD LEVELS	○	○	○
10		○	○	○
11		○	○	○
12		○	○	○
13		○	○	○
14		○	○	○
15		○	○	○

Depth(feet)	Sample Number	Blows on Sampler	Soil Components CL SL S GR	Rock Profile	Penetration Times	Run Number	Core Recovery	RQD	Fracture Sketch	HNu/OVA (ppm)	Comments
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
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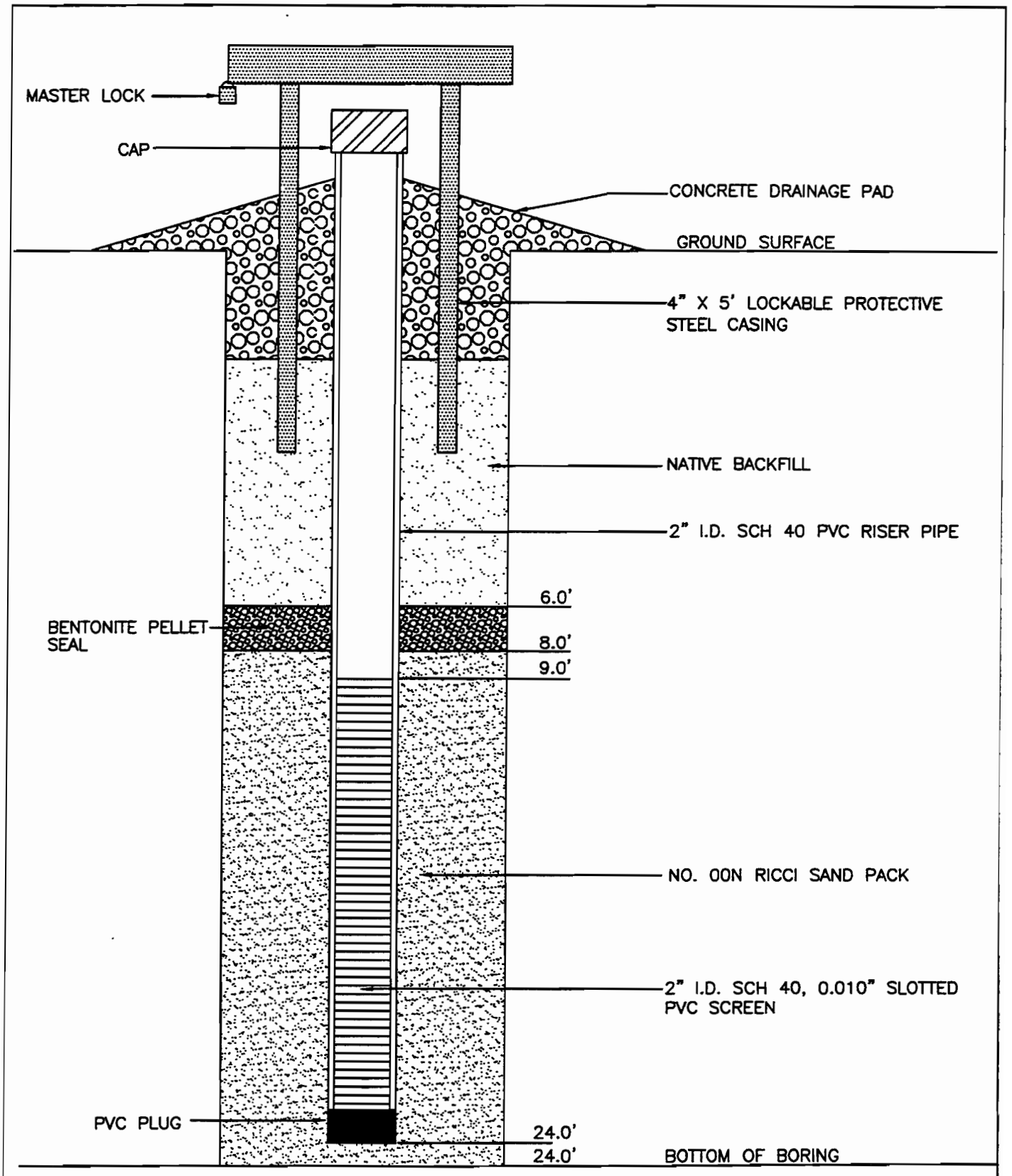
40											
41											
42											
43											
44											
45											



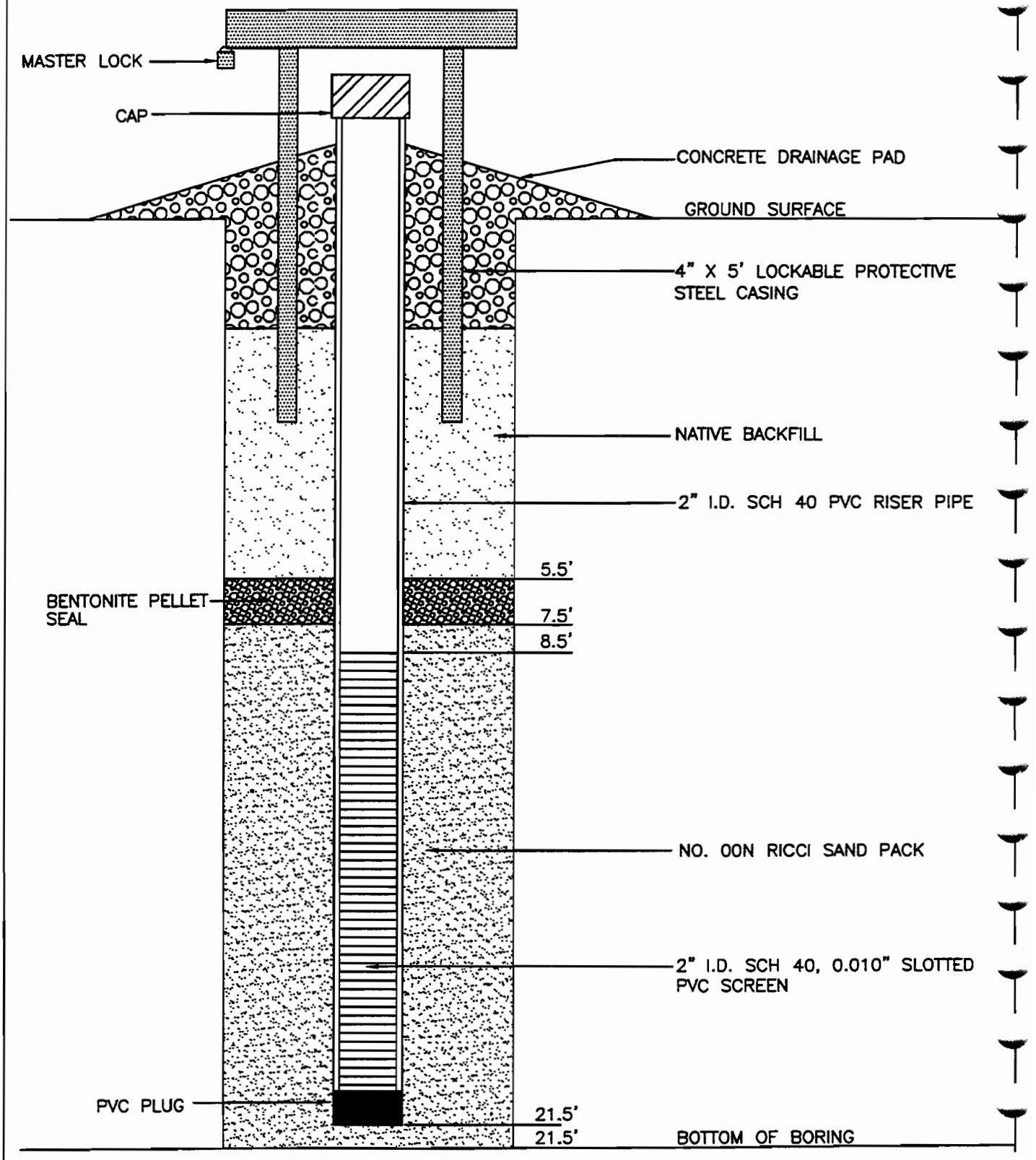
DF-1.DWG

NOT TO SCALE

LU ENGINEERS
Civil and Environmental

DEARCOP FARM SVE PILOT TEST

PZ-01
CONSTRUCTION DETAIL



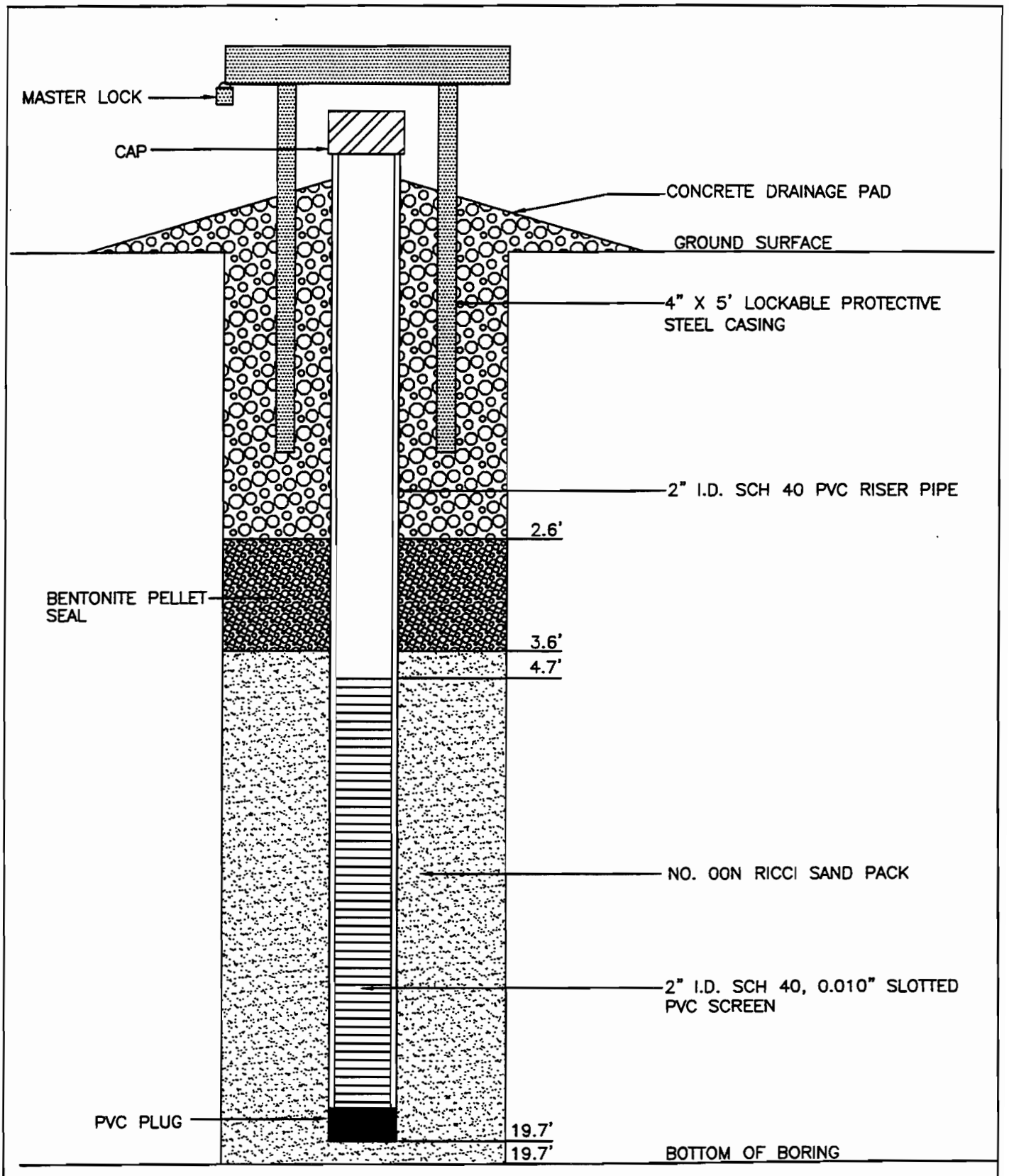
DF-1.DWG

NOT TO SCALE

LU ENGINEERS
Civil and Environmental

DEARCOP FARM SVE PILOT TEST

PZ-02
CONSTRUCTION DETAIL



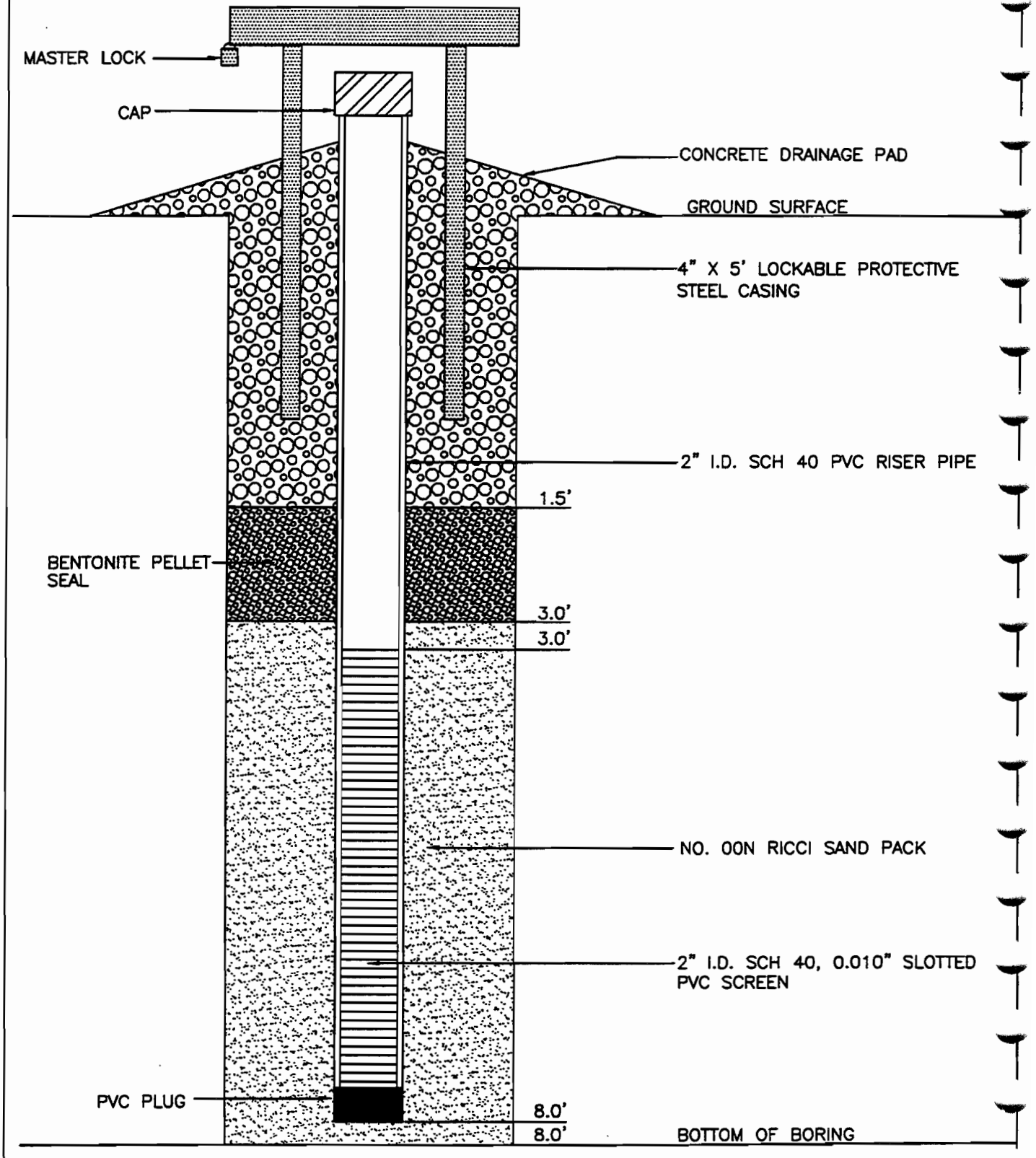
DF-1.DWG

NOT TO SCALE

LU ENGINEERS
Civil and Environmental

DEARCOP FARM SVE PILOT TEST

PZ-03
CONSTRUCTION DETAIL



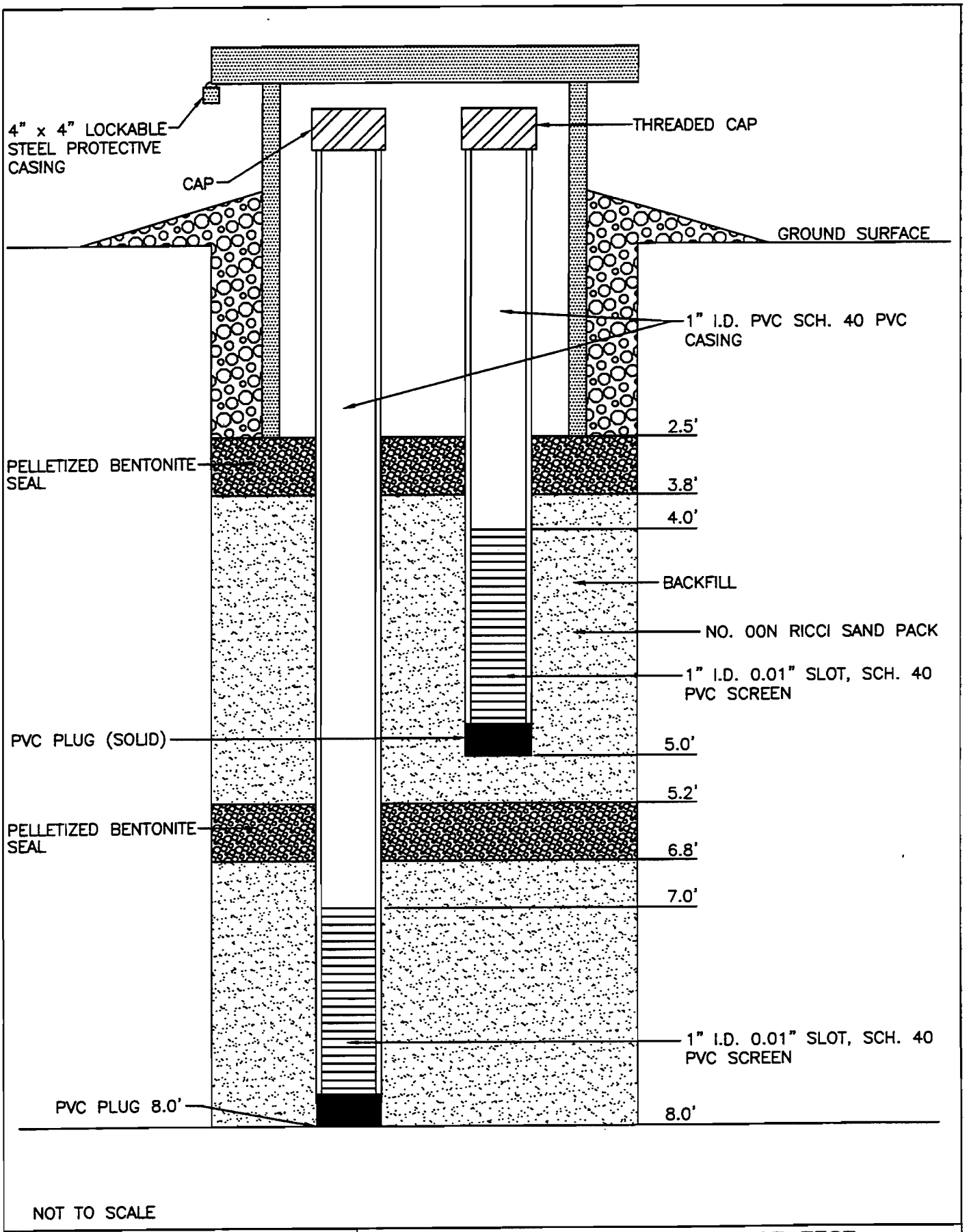
DF-1.DWG

NOT TO SCALE

LU ENGINEERS
Civil and Environmental

DEARCOP FARM PILOT TEST

SVE-01
CONSTRUCTION DETAIL



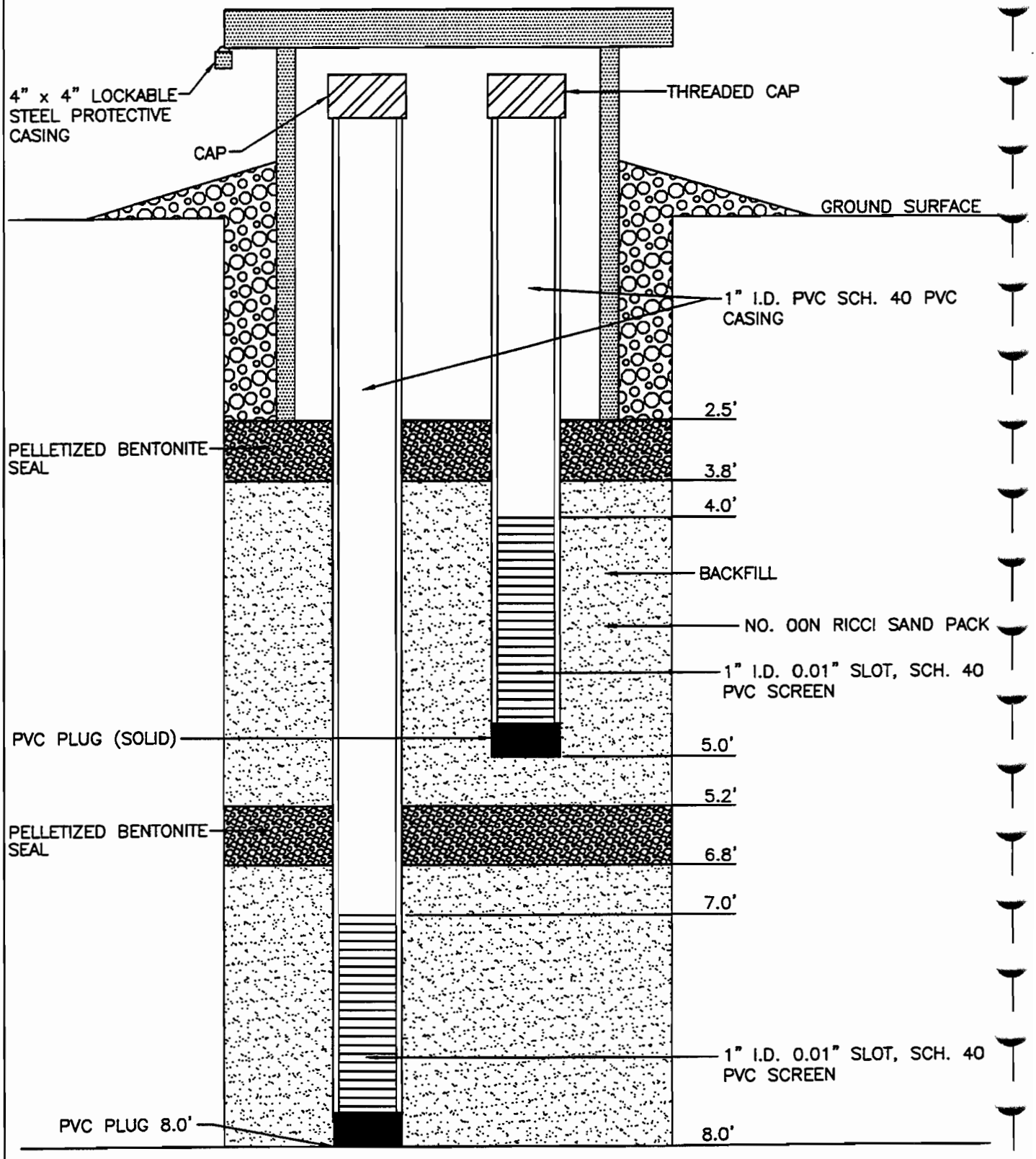
DF-2.DWG

NOT TO SCALE

LU ENGINEERS
Civil and Environmental

DEARCOP FARM SVE PILOT TEST

SVE - 01 - PZ-01 (S/D) CONSTRUCTION DETAIL



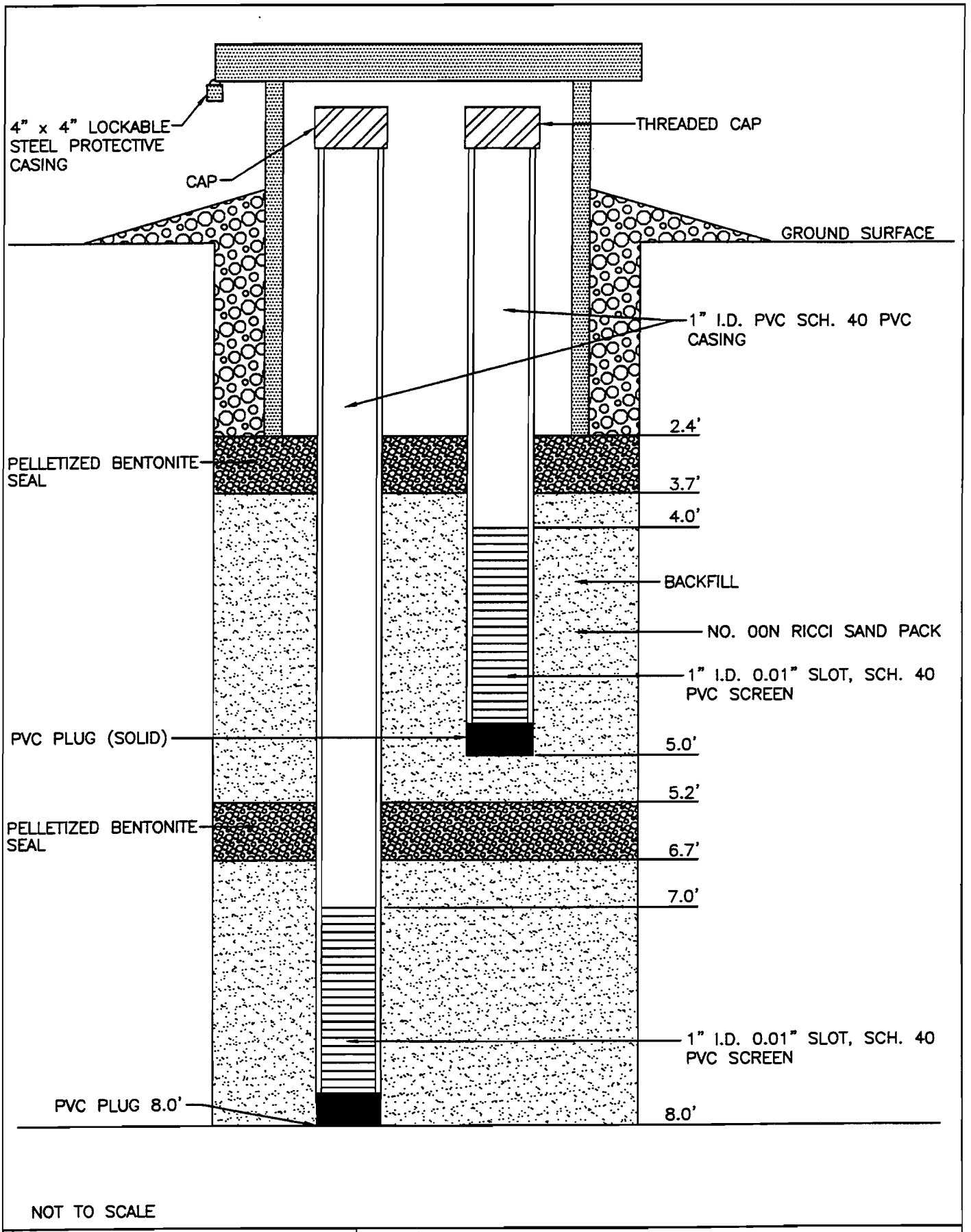
DF-2.DWG

NOT TO SCALE

LU ENGINEERS
Civil and Environmental

DEARCOP FARM SVE PILOT TEST

SVE - 01 - PZ-02 (S/D) CONSTRUCTION DETAIL



DF-2.DWG

NOT TO SCALE

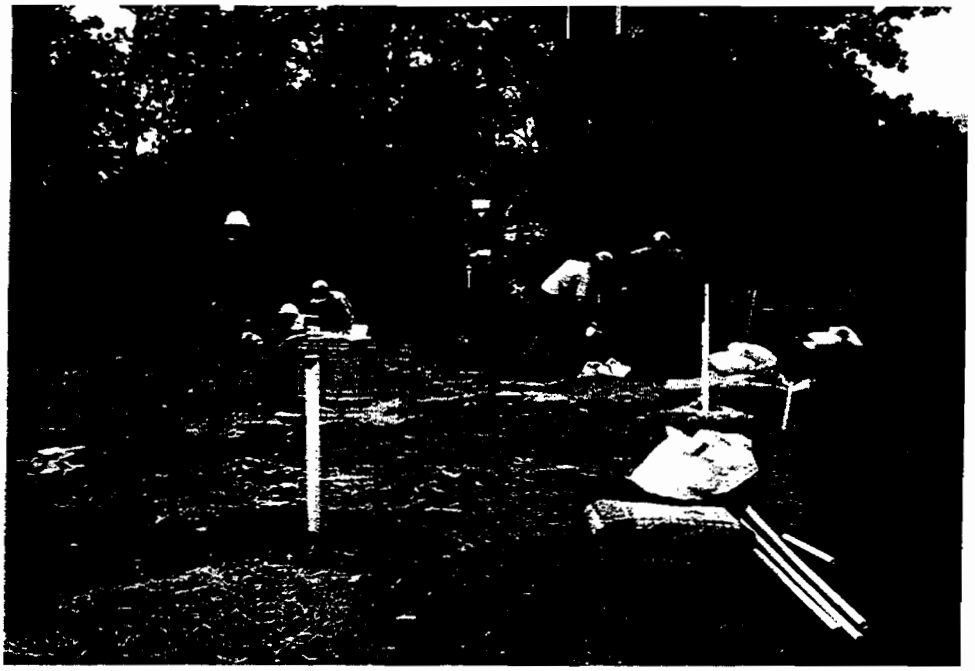
LU ENGINEERS
Civil and Environmental

DEARCOP FARM SVE PILOT TEST

SVE - 01 - PZ-03 (S/D) CONSTRUCTION DETAIL

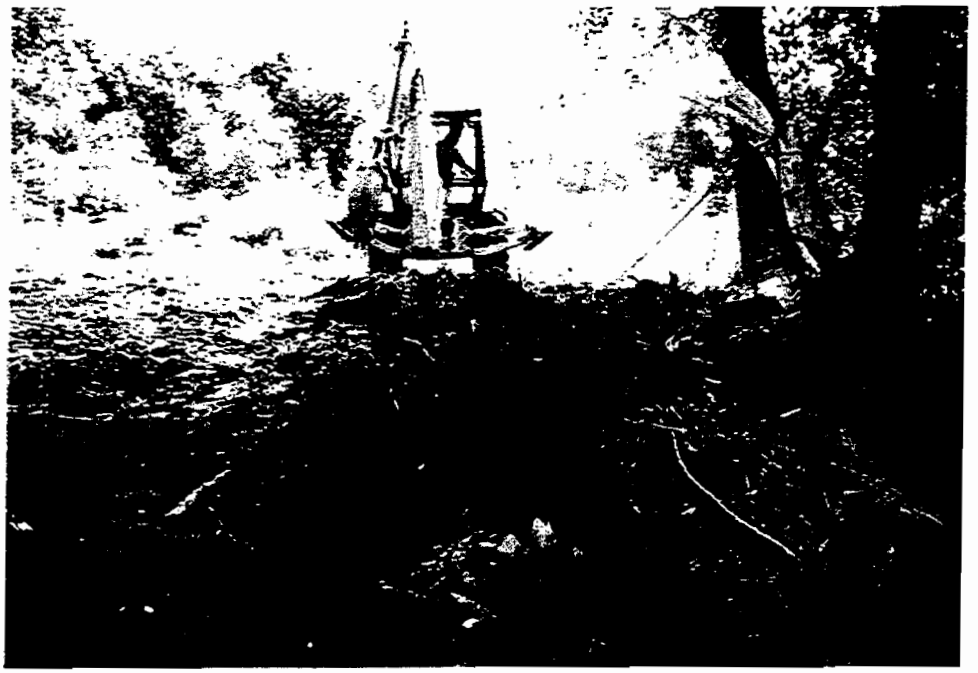
ATTACHMENT 3

PHOTOGRAPHS
SITE PREPARATION ACTIVITIES



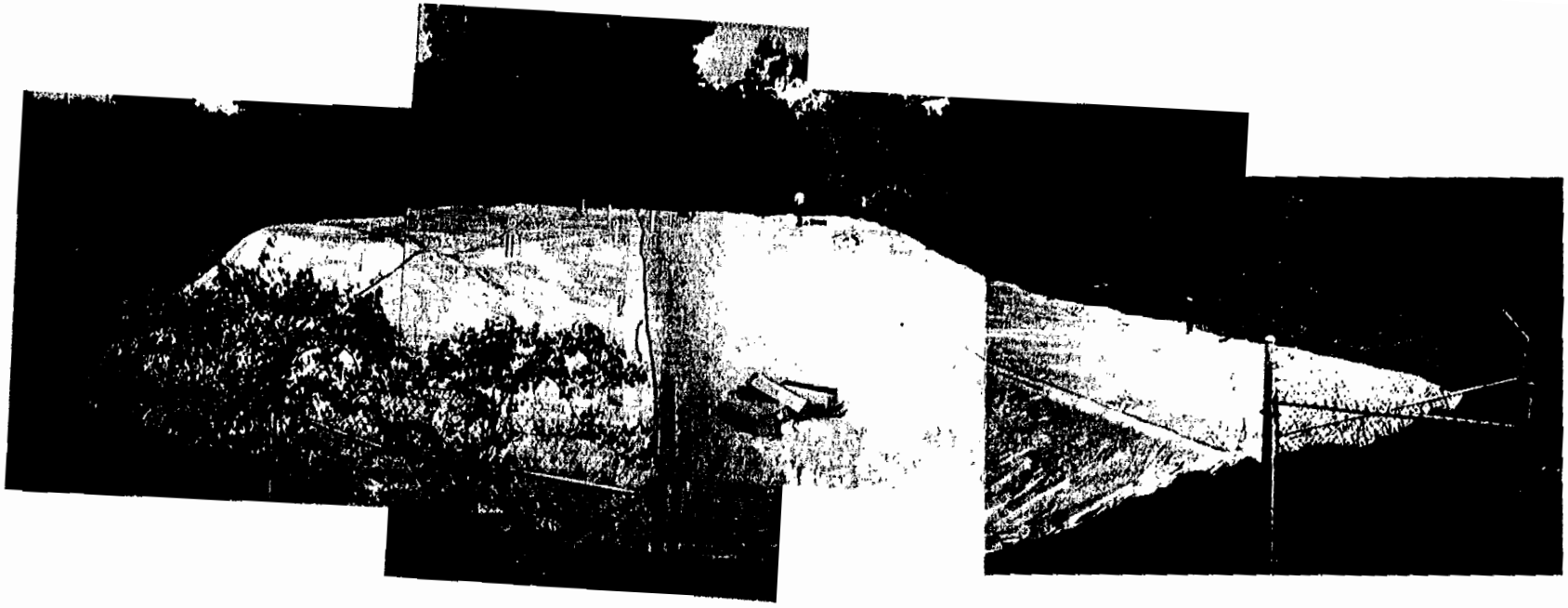
DRILLING IN PROGRESS AT SVE-01-PZO2

SPLIT SPOON SAMPLE OBTAINTED AT PZ-03 LOCATION
LARGE PROPORTION OF SAMPLE IS BLUE IN COLOR



BACKHOE INSTALLING TRENCH FOR IMPERMEABLE BARRIER INSTALLATION

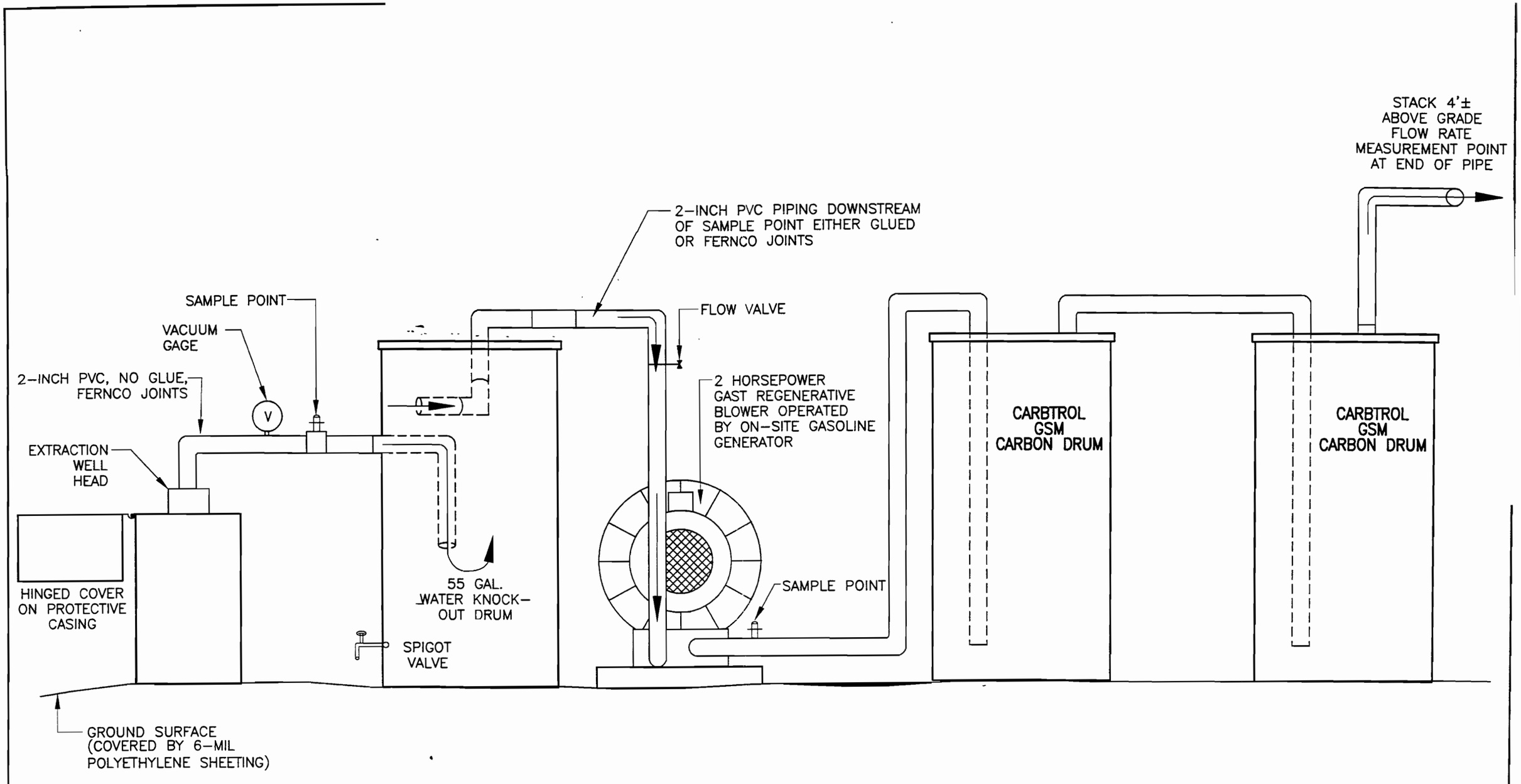
GROUND SURFACE UPON COMPLETION OF ROUGH GRADING FOR IMPERMEABLE BARRIER INSTALLATION



PANORAMIC VIEW (FACING EASTWARD FROM INNER GATE) OF
IMPERMEABLE BARRIER INSTALLATION

ATTACHMENT 4

SCHEMATIC DIAGRAM
SOIL VAPOR EXTRACTION SYSTEM



C:\STEVE\10616\PLOT 1:1\10616PCP

DEARCOP FARM NYSDEC IHWS

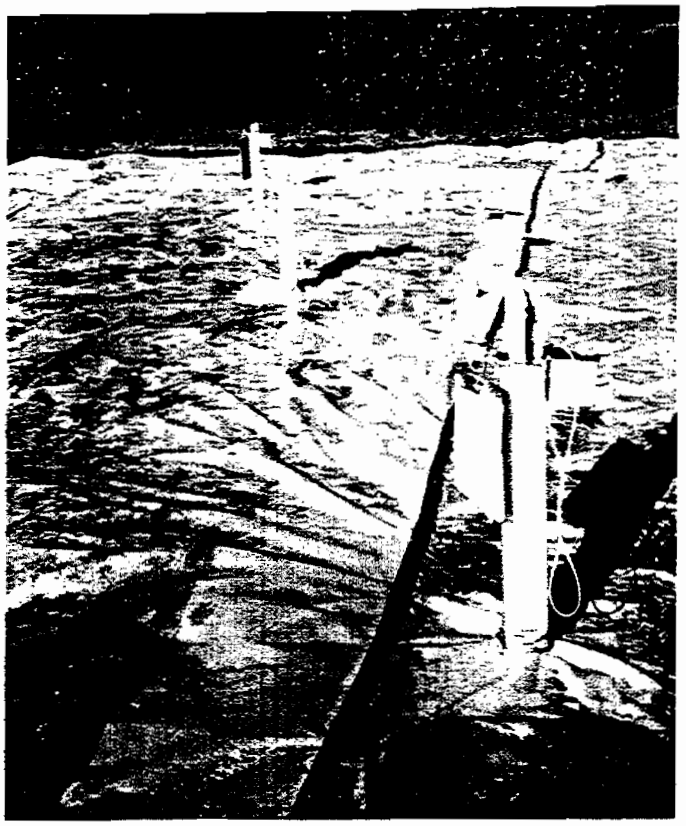
SOIL VAPOR EXTRACTION PILOT STUDY SYSTEM SCHEMATIC

DRAWING NO.	SCALE	DATE	PROJ. NO.	
FIG.	NTS	JUNE 1998	10616	LU ENGINEERS Civil and Environmental

ATTACHMENT 5

PHOTOGRAPHS
SOIL VAPOR EXTRACTION PILOT TESTING

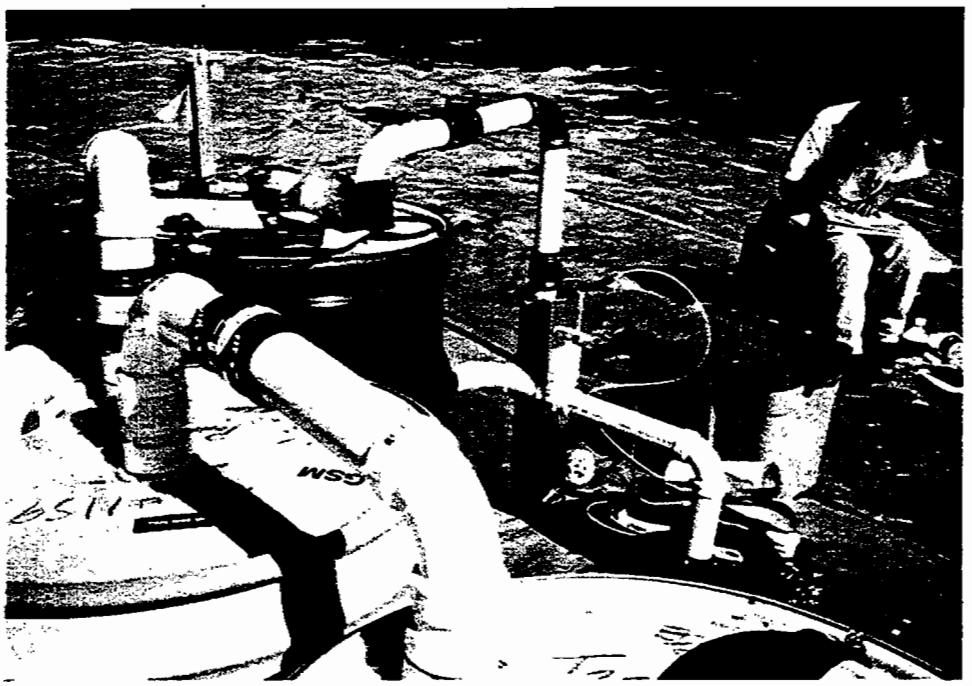
SOIL VAPOR EXTRACTION SYSTEM IN OPERATION
(FACING NORTH EAST)



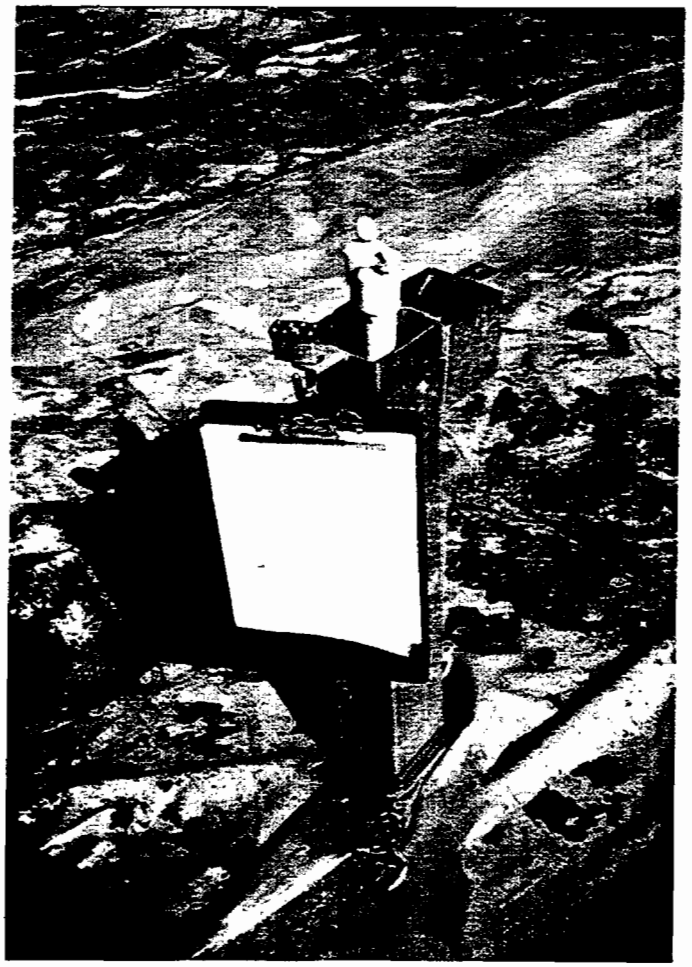
SVE-01-PZO1, 02 AND 03 DURING TESTING
(FACING EASTWARD FROM SVE-01 LOCATION)

OBTAINING VACUUM READINGS FROM NESTED PIEZOMETERS

OBTAINING TEDLAR BAG SAMPLE FROM SVE-01 EXTRACTION LINE



SOIL VAPOR EXTRACTION SYSTEM IN OPERATION
(FACING SOUTH EAST)



TYPICAL NESTED PIEZOMETER LOCATION SET UP DURING TESTING

ATTACHMENT 6

FIELD DATA LOGS
SOIL VAPOR EXTRACTION PILOT TESTING

Soil Vapor Extraction Pilot Test

Piezometer Cluster Number: SVE1-PZ01
Date: 5/27/98
Site Name: Decrop
Site Location: _____
Test Number: _____

Time	Vacuum Reading at Well Head	
	PZ-01 (S)	PZ-01 (D)
10:23	0	0
13:08	0.04 inches of water	0.03 inches of water
13:18	0.04 "	0.04 "
13:28	0.04 "	0.04 "
13:38	0.04 "	0.045 "
13:48	0.04 "	0.04 "
13:58	0.04	0.045 "
14:08	0.04 "	0.04 "
14:23	0.04 "	0.04 "
~~14:38~~ 14:38	0.04 "	0.04 "
RATE CHANGED AT	RES well.	
14:42	0.07 inches of water	0.07 inches of water
14:52	0.075 "	0.075 "
15:02	0.075 "	0.075 "
15:12	0.075 "	0.075 "
15:22	0.075 "	0.075
15:55	0.075 "	0.075 "
RATE CHANGED AT	VES WELL HEAD - 11 "of H_2O	
16:04	0.12 inches of H_2O	0.125 inches of H_2O
16:14	0.12 "	0.12 "
16:24	0.13 "	0.12 "
16:34	0.13 "	0.13 "
16:44	0.125 "	0.125 "
16:54	0.125 "	0.125 "
17:04	0.125 "	0.125 "

Soil Vapor Extraction Pilot Test

Piezometer Cluster Number: SVE1- PZ01
Date: 5/27/98
Site Name: DEARBORN
Site Location: _____
Test Number: _____

Time	Vacuum Reading at Well Head	
	PZ- 01 (S)	PZ- 01 (D)
CHANGED RATE	AT VES WELLHEAD - 18 "of H_2O	
17:15	0.16 inches of H_2O	0.155 inches of H_2O
17:25	0.16 "	0.16 "
17:35	0.16 "	0.16 "
17:45	0.165 "	0.16 "
17:55	0.16 "	0.165 "
18:05	0.165 "	0.16 "
18:15	0.16 "	0.16 "
VES SHUT DOWN at 18:33		
0 VACUUM in 30 sec.		
18:34	0.0	0.0

Soil Vapor Extraction Pilot Test

Piezometer Cluster Number: SVE-PZ02
Date: 5/27/98
Site Name: Dearcop
Site Location: _____
Test Number: _____

Time	Vacuum Reading at Well Head	
	PZ-02 (S)	PZ-02 (D)
10:25	0	0
13:10	0.03 inches of water	0.03 inches of water
13:20	0.03 "	0.035 "
13:30	0.035 "	0.04 "
13:40	0.025 "	0.035 "
13:50 DM	0.025 "	0.04 "
~~14:00~~ 14:00	0.025 "	0.035 "
14:10	0.05 "	0.035 "
14:24	0.03 "	0.04 "
14:39	0.03 "	0.035
RATE CHANGED AT VES WELL HEAD		
14:44	0.045 inches of H_2O	0.06 inches of H_2O
~~14:50~~ DM 14:54	0.05 "	0.065 "
15:03	0.045 "	0.07 "
15:14	0.05 "	0.07 "
15:24	0.05 "	0.07
15:56	0.05 "	0.07
RATE CHANGED AT VES WELL HEAD 11 inches H_2O		
16:06	0.075 inches of H_2O	0.10 inches of H_2O
16:15	0.08 "	0.105 "
16:25	0.08 "	0.105 "
16:35	0.075 "	0.105 "
16:45	0.08 "	0.105 "
16:55	0.085 "	0.105 "
17:05	0.08 "	0.11 "

Soil Vapor Extraction Pilot Test

Piezometer Cluster Number: SVE-PZ02
Date: 5/27/98
Site Name: Dearcop
Site Location: _____
Test Number: _____

Time	Vacuum Reading at Well Head	
	PZ-02(5)	PZ-02 (D)
CHANGED RATE AT VES WELL HEAD – 18" of H_2O		
17:17	0.10 inches of H_2O	0.13 inches of H_2O
17:26	0.095 "	0.135 "
17:36	0.095 "	0.13 "
17:46	0.10 "	0.135 "
17:57	0.095 "	0.135 "
18:06	0.10 "	0.14 "
18:16	0.10 "	0.135 "
VES SHUTDOWN AT 18:35		
18:35	0.0	0.0

Soil Vapor Extraction Pilot Test

Piezometer Cluster Number: SVE-PZ03
Date: 5/27/98
Site Name: Denso
Site Location: _____
Test Number: _____

Time	Vacuum Reading at Well Head	
	PZ-03 (S)	PZ-03 (D
10:26	0	0
13:11	0.025 inches of H_2O	0.025 inches H_2O
15:21	0.035 "	0.03 "
13:31	0.035 "	0.03 "
13:42	0.03 "	0.02 "
13:52	0.03 "	0.025 "
14:01	0.035 "	0.025 "
14:11	0.03 "	0.025 "
14:25	0.03 "	0.025 "
14:39	0.03	0.025
CHANGED RATE AT VES WELL HEAD		
14:47	0.06 inches of H_2O	0.06 inches of H_2O
14:55	0.06 "	0.06 "
15:05	0.055 "	0.05 "
15:15	0.06 "	0.055 "
15:25	0.065 "	0.055 "
15:57	0.06 "	0.06 "
RATE CHANGED AT VES WELL HEAD - 11 inches of H_2O		
16:08	0.10 inches of H_2O	0.10 inches of H_2O
16:17	0.10 inches of H_2O	0.10 "
16:27	0.10 "	0.10 "
16:37	0.105 "	0.105 "
16:47	0.105 "	0.105 "
16:57	0.10	0.10 "
17:07	0.10	0.10

Soil Vapor Extraction Pilot Test

Piezometer Cluster Number: SVE-PZ03
Date: 5/27/98
Site Name: Deas COD
Site Location: _____
Test Number: _____

Time	Vacuum Reading at Well Head	
	PZ-03 (S)	PZ-03 (D)
CHANGED RATE AT VES WELL HEAD - 18" of H_2O		
17:18	0.135 inches of H_2O	0.13 inches of H_2O
17:28	0.14 "	0.135 "
17:38	0.13 "	0.125 "
17:48	0.13 "	0.125 "
17:58	0.13 "	0.125 "
18:08	0.13 "	0.125 "
18:18	0.13 "	0.125 "
VES SHUTDOWN AT 18:33		
18:36	0.0	0.0

Soil Vapor Extraction Pilot Test

Date: 5/27/98
Site Name: Deer Park Fern IHWS
Site Location: Gates
Initial Barometric Pressure:
General Weather Conditions: sunny warm, light wind at of the west
Vacuum Pump Description: 2hp Gast R5, 1250 Regenerative Blower

Extraction Well Number: SVE-01
Test Number: 1
Initial Temp.: ambient 70°F

pre/post carbon in/outside of line (pre blower)

Time	Vacuum	Flow Rate	Effluent OVA Reading (in ppm)	Barometric Pressure	Temp. (°F)	Comments
13:00				1000 mbar		
13:08	~~3"~~ ~~"H2O~~	31 cfm	19ppm / 4ppm	~~1008~~ mbar		
13:15	3" H_2O	31 cfm	19ppm / 4ppm	1008 mbar	60°F in / 75° out	
13:17	~~3"~~ ~~"H2O~~	29 cfm	19ppm / 4ppm	1008	60°F in / 75° out	
13:27	~~3"~~ ~~H2O~~	30 cfm	19ppm / ~~4.0~~ ppm	1008	60°F / 82° out	
13:42	3" H_2O	24 cfm	14ppm / 3.5ppm	1008	60°F / 82° out	
13:~~50~~	3" H_2O ~~3.25" H2O~~	24 cfm	14ppm / 3.5ppm	1008	60°F / 82° out	
14:00	3.25" H_2O	31 cfm	14ppm / 3.5ppm	1002	60°F / 83° out	
14:10	3.25" H_2O	31 cfm	13.5ppm / 3.5ppm	1000	60°F / 86° out	
14:14	3.0" H_2O	32 cfm	12.0ppm / 3.5ppm	995	60°F / 88° out	

Soil Vapor Extraction Pilot Test

Date: 5/27/98
Site Name: Deer Lop
Site Location: [redacted]
Initial Barometric Pressure:
General Weather Conditions: Sunny mid 80's, light west wind
Vacuum Pump Description: 2hp Gast R5, 125Q Regenerative Blower

Extraction Well Number: SVE-01
Test Number: 2
Initial Temp.: See p. #1

pre / post in / outside of line (pre blower)

Time	Vacuum	Flow Rate	Effluent OVA Reading (in ppm)	Barometric Pressure	Temp. (° C)	Comments
14:44	6" H_2O	51 cfm	13ppm / 3.5ppm	1000 mbar	59°in	/ 81° out stepped up vacuum by 3 1/8
14:52	6.25" H_2O	52 cfm	12ppm / 3.5ppm	1000 mbar	59°in	/ 88° out 17.6% O_2 pre cert
15:04	6.5" H_2O	53 cfm	12ppm / 3.5ppm	1000 mbar	58°in	/ 88° out
15:10	—	→	8ppm bag (pre blower)			tedlar bag sample
15:17	6.5" H_2O	53 cfm	12ppm / 3.5ppm	1000 mbar	58°in	/ 88° out
15:27	6.5" H_2O	53 cfm	12ppm / 3.5ppm	1000 mbar	58°in	/ 88° out
15:50	6.5" H_2O	53 cfm	12ppm / 4.0ppm	1000 mbar	58°in	/ 88° out

Soil Vapor Extraction Pilot Test

Date: 5/27/98
Site Name: Deer op
Site Location:
Initial Barometric Pressure:
General Weather Conditions: Sunny, light west wind
Vacuum Pump Description: 2hp Gast R5-125Q Regenerative Blower

Extraction Well Number: SVE-01
Test Number: 3
Initial Temp.:

pre / post carbon in / outside of line (pre blower)

Time	Vacuum	Flow Rate	Effluent OVA Reading (in ppm)	Barometric Pressure	Temp. (°F)	Comments
16:03	11.25"H_2O	80cfm	12ppm / 3.5ppm	998 millibar	57°in / 84°out	stepped up to 11"H_2O
16:17	11.5"H_2O	81cfm	11.5ppm / 3.5ppm	1000	56°in /	82°out
16:24	11.5"H_2O	81cfm	11.0ppm / 3.5ppm 7ppm on tedlar bag	1002 from sample port	56°in /	80°out
16:33	11.5"H_2O	80cfm	11.0ppm / 3.5ppm	1002	56°in /	79°out
16:50	11.75"H_2O	80cfm	12ppm / 3.5ppm	1004	56°in / 80°out	checked PZ-02 no response (screen is below H_2O)
16:57	11.75H_2O	80cfm	11ppm / 3.5ppm	1004	56°in / 78°out	
17:04	11.75H_2O	82cfm	11ppm / 3.5ppm	1004	56°in / 80°out	

Soil Vapor Extraction Pilot Test

Date: 5/27/98
Site Name: Decrop
Site Location:
Initial Barometric Pressure: 1002 milibars
General Weather Conditions: sunny, light wind out of west
Vacuum Pump Description: 2 hp Gast R5 125Q Regenerative Blower

Extraction Well Number: SVE-01
Test Number: 4
Initial Temp.: 80° ambient
pre / post carbon in / outside of line (pre-blower)

Time	Vacuum	Flow Rate	Effluent OVA Reading (in ppm)	Barometric Pressure	Temp. (°F)	Comments
17:15	15" H_2O	98cfm	12.0ppm / 3.5ppm	1002milibars	56°in /	79°out begin 4th step test system is now "wide open"
17:23	—	—	—	—	→	O² level / precarbon = 16.7%
17:25	15" H_2O	98 cfm	12.00ppm / 3.5ppm	1000	56°in /	80°out PZ-01: 11.68 btc. / 9.2 bgs. *
17:35	15" H_2O	95 cfm	12.0ppm / 3.5ppm	1002	55°in /	79°out
17:45	15" H_2O	98 cfm	12.0ppm / 3.5ppm	1002	55°in /	80°out
17:57	15" H_2O	95cfm	12.0ppm / 3.5ppm	1002	55°in /	80°out
18:05	15" H_2O	95cfm	12.0ppm / 3.5ppm	1002	55°in /	80°out
18:15	15" H_2O	97 cfm	12.0ppm / 3.5ppm	1002	55°in /	79°out
18:32	—	—	—	—	→	109°F on effluent prior to shutdown
18:33	—	—	—	—	→	shut down system

* AT 19:26 WATER LEVEL PZ-01
TOC 11.67
Bdowgrade 9.1

C

Laboratory Data

July 14, 1998

parratt wolff inc

Mr. Jon Sundquist
Ecology and Environment, Inc.
368 Pleasant View Drive
Lancaster, New York 14086

Re: L-98087
Laboratory Testing
PO #124182

Dear Mr. Sundquist:

Enclosed are the results of laboratory testing performed at your request on four Shelby tube soil samples delivered to our laboratory on June 11, 1998 for the above referenced project. Results include:

1.	Natural Moisture Content ASTM D2216	4 each
2.	Sieve Analysis ASTM D422 & D1140	4 each
3.	Hydrometer Analysis ASTM D422	1 each
4.	Hydraulic Conductivity - Flexible Wall ASTM D5084	4 each
5.	Bulk (Natural) Soil Density- Corps of Engineers EM-1110-2-1906 Appendix II, Displacement Method	1 each

All requested tests have been completed on the previously received sample(s) for the above project. All sample remains are scheduled to be disposed of on August 14, 1998. Please notify Parratt-Wolff, Inc. by letter or telephone prior to August 14,1998 if you would prefer to pick up the sample(s) or that the sample(s) be retained by Parratt-Wolff, Inc. for an additional period of time.

Thank you for this opportunity to work with you.

Very truly yours,

PARRATT - WOLFF, INC.

Virginia J. Thoma
Assistant Laboratory Manager
VJT/bap
encs:

C:MSWORKS\LETTERS\98\98087.WPS

☑ P.O. Box 56, 5879 Fisher Road, East Syracuse, NY 13057 Telephone 315-437-1429 or 800-782-7260 FAX 315-437-1770
☐ P.O. Box 1029, 501 Millstone Drive, Hillsborough, NC 27278 Telephone 919-644-2814 or 800-627-7920 FAX 919-644-2817

July 14, 1998

L-98087
Laboratory Testing
PO # 124182

NATURAL MOISTURE CONTENT
ASTM D2216

Lab I.D. #	Sample	Depth (feet)	Moisture Content as a Percent of Dry Weight
10999	SVE 1	4.0-6.0	26.5
11000	SVE-1 PZ1	4.0-7.8	5.0
11001	SVE-1 PZ2	6.0-8.0	10.3
11002	SVE-1 PZ3	4.0-6.0	21.7

Barratt Wolff Inc

SIEVE ANALYSIS OF SOIL / AGGREGATE

PROJECT TITLE Laboratory Testing -PO # 124182

PROJECT # L-98087

TEST METHOD ASTM D422 & D1140

REPORT # 1

REPORT DATE July 14, 19

Lab I.D. #	Sample	Depth (feet)	Sieve Size - Percent Passing Sieve													
			1 1/2"	1"	3/4"	1/2"	3/8"	1/4"	#4	#10	#30	#40	#60	#100	#200	
10999	SVE-1	4.0-6.0	--	--	100	99.6	96.4	89.7	86.4	81.4	70.8	66.4	45.2	24.8	14.7	
11000	SVE-1 PZ1	4.0-7.8	100	94.0	94.0	93.1	92.0	90.5	89.7	87.0	83.1	79.3	46.4	19.6	9.3	
11001	SVE-1 PZ2	6.0-8.0	100	98.1	96.0	95.6	94.5	93.1	92.2	90.6	85.3	81.7	53.9	25.9	12.0	
11002	SVE-1 PZ3	6.0-6.0	--	--	--	100	99.4	98.4	98.1	97.5	96.3	95.0	79.0	58.5	42.0	

Sample mass, as received, meets minimum requirements of test method: Yes ____ No X

Prewashed: Yes X No ____

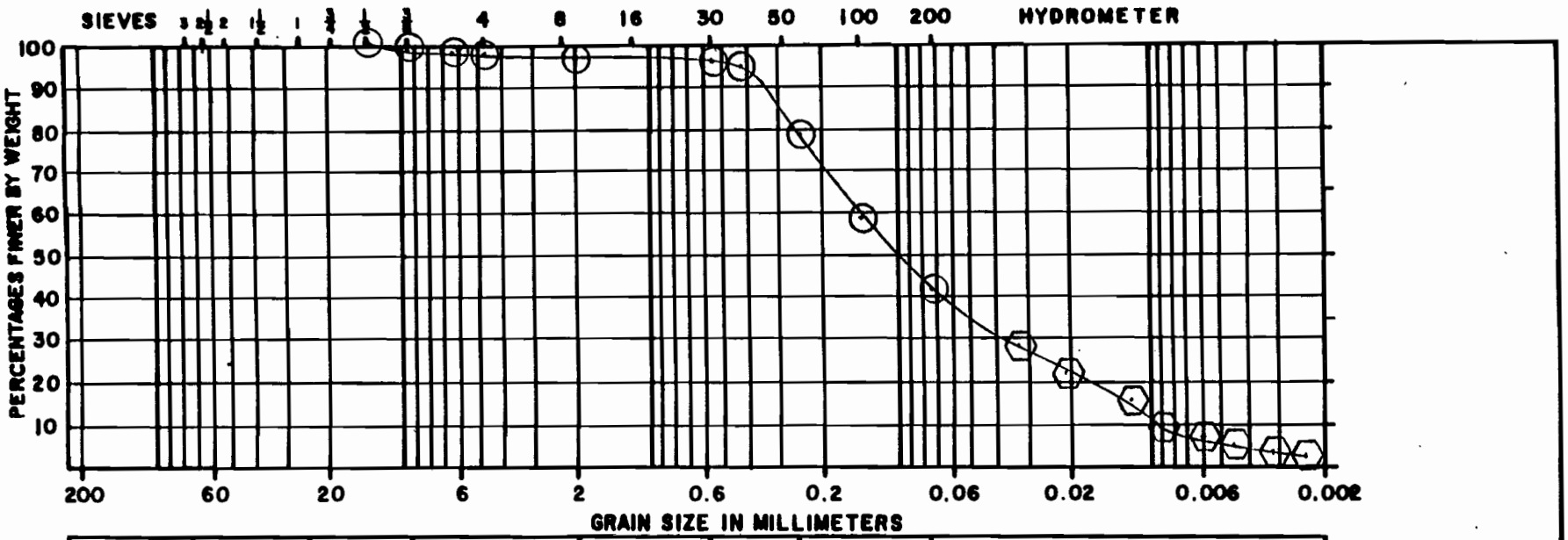
Remarks:

Performed By: LS

Checked By: V. J. Thoma

c:msworks\sieve\97\97002

GRAIN SIZE ANALYSIS



parratt wolff inc
FISHER RD. EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

JOB NO. L-98087
REPORT NO. 1
July 14, 1998

L-98087
Laboratory Testing
PO # 124182

Lab I.D. #: 11002
Sample: SVE-1 PZ3
Depth: 4.0'-6.0'

⊙ Sieve Analysis ASTM D422 & D1140
⬡ Hydrometer Analysis ASTM D422

Report Date: July 14, 1998

Test Start Date: 6/19/98

Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D5084

Ecology & Environment

Project No: L-98087 / Project Title: Laboratory Testing PO # 124182

ST No: -- / Lab ID#: 10999 / Test Sample Location: SVE-1

Depth/Lift/Elev.: 4.0'-6.0' / Type of Sample: Undisturbed -- Remolded X

Method of Compaction: -- (1) / Percent Compaction: --

Dry Unit Weight (PCF): Maximum: -- Initial: 102.7 / Moisture Content (% of Dry Weight): Optimum: -- Initial: 5.8

Initial Height (cm): 6.50 / Initial Diameter (cm): 7.20 / Initial Gradient: 32.5

Initial Degree of Saturation (B Value)(%): -- / Permeant Liquid Used: Deaired Deionized H_2O

Confining Pressure (PSI): 71.0 / Test (head) Pressure (PSI): 68.0 / Tail (back) Pressure (PSI): 65.0

Final Degree Of Saturation (B Value)(%): 96 / Final Dry Unit Weight (PCF): 98.5 / Final Gradient: 29.7

Final Height (cm): 7.10 / Final Diameter (cm): 7.05 / Final Moisture Content (% of Dry Weight): 28.2

Final Four Determinations k (cm/sec)

1.25×10^{-4}	1.25×10^{-4}	1.23×10^{-4}	1.23×10^{-4}

Mean Value of Final Four Consecutive Determinations:

Coefficient of Permeability k (cm/sec): 1.24×10^{-4} Project Specifications: --

Notes: (1) As necessary to acheive target density.

Report Date: July 14, 1998

Test Start Date: 6/19/98

Measurement of Hydraulic Conductivity
of Saturated Porous Materials
Using a Flexible Wall Permeameter
ASTM D5084

Ecology & Environment

Project No: L-98087 / Project Title: Laboratory Testing PO # 124182

ST No: -- / Lab ID#: 11000 / Test Sample Location: SVE-1 PZ1

Depth/Lift/Elev.: 4.0'-7.8' / Type of Sample: Undisturbed X Remolded --

Method of Compaction: -- / Percent Compaction: --

Dry Unit Weight (PCF): Maximum: -- Initial: 102.2 / Moisture Content (% of Dry Weight): Optimum: -- Initial: 5.0

Initial Height (cm): 12.8 / Initial Diameter (cm): 7.2 / Initial Gradient: 22.0

Initial Degree of Saturation (B Value)(%): -- / Permeant Liquid Used: Deaired Deionized H_2

Confining Pressure (PSI): 71.0 / Test (head) Pressure (PSI): 68.0 / Tail (back) Pressure (PSI): 64.0

Final Degree Of Saturation (B Value)(%): 96 / Final Dry Unit Weight (PCF): 110.7 / Final Gradient: 22.8

Final Height (cm): 12.33 / Final Diameter (cm): 7.05 / Final Moisture Content (% of Dry Weight): 23.5

Final Four Determinations k (cm/sec)

8.19×10^{-4} | 8.19×10^{-4} | 8.19×10^{-4} | 8.19×10^{-4}

Mean Value of Final Four Consecutive Determinations:

Coefficient of Permeability k (cm/sec): 8.19×10^{-4} Project Specifications: --

Notes:

Report Date: July 14, 1998

Test Start Date: 6/19/98

Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D5084

Ecology & Environment

Project No: L-98087 / Project Title: Laboratory Testing PO # 124182

ST No: -- / Lab ID#: 11001 / Test Sample Location: SVE-1 PZ2

Depth/Lift/Elev.: 6.0'-8.0' / Type of Sample: Undisturbed X Remolded --

Method of Compaction: -- / Percent Compaction: --

Dry Unit Weight (PCF): Maximum: -- Initial: 122.1 / Moisture Content (% of Dry Weight): Optimum: -- Initial: 10.3

Initial Height (cm): 11.70 / Initial Diameter (cm): 7.20 / Initial Gradient: 24.1

Initial Degree of Saturation (B Value)(%): -- / Permeant Liquid Used: Deaired Deionized H_2O

Confining Pressure (PSI): 71.0 / Test (head) Pressure (PSI): 68.0 / Tail (back) Pressure (PSI): 64.0

Final Degree Of Saturation (B Value)(%): 98 / Final Dry Unit Weight (PCF): 123.8 / Final Gradient: 24.1

Final Height (cm): 11.70 / Final Diameter (cm): 7.15 / Final Moisture Content (% of Dry Weight): 18.0

Final Four Determinations k (cm/sec)

6.60×10^{-4}	6.60×10^{-4}	6.60×10^{-4}	6.60×10^{-4}

Mean Value of Final Four Consecutive Determinations:

Coefficient of Permeability k (cm/sec): 6.60×10^{-4} Project Specifications: --

Notes:

Report Date: July 14, 1998

Test Start Date: 6/19/98

Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D5084

Ecology & Environment

Project No: L-98087 / Project Title: Laboratory Testing PO # 124182

ST No: -- / Lab ID#: 11002 / Test Sample Location: SVE-1 PZ3

Depth/Lift/Elev.: 4.0'-6.0' / Type of Sample: Undisturbed X Remolded --

Method of Compaction: -- / Percent Compaction: --

Dry Unit Weight (PCF): Maximum: -- Initial: 95.8 / Moisture Content (% of Dry Weight): Optimum: -- Initial: 21.7

Initial Height (cm): 7.14 / Initial Diameter (cm): 7.05 / Initial Gradient: 39.4

Initial Degree of Saturation (B Value)(%): -- / Permeant Liquid Used: Deaired Deionized H_2O

Confining Pressure (PSI): 71.0 / Test (head) Pressure (PSI): 68.0 / Tail (back) Pressure (PSI): 64.0

Final Degree Of Saturation (B Value)(%): 96 / Final Dry Unit Weight (PCF): 96.0 / Final Gradient: 38.4

Final Height (cm): 7.33 / Final Diameter (cm): 6.95 / Final Moisture Content (% of Dry Weight): 24.2

Final Four Determinations k (cm/sec)

1.40×10^{-5} 1.38×10^{-5} 1.38×10^{-5} 1.39×10^{-5}

Mean Value of Final Four Consecutive Determinations:

Coefficient of Permeability k (cm/sec): 1.38×10^{-5} Project Specifications: --

Notes:

parratt wolff inc

July 14, 1998

L-98087
Laboratory Testing
PO #124182

BULK(NATURAL) SOIL DENSITY
CORPS OF ENGINEERS EM-1110-2-1906 APPENDIX II,
DISPLACEMENT METHOD

Lab I.D. #	Sample I.D.	Depth (feet)	(Bulk (Natural) Soil Density (PCF) Dry Density	Moist Density
10999	SVE-1	4.0-6.0	102.7 (1)	108.7

(1) Average of two determinations.

July 14, 1998

L-98087
Laboratory Testing
PO # 124182

NATURAL MOISTURE CONTENT
ASTM D2216

Lab I.D. #	Sample	Depth (feet)	Moisture Content as a Percent of Dry Weight
10999	SVE 1	4.0-6.0	26.5
11000	SVE-1 PZ1	4.0-7.8	5.0
11001	SVE-1 PZ2	6.0-8.0	10.3
11002	SVE-1 PZ3	4.0-6.0	21.7

parratt wolff inc

SIEVE ANALYSIS OF SOIL / AGGREGATE

PROJECT TITLE Laboratory Testing -PO # 124182

PROJECT # L-98087

TEST METHOD ASTM D422 & D1140

REPORT # 1

REPORT DATE July 14, 1998

			Sieve Size - Percent Passing Sieve													
Lab I.D. #	Sample	Depth (feet)	1 1/2"	1"	3/4"	1/2"	3/8"	1/4"	#4	#10	#30	#40	#60	#100	#200	
10999	SVE-1	4.0-6.0	--	--	100	99.6	96.4	89.7	86.4	81.4	70.8	66.4	45.2	24.8	14.7	
11000	SVE-1 PZ1	4.0-7.8	100	94.0	94.0	93.1	92.0	90.5	89.7	87.0	83.1	79.3	46.4	19.6	9.3	
11001	SVE-1 PZ2	6.0-8.0	100	98.1	96.0	95.6	94.5	93.1	92.2	90.6	85.3	81.7	53.9	25.9	12.0	
11002	SVE-1 PZ3	6.0-6.0	--	--	--	100	99.4	98.4	98.1	97.5	96.3	95.0	79.0	58.5	42.0	

Sample mass, as received, meets minimum requirements of test method: Yes ____ No X

Prewashed: Yes X No ____

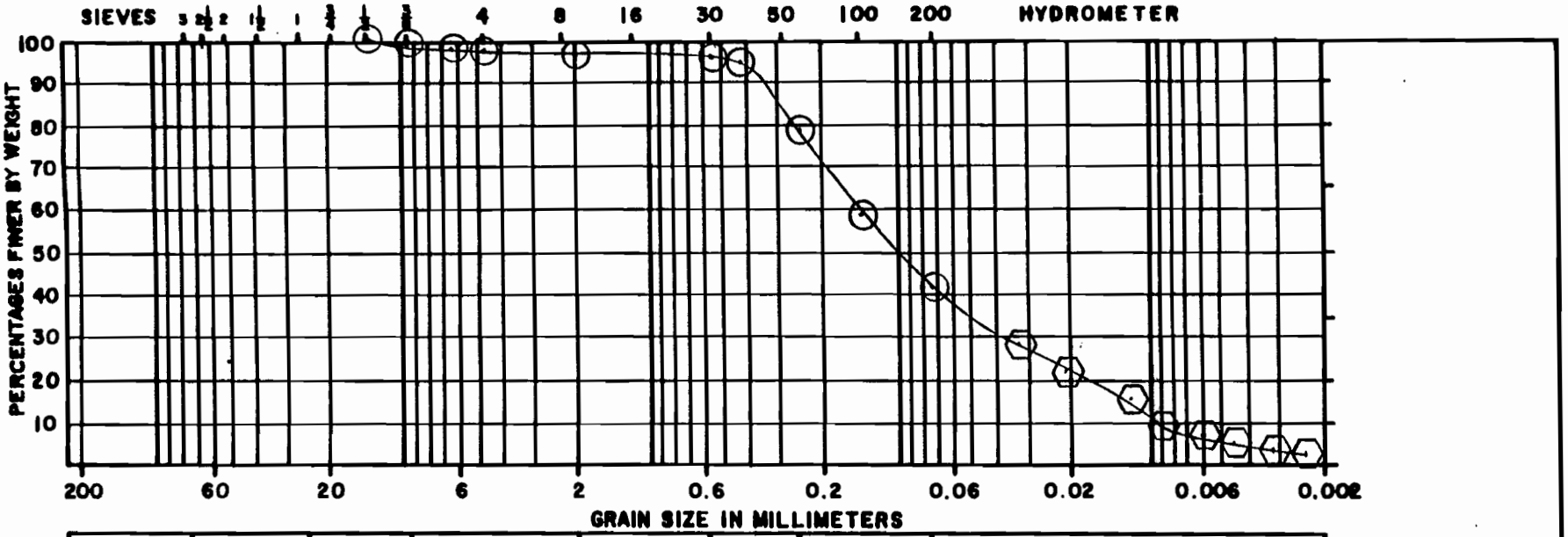
Remarks:

Performed By: LS

Checked By: V. J. Thoma

c:msworks\sieve\97\97002

GRAIN SIZE ANALYSIS



L-98087

Laboratory Testing

PO # 124182

Lab I.D. #: 11002

Sample: SVE-1 PZ3

Depth: 4.0'-6.0'

○ Sieve Analysis ASTM D422 & D1140

⬡ Hydrometer Analysis ASTM D422

parratt wolff inc

FISHER RD., EAST SYRACUSE, N.Y. 13057

TELEPHONE AREA CODE 315/437-1429

JOB NO. L-98087

REPORT NO. 1

July 14, 1998

Report Date: July 14, 1998

Test Start Date 6/19/98

Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D5084

Ecology & Environment

Project No: L-98087 / Project Title: Laboratory Testing PO # 124182

ST No: -- / Lab ID#: 10999 / Test Sample Location: SVE-1

Depth/Lift/Elev.: 4.0'-6.0' / Type of Sample: Undisturbed -- Remolded X

Method of Compaction: (1) / Percent Compaction: --

Dry Unit Weight (PCF): Maximum: -- Initial: 102.7 / Moisture Content (% of Dry Weight): Optimum: -- Initial: 5.8

Initial Height (cm): 6.50 / Initial Diameter (cm): 7.20 / Initial Gradient: 32.5

Initial Degree of Saturation (B Value)(%): -- / Permeant Liquid Used: Deaired Deionized H_2O

Confining Pressure (PSI): 71.0 / Test (head) Pressure (PSI): 68.0 / Tail (back) Pressure (PSI): 65.0

Final Degree Of Saturation (B Value)(%): 96 / Final Dry Unit Weight (PCF): 98.5 / Final Gradient: 29.7

Final Height (cm): 7.10 / Final Diameter (cm): 7.05 / Final Moisture Content (% of Dry Weight): 28.2

Final Four Determinations k (cm/sec)

1.25×10^{-4} 1.25×10^{-4} 1.23×10^{-4} 1.23×10^{-4}

Mean Value of Final Four Consecutive Determinations:

Coefficient of Permeability k (cm/sec): 1.24×10^{-4} Project Specifications: --

Notes: (1) As necessary to acheive target density.

Report Date: July 14, 1998

Test Start Date: 6/19/98

Measurement of Hydraulic Conductivity
of Saturated Porous Materials
Using a Flexible Wall Permeameter
ASTM D5084

Ecology & Environment

Project No: L-98087 / Project Title: Laboratory Testing PO # 124182

ST No: -- / Lab ID#: 11000 / Test Sample Location: SVE-1 PZ1

Depth/Lift/Elev.: 4.0'-7.8' / Type of Sample: Undisturbed X Remolded --

Method of Compaction: -- / Percent Compaction: --

Dry Unit Weight (PCF): Maximum: -- Initial: 102.2 / Moisture Content (% of Dry Weight): Optimum: -- Initial: 5.0

Initial Height (cm): 12.8 / Initial Diameter (cm): 7.2 / Initial Gradient: 22.0

Initial Degree of Saturation (B Value)(%): -- / Permeant Liquid Used: Deaired Deionized H

Confining Pressure (PSI): 71.0 / Test (head) Pressure (PSI): 68.0 / Tail (back) Pressure (PSI): 64.0

Final Degree Of Saturation (B Value)(%): 96 / Final Dry Unit Weight (PCF): 110.7 / Final Gradient: 22.8

Final Height (cm): 12.33 / Final Diameter (cm): 7.05 / Final Moisture Content (% of Dry Weight): 23.5

Final Four Determinations k (cm/sec)

8.19×10^{-4} | 8.19×10^{-4} | 8.19×10^{-4} | 8.19×10^{-4}

Mean Value of Final Four Consecutive Determinations:

Coefficient of Permeability k (cm/sec): 8.19×10^{-4} Project Specifications: --

Notes:

Report Date: July 14, 1998

Test Start Date: 6/19/98

Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D5084

Ecology & Environment

Project No: L-98087 / Project Title: Laboratory Testing PO # 124182

ST No: -- / Lab ID#: 11001 / Test Sample Location: SVE-1 PZ2

Depth/Lift/Elev.: 6.0'-8.0' / Type of Sample: Undisturbed X Remolded --

Method of Compaction: -- / Percent Compaction: --

Dry Unit Weight (PCF): Maximum: -- Initial: 122.1 / Moisture Content (% of Dry Weight): Optimum: -- Initial: 10.3

Initial Height (cm): 11.70 / Initial Diameter (cm): 7.20 / Initial Gradient: 24.1

Initial Degree of Saturation (B Value)(%): -- / Permeant Liquid Used: Deaired Deionized H_2O

Confining Pressure (PSI): 71.0 / Test (head) Pressure (PSI): 68.0 / Tail (back) Pressure (PSI): 64.0

Final Degree Of Saturation (B Value)(%): 98 / Final Dry Unit Weight (PCF): 123.8 / Final Gradient: 24.1

Final Height (cm): 11.70 / Final Diameter (cm): 7.15 / Final Moisture Content (% of Dry Weight): 18.0

Final Four Determinations k (cm/sec)

6.60×10^{-4}	6.60×10^{-4}	6.60×10^{-4}	6.60×10^{-4}

Mean Value of Final Four Consecutive Determinations:

Coefficient of Permeability k (cm/sec): 6.60×10^{-4} Project Specifications: --

Notes:

Report Date: July 14, 1998

Test Start Date: 6/19/98

Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter ASTM D5084

Ecology & Environment

Project No: L-98087 / Project Title: Laboratory Testing PO # 124182

ST No: -- / Lab ID#: 11002 / Test Sample Location: SVE-1 PZ3

Depth/Lift/Elev.: 4.0'-6.0' / Type of Sample: Undisturbed X Remolded --

Method of Compaction: -- / Percent Compaction: --

Dry Unit Weight (PCF): Maximum: -- Initial: 95.8 / Moisture Content (% of Dry Weight): Optimum: -- Initial: 21.7

Initial Height (cm): 7.14 / Initial Diameter (cm): 7.05 / Initial Gradient: 39.4

Initial Degree of Saturation (B Value)(%): -- / Permeant Liquid Used: Deaired Deionized H_2O

Confining Pressure (PSI): 71.0 / Test (head) Pressure (PSI): 68.0 / Tail (back) Pressure (PSI): 64.0

Final Degree Of Saturation (B Value)(%): 96 / Final Dry Unit Weight (PCF): 96.0 / Final Gradient: 38.4

Final Height (cm): 7.33 / Final Diameter (cm): 6.95 / Final Moisture Content (% of Dry Weight): 24.2

Final Four Determinations k (cm/sec)

1.40×10^{-5} 1.38×10^{-5} 1.38×10^{-5} 1.39×10^{-5}

Mean Value of Final Four Consecutive Determinations:

Coefficient of Permeability k (cm/sec): 1.38×10^{-5} Project Specifications: --

Notes:

parratt wolff inc

July 14, 1998

L-98087
Laboratory Testing
PO #124182

BULK(NATURAL) SOIL DENSITY
CORPS OF ENGINEERS EM-1110-2-1906 APPENDIX II,
DISPLACEMENT METHOD

Lab I.D. #	Sample I.D.	Depth (feet)	(Bulk (Natural) Soil Density (PCF) Dry Density	Moist Density
10999	SVE-1	4.0-6.0	102.7 (1)	108.7

(1) Average of two determinations.

ecology and environment, inc.
International Specialists in the Environment

ANALYTICAL SERVICES CENTER
4493 Walden Avenue
Lancaster, New York 14086
Tel. (716) 685-8080, Fax: (716) 685-0852

MEMORANDUM

To: Jon Sundquist - E & E, Buffalo

From: Tony Bogolin - E & E, ASC

Date: July 1, 1998

SUBJECT: Dearcop Farm

RE: 9801.144

CC: Lab File

Results for the following samples subcontracted for Method TO-14 air analysis are included in the attached report:

E&E SAMPLE ID	CLIENT ID
7750	AMB-1
7751	SVE-1
7752	SVE-2
7753	SVE-3
7754	SVE-4
7755	SVE-5
7756	SVE-6
7757	SVE-7
7758	SVE-8
7759	SVE-9

This completes Job 9801.144

TB/bk
Enclosure

Performance Analytical Inc.
Air Quality Laboratory

LABORATORY REPORT

Client:	ECOLOGY & ENVIRONMENT, INC.	Date of Report:	06/29/98
Address:	4493 Walden Avenue	Date Received:	05/28/98
	Lancaster, NY 14086	PAI Project No:	P9800887
Contact:	Mr. Tony Bogolin	Purchase Order:	Verbal
Client Project ID:	Dearcop Farm #QT9	New York ELAP ID:	11221

Ten (10) Tedlar Bag Samples labeled: "AMB-1" and "SVE-1" through "SVE-9"

The samples were received at the laboratory under chain of custody on May 28, 1998. The samples were received intact. The dates of analyses are indicated on the attached data sheets.

Volatile Organic Compound Analysis

The samples were analyzed by combined gas chromatography/mass spectrometry (GC/MS) for selected volatile organic compounds. The analyses were performed according to the methodology outlined in EPA Method TO-14 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, EPA 600/4-84-041, U.S. Environmental Protection Agency, Research Triangle Park, NC, April, 1984 and May, 1988. The method was modified for using Tedlar bags. The analyses were performed by gas chromatography/mass spectrometry, utilizing a direct cryogenic trapping technique. The analytical system used was comprised of a Hewlett Packard Model 5973 GC/MS/DS interfaced to a Tekmar AutoCan Elite whole air inlet system/cryogenic concentrator. A 100% Dimethylpolysiloxane capillary column (RT_x-1, Restek Corporation, Bellefonte, PA) was used to achieve chromatographic separation.

The results of analyses are given on the attached data sheets.

Data Release Authorization:

Cindy Yoon

Cindy Yoon
Analytical Chemist

Reviewed and Approved:

Michael Tuday
Laboratory Director

RESULTS OF VOLATILE ORGANIC ANALYSIS

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : AMB-1
PAI Sample ID : P9800887-001

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.200 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m^3	REPORTING LIMIT ug/m^3	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	5.0	ND	2.0
75-00-3	Chloroethane	ND	5.0	ND	1.9
75-35-4	1,1-Dichloroethene	ND	5.0	ND	1.3
75-09-2	Methylene Chloride	13	5.0	3.7	1.4
156-60-5	trans-1,2-Dichloroethene	ND	5.0	ND	1.3
75-34-3	1,1-Dichloroethane	ND	5.0	ND	1.2
156-59-2	cis-1,2-Dichloroethene	ND	5.0	ND	1.3
107-06-2	1,2-Dichloroethane	ND	5.0	ND	1.2
71-55-6	1,1,1-Trichloroethane	2.7 TR	5.0	0.49 TR	0.92
71-43-2	Benzene	ND	5.0	ND	1.6
79-01-6	Trichloroethene	5.3	5.0	0.99	0.93
108-88-3	Toluene	24	5.0	6.4	1.3
100-41-4	Ethylbenzene	3.1 TR	5.0	0.71 TR	1.2
1330-20-7	m- & p-Xylene	7.0	5.0	1.6	1.2
95-47-6	o-Xylene	ND	5.0	ND	1.2

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RG **Date:** 6/15/98

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-1
PAI Sample ID : P9800887-002

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	9,800	200	2,400	49
156-59-2	cis-1,2-Dichloroethene	860	200	220	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	8,800	200	1,600	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	8,600	200	1,600	37
108-88-3	Toluene	110 TR	200	28 TR	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	ND	200	ND	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RC **Date:** 6/5/98

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-1
PAI Sample ID : P9800887-002 (Laboratory Duplicate)

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	9,600	200	2,400	49
156-59-2	cis-1,2-Dichloroethene	820	200	210	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	8,700	200	1,600	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	8,300	200	1,500	37
108-88-3	Toluene	120 TR	200	32 TR	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	ND	200	ND	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RG **Date:** 6/15/98

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-2
PAI Sample ID : P9800887-003

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m^3	REPORTING LIMIT ug/m^3	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	7,300	200	1,800	49
156-59-2	cis-1,2-Dichloroethene	730	200	180	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	7,600	200	1,400	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	11,000	200	2,000	37
108-88-3	Toluene	ND	200	ND	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	ND	200	ND	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RC **Date:** 6/15/98

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-3
PAI Sample ID : P9800887-004

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m^3	REPORTING LIMIT ug/m^3	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	6,900	200	1,700	49
156-59-2	cis-1,2-Dichloroethene	680	200	170	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	7,200	200	1,300	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	11,000	200	2,000	37
108-88-3	Toluene	ND	200	ND	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	ND	200	ND	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RG **Date:** 6/15/98

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-4
PAI Sample ID : P9800887-005

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m^3	REPORTING LIMIT ug/m^3	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	6,700	200	1,700	49
156-59-2	cis-1,2-Dichloroethene	680	200	170	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	7,400	200	1,400	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	11,000	200	2,100	37
108-88-3	Toluene	ND	200	ND	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	ND	200	ND	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RC- **Date:** 6/15/98

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1339 • Fax 818 709-2915

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-5
PAI Sample ID : P9800887-006

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m^3	REPORTING LIMIT ug/m^3	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	5,300	200	1,300	49
156-59-2	cis-1,2-Dichloroethene	530	200	130	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	5,900	200	1,100	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	9,100	200	1,700	37
108-88-3	Toluene	110 TR	200	29 TR	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	ND	200	ND	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RG **Date:** 6/15/98

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-6
PAI Sample ID : P9800887-007

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.020 (liters)
0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m^3	REPORTING LIMIT ug/m^3	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	50	50	20	20
75-00-3	Chloroethane	ND	50	ND	19
75-35-4	1,1-Dichloroethene	36 TR	50	9.1 TR	13
75-09-2	Methylene Chloride	ND	50	ND	14
156-60-5	trans-1,2-Dichloroethene	42 TR	50	11 TR	13
75-34-3	1,1-Dichloroethane	3,600	50	900	12
156-59-2	cis-1,2-Dichloroethene	400	50	100	13
107-06-2	1,2-Dichloroethane	ND	50	ND	12
71-55-6	1,1,1-Trichloroethane	4,000	50	730	9.2
71-43-2	Benzene	ND	50	ND	16
79-01-6	Trichloroethene	7,900	50	1,500	9.3
108-88-3	Toluene	ND	50	ND	13
100-41-4	Ethylbenzene	ND	50	ND	12
1330-20-7	m- & p-Xylene	ND	50	ND	12
95-47-6	o-Xylene	ND	50	ND	12

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RC **Date:** 6/15/98

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-7
PAI Sample ID : P9800887-008

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m^3	REPORTING LIMIT ug/m^3	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	3,600	200	900	49
156-59-2	cis-1,2-Dichloroethene	390	200	97	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	4,000	200	730	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	6,600	200	1,200	37
108-88-3	Toluene	220	200	59	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	150 TR	200	34 TR	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RG **Date:** 6/5/98

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-8
PAI Sample ID : P9800887-009

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.020 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	40 TR	50	15 TR	20
75-00-3	Chloroethane	ND	50	ND	19
75-35-4	1,1-Dichloroethene	ND	50	ND	13
75-09-2	Methylene Chloride	ND	50	ND	14
156-60-5	trans-1,2-Dichloroethene	ND	50	ND	13
75-34-3	1,1-Dichloroethane	1,900	50	470	12
156-59-2	cis-1,2-Dichloroethene	230	50	57	13
107-06-2	1,2-Dichloroethane	ND	50	ND	12
71-55-6	1,1,1-Trichloroethane	2,100	50	380	9.2
71-43-2	Benzene	ND	50	ND	16
79-01-6	Trichloroethene	3,700	50	690	9.3
108-88-3	Toluene	30 TR	50	7.8 TR	13
100-41-4	Ethylbenzene	ND	50	ND	12
1330-20-7	m- & p-Xylene	ND	50	ND	12
95-47-6	o-Xylene	ND	50	ND	12

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RC **Date:** 6/15/98

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-9
PAI Sample ID : P9800887-010

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.200 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	5.0	ND	2.0
75-00-3	Chloroethane	ND	5.0	ND	1.9
75-35-4	1,1-Dichloroethene	ND	5.0	ND	1.3
75-09-2	Methylene Chloride	5.9	5.0	1.7	1.4
156-60-5	trans-1,2-Dichloroethene	ND	5.0	ND	1.3
75-34-3	1,1-Dichloroethane	35	5.0	8.6	1.2
156-59-2	cis-1,2-Dichloroethene	7.7	5.0	1.9	1.3
107-06-2	1,2-Dichloroethane	ND	5.0	ND	1.2
71-55-6	1,1,1-Trichloroethane	53	5.0	9.8	0.92
71-43-2	Benzene	2.8 TR	5.0	0.88 TR	1.6
79-01-6	Trichloroethene	400	5.0	74	0.93
108-88-3	Toluene	18	5.0	4.8	1.3
100-41-4	Ethylbenzene	3.0 TR	5.0	0.69 TR	1.2
1330-20-7	m- & p-Xylene	9.1	5.0	2.1	1.2
95-47-6	o-Xylene	2.8 TR	5.0	0.63 TR	1.2

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RC **Date:** 6/5/98

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : N/A
PAI Sample ID : Method Blank

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : N/A
Date Received : N/A
Date Analyzed : 5/29/98
Volume(s) Analyzed : 1.000 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m^3	REPORTING LIMIT ug/m^3	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	1.0	ND	0.39
75-00-3	Chloroethane	ND	1.0	ND	0.38
75-35-4	1,1-Dichloroethene	ND	1.0	ND	0.25
75-09-2	Methylene Chloride	ND	1.0	ND	0.29
156-60-5	trans-1,2-Dichloroethene	ND	1.0	ND	0.25
75-34-3	1,1-Dichloroethane	ND	1.0	ND	0.25
156-59-2	cis-1,2-Dichloroethene	ND	1.0	ND	0.25
107-06-2	1,2-Dichloroethane	ND	1.0	ND	0.25
71-55-6	1,1,1-Trichloroethane	ND	1.0	ND	0.18
71-43-2	Benzene	ND	1.0	ND	0.31
79-01-6	Trichloroethene	ND	1.0	ND	0.19
108-88-3	Toluene	ND	1.0	ND	0.27
100-41-4	Ethylbenzene	ND	1.0	ND	0.23
1330-20-7	m- & p-Xylene	ND	1.0	ND	0.23
95-47-6	o-Xylene	ND	1.0	ND	0.23

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RG **Date:** 6/15/98

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Air Quality Laboratory

SURROGATE SPIKE RECOVERY RESULTS

Client: Ecology & Environment, Inc.

Client Project ID: Dearcop Farm
PAI Project ID: P9800887

Test Code: GC/MS Mod. EPA TO-14
Analyst: Cindy Yoon
Instrument: HP5973/Tekmar AUTOCan Elite
Matrix: Tedlar Bag

Date Sampled : 5/27/98
Date Received: 5/28/98
Date Analyzed: 5/29/98

Client Sample ID	PAI Sample ID	PERCENT RECOVERY		
		1,2-Dichloroethane-d4	Toluene-d8	Bromofluorobenzene
N/A (5/29/98)	Method Blank	114	100	99.8
AMB-1	P9800887-001	104	99.6	100
SVE-1	P9800887-002	103	99.3	99.8
SVE-1	Lab Duplicate	102	100	98.0
SVE-2	P9800887-003	103	99.3	98.1
SVE-3	P9800887-004	103	99.1	99.4
SVE-4	P9800887-005	102	99.9	99.7
SVE-5	P9800887-006	103	99.2	99.1
SVE-6	P9800887-007	103	101	100
SVE-7	P9800887-008	104	101	99.8
SVE-8	P9800887-009	103	101	100
SVE-9	P9800887-010	104	99.5	99.0

Verified by: RCr

Date: 6/29/98

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

QCCS RESULTS

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF QCCS

Client : Ecology & Environment, Inc.

Client Project ID : Dearcop Farm
PAI Project ID : P9800887

Test Code : GC/MS Mod. EPA TO-14
Instrument : HP5973/Tekmar AUTOCan Elite
Analyst : Chris Parnell
Matrix : Tedlar Bag

Date Sampled : N/A
Date Received : N/A
Date Analyzed : 5/16/98
Volume(s) Analyzed : N/A Liter

CAS #	COMPOUND	Amount Spiked (ng)	Amount Recovered (ng)	% Recovery
75-01-4	Vinyl Chloride	25.0	26.9	108
75-35-4	1,1-Dichloroethene	25.0	28.0	112
156-60-5	trans-1,2-Dichloroethene	25.0	27.8	111
78-93-3	2-Butanone	25.0	27.9	112
156-59-2	cis-1,2-Dichloroethene	25.0	27.8	111
67-66-3	Chloroform	25.0	27.0	108
71-55-6	1,1,1-Trichloroethane	25.0	22.8	91.2
71-43-2	Benzene	25.0	25.0	100
79-01-6	Trichloroethene	25.0	25.2	101
108-10-1	4-Methyl-2-Pentanone	25.0	23.7	94.8
108-88-3	Toluene	25.0	24.9	99.6
127-18-4	Tetrachloroethene	25.0	22.9	91.6
108-90-7	Chlorobenzene	25.0	24.0	96.0
1330-20-8	m- & p-Xylenes	25.0	23.1	92.4

Verified by : RC

Date : 6/29/98

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CHAIN OF CUSTODY RECORD

ASC analytical services center

Ecology and Environment, Inc., Analytical Services Center
4493 Walden Avenue, Lancaster, New York, 14086, Tel: 716/685-8080, Fax 716/685-0852
Where Scientific Excellence and Efficiency Meet

Cooler No: _____
Lab: _____

P9800887

Page: ____ of ____

PROJECT No:	SITE NAME:	LOCATION: (Include State)
QT9	Dearcop Farm	Gates, NY

CLIENT: New York State DEC

PROJECT MANAGER: Jon Sundquist

OFFICE No: Buf

FIELD TEAM LEADER:

PHONE No: (716)684-8060

SAMPLERS: (PRINT) Greg Andrus - Lu Engineers

CONTAINER TYPE AND PRESERVATIVE: Tedlar Bag

REQUESTED ANALYSIS: Volatiles - TO14

TURNAROUND TIME
- 24-HOUR ☐ R
- 48-HOUR ☐ U
- 1-WEEK ☐ S
- STANDARD ☑ H
- RUSH _____ days
- OTHER _____

(FOR LAB USE ONLY)
Lab Job No:
Report type:
Batch QC: Yes No

DATE	TIME	SAMPLE ID	SAMPLE MATRIX	CHECK FOR MS/MSD	SAMPLE TYPE	No. OF CONTAINERS	Volatiles - TO14	OVA/HNU READINGS (PPM)	BEGINNING DEPTH (FEET BGS)	ENDING DEPTH (FEET BGS)	REMARKS
5/27/98	10:11	AMB-1 -001	Air			1	1	N/A			
	13:00	SVE-1 -002					1	19			
	14:25	SVE-2 -003					1	12			
	14:36	SVE-3 -004					1	13			
	15:10	SVE-4 -005					1	12			
	16:00	SVE-5 -006					1	12			
	16:03	SVE-6 -007					1	12			
	1705	SVE-7 -008					1	11			
	1711	SVE-8 -009					1	12			
		SVE-9 -010					1	12			

Relinquished By: (Signature)	Date/Time:	Received By: (Signature)	Date/Time:	Ship Via:	Date:
Amy R Murphy	5/27/98 1830			FedEx	
Relinquished By: (Signature)	**Date/Time:**	**Received By: (Signature)**	**Date/Time:**	**BL/Airbill Number:**	
		Robert F	5/28/98 10:00am	805331125865	

Temperature Blank Info.
Enclosed: Yes (No)

(FOR LAB USE ONLY)
Date: _____ Time: _____
Temperature: _____ °C

Distribution: White - Lab original Yellow - Field team leader

ecology and environment, inc.
International Specialists in the Environment

ANALYTICAL SERVICES CENTER
4493 Walden Avenue
Lancaster, New York 14086
Tel. (716) 685-8080, Fax: (716) 685-0852

MEMORANDUM

TO: Jon Sundquist - E & E Buffalo

FROM: Barbara Krajewski - Project Manager

DATE: June 17, 1998

SUBJECT: Dearcop Farm
Project # QT9700

RE: 9801.075

CC: Lab File

Attached is the laboratory report of the analyses conducted on samples received at the Analytical Services Center on May 21, 1998. Volatile analysis was performed according to the procedures set forth in the "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Third Edition, U.S. EPA, 1986 and the New York State Department of Environmental Conservation, Analytical Services Protocol, 10/95 Revisions.

The chain of custody form provided herein is integral to this report and must be included with the analytical results forms upon transferral to another data user.

All samples on which this report is based will be retained by E & E for a period of 30 days from the date of this report, unless otherwise instructed by the client. If additional storage of samples is requested by the client, a storage fee of $1.00 per sample container per month will be charged for each sample, with such charges accruing until destruction of the samples is authorized by the client.

BK/fal
Enclosure

Case Narrative
Dearcop Farm
Project # QT-9700
9801.075

VOLATILES

Due to software limitations, the client identification codes have been truncated throughout this report. Sample depth and the "-" have been removed from all client IDs.

The "M" flag on a GC/MS instrument generated quantitation report indicates that a manual integration was performed. Manual integration was required due to peak shape.

The undiluted analysis of sample SVE-1 and the diluted analysis of sample SVE-1-PZ1 exceeded the DEC hold time by one day. Both samples were analyzed within metthod hold time. Results from both analyses are included in this report.

Sample SVE-1 was initially analyzed using 1.0 g. Surrogate recovery and internal standard responses were acceptable. Levels of target compounds detected did not justify analysis using reduced sample. The sample was reanalyzed using 5.0 g. Recovery of the surrogate bromofluorobenzene was slightly high at 114% (upper limit is 113%). The sample also did not meet the internal standard area criteria for 1,4-dichlorobenzene-d4. Response was low.

Sample SVE-1-PZ1 exceeded the calibration range for trichloroethene. The sample also had a slightly high surrogate recovery for bromofluorobenzene at 117% and a low internal standard response for 1,4-dichlorobenzene-d4. The sample was reanalyzed using 1.0 g of sample. The reanalysis met all QC criterion.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Barbara Krajewski

Barbara Krajewski - Project Manager
Analytical Services Center
June 17, 1998

To be included with all lab data and with each workplan

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE IDENTIFICATION AND ANALYTICAL REQUIREMENT SUMMARY

Customer Sample Code	Laboratory Sample Code	Analytical Requirements					
		*VOA GC/MS Method #	*BNA GC/MS Method #	*VOA GC Method #	*Pest PCBs Method #	*Metals	*Other
SVE-1 (5')	7351	8260					
SVE-1-P21(6.8')	7352	"					
SVE-1-P22 (7.8')	7353	"					
SVE-1-P22D (7.8')	7354	"					
SVE-1- P23	7355	"					

SAMPLE PREPARATION AND ANALYSIS SUMMARY
VOLATILE (VOA)
ANALYSES

Laboratory Sample ID	Matrix	Date Collected	Date Rec'd at Lab	Date Extracted	Date Analyzed
7351	SOIL	5-21-98	5-21-98	NA	5/29/98
7352	"	"	"	"	5/28/98
7353	"	"	"	"	"
7354	"	"	"	"	"
7355	"	"	"	"	"
7351 DL	"	"	"	"	5/28/98
7352 DL	"	"	"	"	5/29/98

DL= Dilution

ecology and environment, inc.
Analytical Services Center
4493 Walden Avenue, Lancaster, New York, 14086, Tel. 716/685-8080, Fax 716/685-0852
International Specialists in the Environment

ecology and environment

CHAIN-OF-CUSTODY RECORD

Project No.:	Project Name:	Project Manager:
QT9020	Dewey Farm	J. Sundquist
Samplers: (Signatures)		**Field Team Leader:**
G. Florentino		G. Florentino

STATION NUMBER	DATE	TIME	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE TYPE AIR	SAMPLE INFORMATION — EXPECTED COMPOUNDS (Concentration)* (OVA PPM)	STATION LOCATION	NUMBER OF CONTAINERS	VOCs 8260	REMARKS
1	5/21/98	0905		X		chlorinated solvents (low-med) 20	SVE-1 (5')	2	2	soil from auger flights – 5' bgs
2	5/21/98	1000		X		" " (low) 3	SVE-1-PZ1 (6-8')	2	2	" " bent shelby tube 6-8' bgs
3	↓			X		" "	SVE-1-PZ2 (7-8')	2	2	" " auger flights 7-8' bgs
4				X		" "	SVE-1-PZ3/D (7-8')	2	2	duplicate soil " " " "
5	↓			X		" "	SVE-1-PZ3 (5')	2	2	soil from " " 5' bgs

GF 5/21/98

All readings with NaI probe (Survey M) = less than background radiation

Temperature blank enclosed

recycled paper

Relinquished By: (Signature)	Date/Time:	Received By: (Signature)	Relinquished By: (Signature)	Date/Time:	Received By: (Signature)	Ship Via:
						Hand Delivery
Relinquished By: (Signature)	Date/Time:	Received By: (Signature)	Relinquished By: (Signature)	Date/Time:	Received By: (Signature)	BL/Airbill Number: NA
						Date: 5-21-98
Relinquished By: (Signature)	Date/Time: 5/21/98/1500	Received For Laboratory By: (Signature)	Relinquished By: (Signature) 5/21/98/1730	Date/Time:	Received For Laboratory By: (Signature)	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

*See CONCENTRATION RANGE on back of form.

0571194

S1

Ecology and Environment, Inc. Analytical Services Center

Cooler Receipt Form

PACKAGE RECEIPT #: 774 NUMBER OF COOLERS: 1 DATE RECEIVED: 5.21.98

E & E PROJECT #: QT9020 PROJECT OR SITE NAME: Deercop Farm

A. Preliminary Examination Phase

CIRCLE ONE

1. Did coolers come with airbill or packing slip? YES NO NA
   Enter carrier here and print airbill # below: E+E
2. Did cooler(s) have custody seals? YES NO NA
   If YES, how many and where? 1 - at Seam
3. Were custody seals unbroken and intact on receipt? YES NO* NA
4. Were custody seals dated and signed? YES NO NA
   If YES, enter date: 5.21.98 Name: Gen Florentino
5. Sign here to acknowledge receipt of cooler (s): [signature]
   Date cooler(s) opened: 5.21.98 C-O-C numbers:
   Cooler(s) opened by (print): Jeremy Anderson Signature: [signature]
6. Were the C-O-C forms received? YES NO* NA
7. Was the project identifiable from the C-O-C form? YES NO* NA
   If YES, enter the project number and name in the heading above.

Please record Temperature Blank or Cooler Temperature for Each Cooler, Range (2 - 5°C)*

AIRBILL #	TEMP. °C	AIRBILL #	TEMP. °C	AIRBILL #	TEMP. °C
N/A	4.0				

Thermometer # 069 Correction factor 0

B. Unpacking Phase

8. Was enough packing material used in cooler(s)? YES NO NA
   Type of material: Vermiculite Bubble Wrap Other
9. If required, was enough ice used? YES NO NA
   If YES, type of ice used: Wet Dry Blue Other
10. Was a temperature blank included inside cooler(s)? YES NO NA
    If YES, indicate temperature blank temperature in table above. If NO, indicate cooler temperature in table above.
11. Were all containers sealed in separate plastic bags? YES NO NA
12. Did all containers arrive unbroken and in good condition? YES NO* NA

C. Login Phase

Samples Logged in By (print): Jeremy Anderson Signature: [signature] Date: 5.21.98

13. Were all container labels complete (e.g. date, time preserv)? YES NO* NA
14. Were all C-O-C forms filled out properly in ink and signed? YES NO* NA
15. Did the C-O-C form agree with containers received? YES NO* NA
16. Were the correct containers used for the tests requested? YES NO* NA
17. Were the correct preservatives listed on the sample labels? YES NO* NA
18. Was a sufficient sample volume sent for the tests requested? YES NO* NA
19. Were all volatile samples received without head space? YES NO* NA

* If No or Temperature Outside of Acceptable Range, a Corrective Action Form Must Be Filed.

DEFINED QUALIFIERS FOR ORGANIC ANALYSIS	
QUALIFIER	DEFINITION
U	Indicates that the compound was analyzed for but not detected. The sample quantitation limit is corrected for dilution and for percent moisture.
J	Indicates an estimated value. This flag is used when reporting a concentration for tentatively identified compounds, or when the mass spectral data indicate the presence of a compound but the result is less than the sample quantitation limit.
C	Applies to pesticide results where the identification has been confirmed by GC/MS.
B	Is used when the analyte is found in the associated blank as well as in the sample.
E	Identifies compounds whose concentrations exceed the calibration range of the instrument. The result should be considered an estimate of the concentration.
D	Identifies all compounds identified in an analysis of a diluted sample.
A	Indicates that a TIC is a suspected aldol-condensation product.
P	Is used for a pesticide/Aroclor target compound when there is greater than 25% difference for detected concentrations between the primary and confirmatory GC columns. The quantitation should be considered an estimate.
N	Indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds, where the identification is based on a mass spectral library search.

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SVE1

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07351

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8109

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 11 Date Analyzed: 05/29/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	5	J
67-64-1	Acetone	13	B
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	1	J
75-34-3	1,1-Dichloroethane	150	
540-59-0	1,2-Dichloroethene (total)	71	
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	9	
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	17	
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	6	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	89	
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	5	J
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	89	
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	Xylene (total)	6	
110-75-8	2-Chloroethyl vinyl ether	6	U

1E

DEC SAMPLE NO.

SVE1

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07351

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8109

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 11 Date Analyzed: 05/29/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 5

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		Dichlorobutene isomer	13.38	9	J
2.		Octane isomer	14.19	6	J
3.		Octane isomer	14.51	6	J
4.		Dichlorobutene isomer	17.36	13	J
5.		Unknown	24.46	7	J

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SVE1DL

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07351DL

Sample wt/vol: 1.0 (g/mL) G Lab File ID: J8093

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 11 Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	56	U
74-83-9	Bromomethane	56	U
75-01-4	Vinyl Chloride	56	U
75-00-3	Chloroethane	56	U
75-09-2	Methylene Chloride	14	BJD
67-64-1	Acetone	27	BJD
75-15-0	Carbon Disulfide	28	U
75-35-4	1,1-Dichloroethene	28	U
75-34-3	1,1-Dichloroethane	170	D
540-59-0	1,2-Dichloroethene (total)	120	D
67-66-3	Chloroform	28	U
107-06-2	1,2-Dichloroethane	15	JD
78-93-3	2-Butanone	56	U
71-55-6	1,1,1-Trichloroethane	14	JD
56-23-5	Carbon Tetrachloride	28	U
108-05-4	Vinyl Acetate	28	U
75-27-4	Bromodichloromethane	28	U
78-87-5	1,2-Dichloropropane	28	U
10061-01-5	cis-1,3-Dichloropropene	28	U
79-01-6	Trichloroethene	130	BD
124-48-1	Dibromochloromethane	28	U
79-00-5	1,1,2-Trichloroethane	28	U
71-43-2	Benzene	28	U
10061-02-6	trans-1,3-Dichloropropene	28	U
75-25-2	Bromoform	28	U
108-10-1	4-Methyl-2-Pentanone	56	U
591-78-6	2-Hexanone	56	U
127-18-4	Tetrachloroethene	5	JD
79-34-5	1,1,2,2-Tetrachloroethane	28	U
108-88-3	Toluene	100	D
108-90-7	Chlorobenzene	28	U
100-41-4	Ethylbenzene	28	U
100-42-5	Styrene	28	U
1330-20-7	Xylene (total)	4	JD
110-75-8	2-Chloroethyl vinyl ether	28	U

1E

DEC SAMPLE NO.

SVE1DL

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07351DL

Sample wt/vol: 1.0 (g/mL) G Lab File ID: J8093

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 11 Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	23.16	29	J

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SVE1PZ1

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07352

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8091

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 21 Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	13	U
74-83-9	Bromomethane	13	U
75-01-4	Vinyl Chloride	13	U
75-00-3	Chloroethane	13	U
75-09-2	Methylene Chloride	7	B
67-64-1	Acetone	4	BJ
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	64	
540-59-0	1,2-Dichloroethene (total)	25	
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	13	U
71-55-6	1,1,1-Trichloroethane	25	
56-23-5	Carbon Tetrachloride	3	J
108-05-4	Vinyl Acetate	6	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	420	BE
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	13	U
591-78-6	2-Hexanone	13	U
127-18-4	Tetrachloroethene	7	
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	3	J
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	Xylene (total)	5	J
110-75-8	2-Chloroethyl vinyl ether	6	U

1E

DEC SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SVE1PZ1

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07352

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8091

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 21 Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	23.15	7	J

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SVE1PZ1DL

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07352DL

Sample wt/vol: 1.0 (g/mL) G Lab File ID: J8110

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 21 Date Analyzed: 05/29/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	63	U
74-83-9	Bromomethane	63	U
75-01-4	Vinyl Chloride	63	U
75-00-3	Chloroethane	63	U
75-09-2	Methylene Chloride	8	DJ
67-64-1	Acetone	31	BDJ
75-15-0	Carbon Disulfide	32	U
75-35-4	1,1-Dichloroethene	32	U
75-34-3	1,1-Dichloroethane	72	D
540-59-0	1,2-Dichloroethene (total)	53	D
67-66-3	Chloroform	32	U
107-06-2	1,2-Dichloroethane	32	U
78-93-3	2-Butanone	63	U
71-55-6	1,1,1-Trichloroethane	12	DJ
56-23-5	Carbon Tetrachloride	32	U
108-05-4	Vinyl Acetate	32	U
75-27-4	Bromodichloromethane	32	U
78-87-5	1,2-Dichloropropane	32	U
10061-01-5	cis-1,3-Dichloropropene	32	U
79-01-6	Trichloroethene	500	D
124-48-1	Dibromochloromethane	32	U
79-00-5	1,1,2-Trichloroethane	32	U
71-43-2	Benzene	32	U
10061-02-6	trans-1,3-Dichloropropene	32	U
75-25-2	Bromoform	32	U
108-10-1	4-Methyl-2-Pentanone	63	U
591-78-6	2-Hexanone	63	U
127-18-4	Tetrachloroethene	7	DJ
79-34-5	1,1,2,2-Tetrachloroethane	32	U
108-88-3	Toluene	10	DJ
108-90-7	Chlorobenzene	32	U
100-41-4	Ethylbenzene	32	U
100-42-5	Styrene	32	U
1330-20-7	Xylene (total)	32	U
110-75-8	2-Chloroethyl vinyl ether	32	U

1E

DEC SAMPLE NO.

SVE1PZ1DL

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07352DL

Sample wt/vol: 1.0 (g/mL) G Lab File ID: J8110

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 21 Date Analyzed: 05/29/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SVE1PZ2

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07353

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8092

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 18 Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl Chloride	12	U
75-00-3	Chloroethane	2	J
75-09-2	Methylene Chloride	3	BJ
67-64-1	Acetone	6	BJ
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	16	
540-59-0	1,2-Dichloroethene (total)	5	J
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	12	U
71-55-6	1,1,1-Trichloroethane	3	J
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	6	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	23	B
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	12	U
591-78-6	2-Hexanone	12	U
127-18-4	Tetrachloroethene	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	3	J
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	2	J
100-42-5	Styrene	6	U
1330-20-7	Xylene (total)	12	
110-75-8	2-Chloroethyl vinyl ether	6	U

1E

DEC SAMPLE NO.

SVE1PZ2

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07353

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8092

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 18 Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

VOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SVE1PZ2D

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07354

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8089

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 12 Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	2	BJ
67-64-1	Acetone	4	BJ
75-15-0	Carbon Disulfide	6	U
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	8	
540-59-0	1,2-Dichloroethene (total)	3	J
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	2	J
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	6	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	17	B
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	1	J
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	1	J
100-42-5	Styrene	6	U
1330-20-7	Xylene (total)	5	J
110-75-8	2-Chloroethyl vinyl ether	6	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DEC SAMPLE NO.

SVE1PZ2D

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07354

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8089

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 12 Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SVE1PZ3

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07355

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8090

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 18 Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl Chloride	12	U
75-00-3	Chloroethane	12	U
75-09-2	Methylene Chloride	3	BJ
67-64-1	Acetone	5	BJ
75-15-0	Carbon Disulfide	3	J
75-35-4	1,1-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	28	
540-59-0	1,2-Dichloroethene (total)	31	
67-66-3	Chloroform	6	U
107-06-2	1,2-Dichloroethane	6	U
78-93-3	2-Butanone	12	U
71-55-6	1,1,1-Trichloroethane	4	J
56-23-5	Carbon Tetrachloride	6	U
108-05-4	Vinyl Acetate	6	U
75-27-4	Bromodichloromethane	6	U
78-87-5	1,2-Dichloropropane	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U
79-01-6	Trichloroethene	41	B
124-48-1	Dibromochloromethane	6	U
79-00-5	1,1,2-Trichloroethane	6	U
71-43-2	Benzene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
75-25-2	Bromoform	6	U
108-10-1	4-Methyl-2-Pentanone	12	U
591-78-6	2-Hexanone	12	U
127-18-4	Tetrachloroethene	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-88-3	Toluene	9	
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
1330-20-7	Xylene (total)	3	J
110-75-8	2-Chloroethyl vinyl ether	6	U

1E

DEC SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SVE1PZ3

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: 07355

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8090

Level: (low/med) LOW Date Received: 05/21/98

% Moisture: not dec. 18 Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

VBLKS1

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: VBLKS1

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8087

Level: (low/med) LOW Date Received:

% Moisture: not dec. Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	1	J
67-64-1	Acetone	3	J
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	1	J
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U
110-75-8	2-Chloroethyl vinyl ether	5	U

1E

DEC SAMPLE NO.

VBLKS1

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: VBLKS1

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8087

Level: (low/med) LOW Date Received:

% Moisture: not dec. Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

VBLKS2

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: VBLKS2

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8107

Level: (low/med) LOW Date Received:

% Moisture: not dec. Date Analyzed: 05/29/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	3	J
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U
110-75-8	2-Chloroethyl vinyl ether	5	U

200

1E

DEC SAMPLE NO.

VBLKS2

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: VBLKS2

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8107

Level: (low/med) LOW Date Received:

% Moisture: not dec. Date Analyzed: 05/29/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

VMSBS1

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: VMSBS1

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8088

Level: (low/med) LOW Date Received:

% Moisture: not dec. Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	1	BJ
67-64-1	Acetone	4	BJ
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	45	
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	47	B
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	47	
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	47	
108-90-7	Chlorobenzene	48	
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U
110-75-8	2-Chloroethyl vinyl ether	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DEC SAMPLE NO.

VMSBS1

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: VMSBS1

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8088

Level: (low/med) LOW Date Received:

% Moisture: not dec. Date Analyzed: 05/28/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

VMSBS2

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: VMSBS2

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8108

Level: (low/med) LOW Date Received:

% Moisture: not dec. Date Analyzed: 05/29/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	1	J
67-64-1	Acetone	4	BJ
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	48	
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	49	
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	50	
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	49	
108-90-7	Chlorobenzene	49	
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U
110-75-8	2-Chloroethyl vinyl ether	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DEC SAMPLE NO.: VMSBS2

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 9801.075 SAS No.: SDG No.: 07351

Matrix: (soil/water) SOIL Lab Sample ID: VMSBS2

Sample wt/vol: 5.0 (g/mL) G Lab File ID: J8108

Level: (low/med) LOW Date Received:

% Moisture: not dec. Date Analyzed: 05/29/98

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

D

Vapor Flow Frictional Loss Calculations

VAPOR EXTRACTION SYSTEM FRICTIONAL LOSSES (2" diameter line)

VE SECTION: Individual VE well to Branch Header			Mass Flow: 100 SCFM Pipe Diameter: 2 inches Velocity: 4584 feet/min		
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	2" diameter line	1	5	0.2334	1.1671
2	T-Side inlet	2	12.5	0.2334	5.8354
3	Globe Valve (1/4 closed)	1	6	0.2334	1.4005
4	Flow Gauge	1	50	0.2334	11.6707
5	2" 90 degree elbow	1	6	0.2334	1.4005
Total Friction Loss for Individual VE Well to Branch Header:					21.4741

VE SECTION: Branch Header to Main Header			Mass Flow: 500 SCFM Pipe Diameter: 2 inches Velocity: 22918 feet/min		
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	2" diamter line	1	210	5.8354	1225.4260
Branch Header to Main Header					1225.4260

VE SECTION: Main Header to Knockout Drum			Mass Flow: 800 SCFM Pipe Diameter: 2 inches Velocity: 36669 feet/min		
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	2" diamter line	1	421	14.9385	6289
3	T-Standard Run	7	2.5	14.9385	261
4	90 degree elbow	2	6	14.9385	179
Main Header to Knockout Drum					6730

VAPOR EXTRACTION SYSTEM FRICTIONAL LOSSES (4" diameter line)

VE SECTION: Individual VE well to Header		Mass Flow: 100 SCFM Pipe Diameter: 4 inches Velocity: 1146 feet/min			
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	4" diameter line	1	5	0.0073	0.0365
2	2" to 4" Expansion	1	7	0.0073	0.0511
3	T-Side inlet	2	22.5	0.0073	0.3282
4	Globe Valve (1/4 closed)	1	15	0.0073	0.1094
5	Flow Gauge	1	120	0.0073	0.8753
6	4" 90 degree elbow	1	12.5	0.0073	0.0912
Total Friction Loss for Individual VE Well to Branch Header:					1.4917

VE SECTION: Branch Header to Main Header		Mass Flow: 500 SCFM Pipe Diameter: 4 inches Velocity: 5730 feet/min			
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	4" diamter line	1	210	0.1824	38.2946
Branch Header to Main Header					38.2946

VE SECTION: Main Header to Knockout Drum		Mass Flow: 800 SCFM Pipe Diameter: 4 inches Velocity: 9167 feet/min			
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	4" diamter line	1	421	0.4668	196.5350
3	4" to 2" Reduction	1	2	0.4668	0.9337
3	T-Standard Run	7	5	0.4668	16.3390
4	90 degree elbow	2	12.5	0.4668	11.6707
Main Header to Knockout Drum					225.4784

NOTE: Friction loss units are inches of water.

ASSUME: For smooth PVC pipe, f = 0.0297 Dimensionless

VAPOR EXTRACTION SYSTEM FRICTIONAL LOSSES (6" diameter line)

VE SECTION: Individual VE well to Header		Mass Flow:	100 SCFM		
		Pipe Diameter:	6 inches		
		Velocity:	509 feet/min		
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	6" diameter line	1	5	0.0010	0.0048
2	2" to 6" Expansion	1	9	0.0010	0.0086
3	T-Side inlet	2	35	0.0010	0.0672
4	Globe Valve (1/4 closed)	1	19	0.0010	0.0183
5	Flow Gauge	1	175	0.0010	0.1681
6	6" 90 degree elbow	1	17.5	0.0010	0.0168
	Total Friction Loss for Individual VE Well to Branch Header:				0.2838

VE SECTION: Branch Header to Main Header		Mass Flow:	500 SCFM		
		Pipe Diameter:	6 inches		
		Velocity:	2546 feet/min		
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	6" diamter line	1	210	0.0240	5.0429
	Branch Header to Main Header				5.0429

VE SECTION: Main Header to Knockout Drum		Mass Flow:	800 SCFM		
		Pipe Diameter:	6 inches		
		Velocity:	4074 feet/min		
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	6" diamter line	1	421	0.0615	25.8812
3	6" to 2" Reduction	1	5	0.0615	0.3074
3	T-Standard Run	7	7.8	0.0615	3.3566
4	90 degree elbow	2	17.5	0.0615	2.1516
	Main Header to Knockout Drum				31.6967

NOTE: Friction loss units are inches of water.

ASSUME: For smooth PVC pipe, f = 0.0297 Dimensionless

VAPOR EXTRACTION SYSTEM FRICTIONAL LOSSES (8" diameter line)

VE SECTION: Individual VE well to Header		Mass Flow:	100 SCFM		
		Pipe Diameter:	8 inches		
		Velocity:	286 feet/min		
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	8" diameter line	1	5	0.0002	0.0011
2	2" to 8" Expansion	1	20	0.0002	0.0046
3	T-Side inlet	2	48	0.0002	0.0219
4	Globe Valve (1/4 closed)	1	27	0.0002	0.0062
5	Flow Gauge	1	175	0.0002	0.0399
6	6" 90 degree elbow	1	20	0.0002	0.0046
Total Friction Loss for Individual VE Well to Branch Header:					0.0782

VE SECTION: Branch Header to Main Header		Mass Flow:	500 SCFM		
		Pipe Diameter:	8 inches		
		Velocity:	1432 feet/min		
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	8" diamter line	1	210	0.0057	1.1967
Branch Header to Main Header					1.1967

VE SECTION: Main Header to Knockout Drum		Mass Flow:	800 SCFM		
		Pipe Diameter:	8 inches		
		Velocity:	2292 feet/min		
Item	**Description**	**Unit Number**	**Fric loss Equiv feet**	**Friction Loss/foot**	**Friction Loss**
1	8" diamter line	1	421	0.0146	6.1417
3	8" to 2" Reduction	1	10	0.0146	0.1459
3	T-Standard Run	7	14	0.0146	1.4297
4	90 degree elbow	2	20	0.0146	0.5835
Main Header to Knockout Drum					8.3008

NOTE: Friction loss units are inches of water.

ASSUME: For smooth PVC pipe, f = 0.0297 Dimensionless

ASS

VAPOR EXTRACTION BLOWER SIZING

Vacuum Requirements		
Item	Description	Friction Loss
1	Individual VE well to Header	2.3 in H_2O
2	Branch Header to Main Header	5.0 in H_2O
3	Header to KO Drum	31.7 in H_2O
4	Required Vacuum	15.0 in H_2O
5	Friction Loss Water Separator	6.0 in H_2O
	Total Vacuum	60.0 in H_2O
	50% Safety Factor	30.0 in H_2O
	TOTAL VACUUM REQUIRED	90.0 in H_2O
		3.2 lbs/in^2 (psi)

VAPOR EXTRACTION BLOWER SIZING

Vacuum Requirements		
Item	Description	Friction Loss
1	Individual VE well to Header	0.6 in H_2O
2	Branch Header to Main Header	1.2 in H_2O
3	Header to KO Drum	8.3 in H_2O
4	Required Vacuum	15.0 in H_2O
5	Friction Loss Water Separator	6.0 in H_2O
	Total Vacuum	31.1 in H_2O
	50% Safety Factor	15.6 in H_2O
	TOTAL VACUUM REQUIRED	46.7 in H_2O
		1.7 lbs/in^3 (psi)

VAPOR EXTRACTION BLOWER SIZING

Vacuum Requirements		
Item	Description	Friction Loss
1	Individual VE well to Header	11.9 in H_2O
2	Branch Header to Main Header	5.0 in H_2O
3	Header to KO Drum	8.3 in H_2O
4	Required Vacuum	15.0 in H_2O
5	Friction Loss Water Separator	6.0 in H_2O
	Total Vacuum	46.3 in H_2O
	50% Safety Factor	23.1 in H_2O
	TOTAL VACUUM REQUIRED	69.4 in H_2O
		2.5 lbs/in^2 (psi)

E

Storm Water Runoff Flow Calculations

F0350793

ecology and environment, inc.

General Computation Sheet

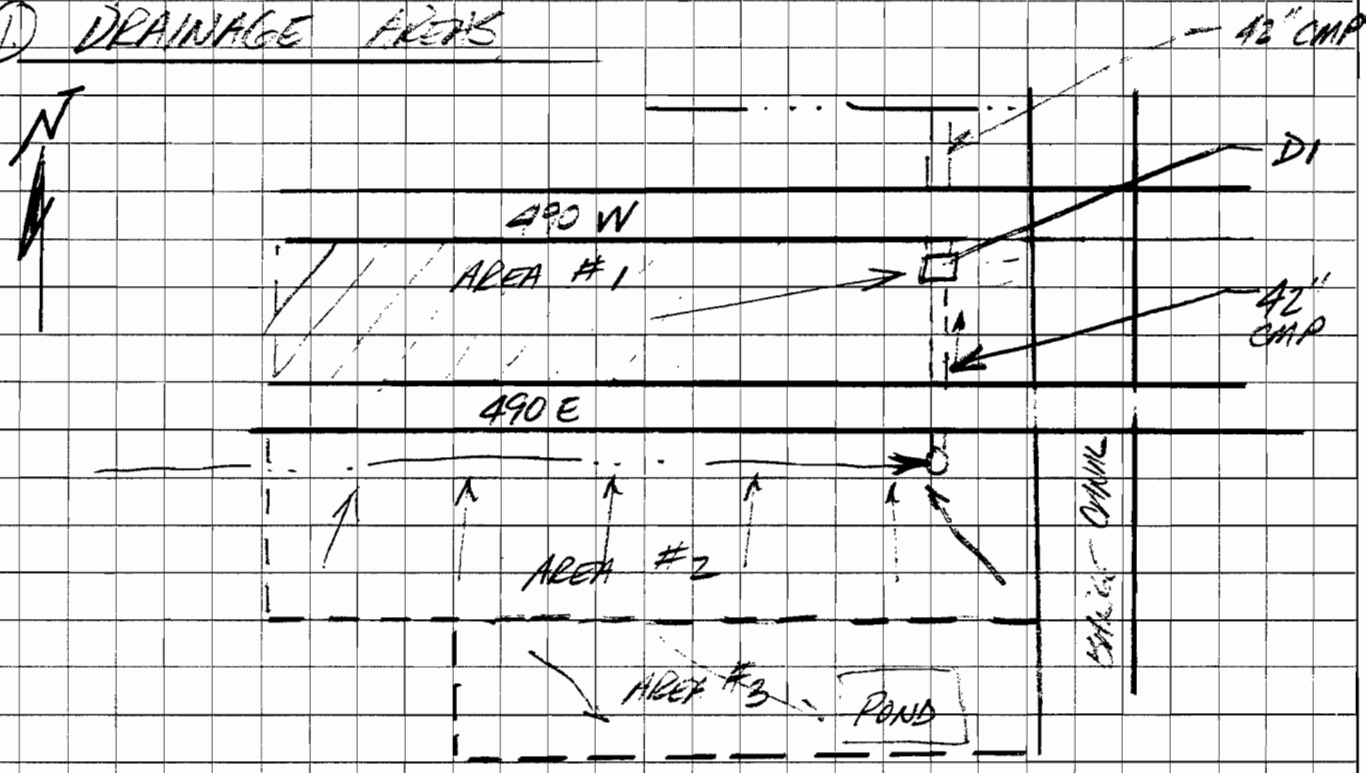
Calculation Set No.	
Preliminary	☐
Final	☐
Void	☐
Sheet 1 of ___	Project No.

Name of Project _____ System _____

Subject _____

Rev.	Completed By	Checked By
☒	Initials: [illegible]	Initials: [illegible]
	Initials: / /	Initials: / /

① DRAINAGE AREAS



AREA #1 = 80,000 SF. (PER TOPO)
80,000 / 43,560 SF/AC = 1.84 AC

AREA #2 = 150,000 SF
150,000 / 43,560 = 3.44 AC

AREA #3 = 100,000 S.F.
100,000 / 43,560 = 2.30 AC

- AREAS 1 & 2 DRAIN TO 42-CMP
- AREA 3 DRAINS TO POND / WETLAND

AREA OF POND / WETLAND IS 15,000 SF x 4' DEPTH
= 60,000 CUBIC FEET
60000 x 7.4805 GAL/CF = 448,830 GAL. CAPACITY

F0350793

ecology and environment, inc.

General Computation Sheet

Calculation Set No.	
Preliminary	☐
Final	☐
Void	☐
Sheet ____ of ____	Project No.

Name of Project DEARCOP System ____

Subject SITE DRAINAGE

Rev.	Completed By	Checked By
☒	Initials: MJA 7/11/92	Initials: SBO 7/9/92
	Initials: / /	Initials: / /

(2) OVERLAND FLOW TIME & INTENSITY

$$t = \frac{1.8(1.1-C)\sqrt{L_o}}{S^{1/3}}$$

t = OVERLAND FLOW
C = RUNOFF COEF.
L_o = LONGEST DIST. TO RECEIVER
S = SLOPE

SLOPES:

$S_{AREA\ \#1} = \frac{547-526}{480} = .044\ FT/FT$

$S_{AREA\ \#2} = \frac{545-529}{400} = .040\ FT/FT$

$S_{AREA\ \#3} = \frac{542-532}{200} = .050\ FT/FT$

TIME:
USE $C = .20$ (LAWNS - POOR DRAINAGE/CLAY 2-7% SLOPE)

$t_{AREA\ 1} = \frac{1.8(1.1-.20)\sqrt{480}}{(.044)^{1/3}} = \frac{35.45}{.3530} = 100\ MINS$

$t_{AREA\ 2} = \frac{1.8(1.1-.20)\sqrt{400}}{(.040)^{1/3}} = \frac{32.40}{.3420} = 95\ MINS$

$t_{AREA\ 3} = \frac{1.8(1.1-.20)\sqrt{600}}{(.050)^{1/3}} = \frac{39.68}{.3684} = 108\ MINS$

INTENSITY:
FROM WORCESTER COUNTY RIC (ATTACHED)

$i_{AREA\ 1} = 1.4\ IN/HR.$

$i_{AREA\ 2} = 1.5\ IN/HR.$

$i_{AREA\ 3} = 1.3\ IN/HR.$

F0350793

ecology and environment, inc.

General Computation Sheet

Calculation Set No.		
Preliminary	☐	
Final	☐	
Void	☐	
Sheet ____ of ____	Project No.	

Name of Project DEPARCO System

Subject SITE DRAINAGE

Rev.	Completed By	Checked By
X	Initials: MW 7/1/93	Initials: SBJ 7/19/93
	Initials: / /	Initials: / /

(3) PEAK FLOWS:

$Q = CIA$

C = RUNOFF COEF.
I = INTENSITY
A = AREA

$Q_1 = .20\,(1.4\ \text{IN/HR})\,(1.84\ \text{ACRES}) = .52\ \text{CFS}$

$Q_2 = .20\,(1.5\ \text{IN/HR})\,(3.24\ \text{ACRES}) = 1.03\ \text{CFS}$

$Q_3 = .20\,(1.3\ \text{IN/HR})\,(2.30\ \text{ACRES}) = .60\ \text{CFS}$

(4) DRAIN/CULVERT CAPACITY:

Q DRAINS TO 42" CMP UNDER ASPH

$Q_{FULL} = \frac{1.49}{n} A R_H^{2/3} \sqrt{S}$

n (CORRUGATED METAL PIPE) = .022

$A = \pi r^2 = \pi (21)^2 = 1385.44\ \text{in}^2 / 144\ \text{in}^2/\text{ft}^2 = 9.62\ \text{SF}$

$R_H = \frac{1}{2} r = 21/2 = 10.5''/12''/\text{ft} = .88'$

$S_W = \frac{526.41 - 524.60}{150'} = .0054\ \text{ft/ft}$ $S_L = \frac{526.35 - 524.65}{255'} = .0067\ \text{ft/ft}$

$Q_{FULL} = \frac{1.49}{.022}(9.62)(.88)^{2/3}(.0054)^{1/2} = 45.9\ \text{CFS}$

$Q_{FULL} = \frac{1.49}{.022}(9.62)(.88)^{2/3}(.0067)^{1/2} = 56.5\ \text{CFS}$

F0350793

ecology and environment, inc.

General Computation Sheet

Calculation Set No.	
Preliminary	☐
Final	☐
Void	☐
Sheet ____ of ____	Project No.

Name of Project _____ System _____

Subject _____

Rev.	Completed By	Checked By
☒	Initials: MW 7/1/93	Initials: SBW 7/9/93
	Initials: / /	Initials: / /

(4) DRAIN / CULVERT CAPACITY (CONT.)

Q_1 = .52 CFS, DRAIN FOR AREA 4, WAS 45 CFS

= 2/45 × 1% OF CAPACITY

Q_2 = 1.63/56.5 × 2% OF CAPACITY

POWERED $Q_1 + Q_2 \rightarrow Q_{4SW}$ ∴

TOTAL SITE DRAINAGE TO Q_{4SW} IS ≤ 3% TOTAL DRAINAGE CAPACITY. O.K.

(5) DRAINAGE TO POND

.60 CFS × (DRAINAGE × 60 SEC/MIN × 24 HR/DAY)

= 51,840 CF OF WATER TO THE POND IN A 24 HR PERIOD.

CAPACITY OF POND = 60,000 CU. FT.

51,840 < 60,000 CU FT

116% CAPACITY

(6) TOTAL FLOW THROUGH 490E CULVERT.

ASSUME ENTIRE S.E. QUAD OF INTERCHANGE:

$S = \frac{560 - 526.41}{1500'} = .0224$ FT/FT $\quad t_c = \frac{1.8(1.1 - .20)\sqrt{1500}}{(0224)^{.33}}$

$A = \frac{1}{2}(2500)(2500) - 5{,}125{,}000/43{,}560 = 73$ ACRES → 75 = 222 MINS ∴

$Q = .20(1.1)(75) = 16.5$ CFS SAY $Q = 1.1$ IN/HR

FIGURE – 2

RAINFALL INTENSITY CURVES
for
MONROE COUNTY, NEW YORK

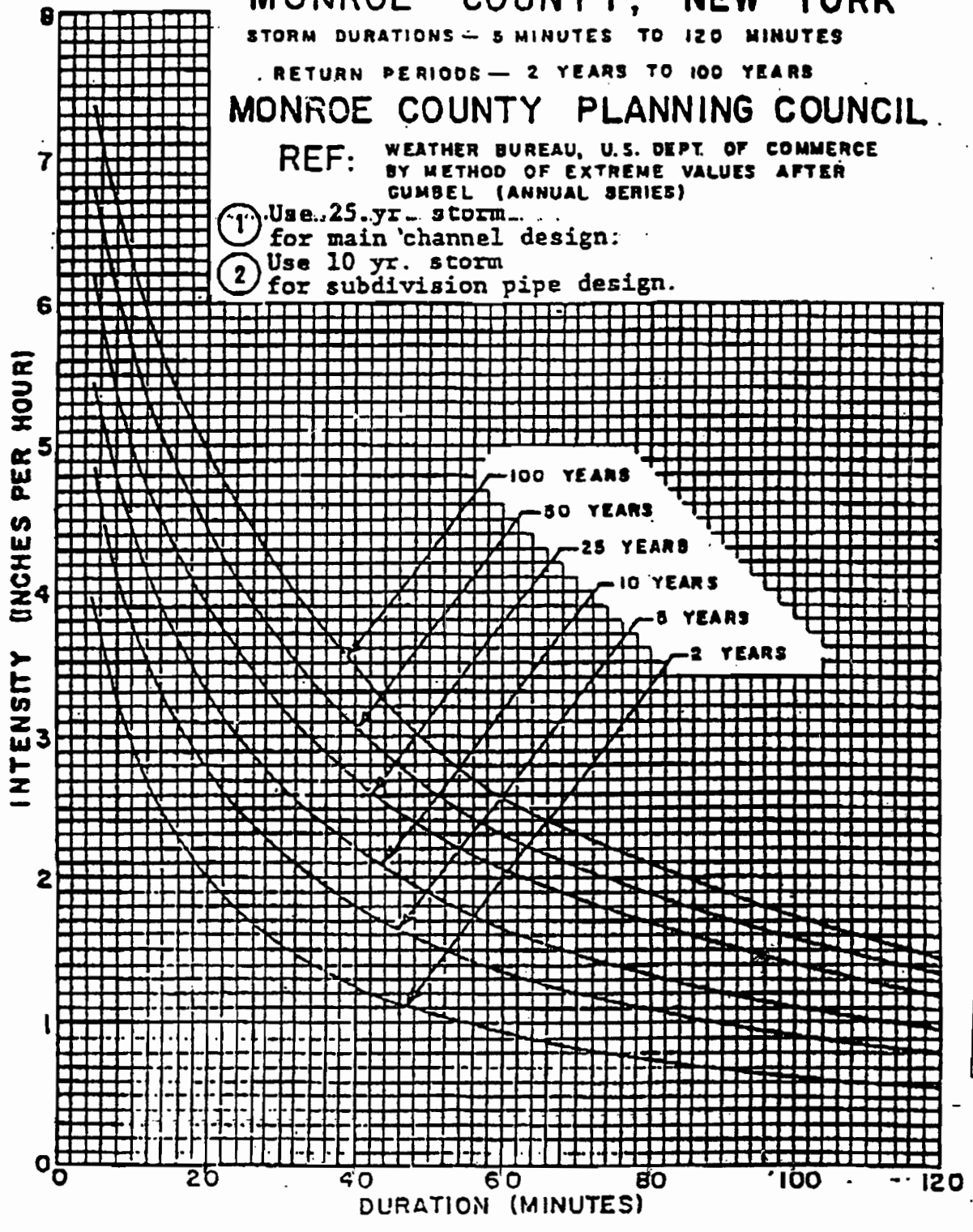
STORM DURATIONS – 5 MINUTES TO 120 MINUTES

RETURN PERIODS – 2 YEARS TO 100 YEARS

MONROE COUNTY PLANNING COUNCIL

REF: WEATHER BUREAU, U.S. DEPT. OF COMMERCE BY METHOD OF EXTREME VALUES AFTER GUMBEL (ANNUAL SERIES)

(1) Use 25 yr. storm for main channel design.
(2) Use 10 yr. storm for subdivision pipe design.



Post-it® Fax Note 7671

To Scott Wolcott		Date 6/25	# of pages ▶ 1
Co./Dept.		From Jerry Charipar	
Phone #		Co.	
Fax # 684-0844		Phone #	
		Fax # 428-5630	

F

SVE Vapor Samples Data Validation Report by ChemWorld Environmental

CW CHEMWORLD ENVIRONMENTAL, INC.
Environmental Consultants

July 21, 1998

Mr. Jon Sundquist
Ecology and Environment, Inc.
368 Pleasantview Drive
Lancaster, New York 14086

RE: Data Usability Summary Report (DUSR)
Dearcop Farm Project
Performance Analytical, Inc.
PAI Project No. P9800887
Analyses for Volatiles in Air - USEPA Method TO-14

Dear Mr. Sundquist:

Data Usability Summary Report (DUSR) technical services were performed by ChemWorld Environmental, Inc. for the Dearcop Farm Project for the sampling event of May 27, 1998. The analytical data from Project No. P9800887 was reviewed (screened) for Volatiles in air analyzed by Gas Chromatography / Mass Spectroscopy (GC/MS). The data screening consisted of a review of the Quality Control (QC) Summary Forms and a brief review of various chromatograms and quantitation reports. The QC Forms were reviewed to determine whether any data required qualification based upon QC deviations noted on the Forms. The associated Analytical Data Summary Sheets are included as Attachment A. These summary sheets include data qualifiers as described within this letter report.

The DUSR review items include the following, as method appropriate:

- Holding Times from Collection (3 days for Tedlar Bags)
- Surrogate Recovery
- GC/MS Instrument Performance Check
- Initial and Continuing Calibration
- Internal Standards
- Method and Field Blanks
- Laboratory Duplicate Samples
- Laboratory Control Samples (LCS)

The following should be noted regarding qualification of the data set for the review items listed above.

BLANKS

Volatile Organics were detected in the ambient blank, as detailed below.

Sample ID			
AMB-1	Methylene Chloride	3.7 ppb	(x10)
	1,1,1-Trichloroethane	0.49 ppb	(x5)
	Trichloroethene	0.99 ppb	(x5)
	Toluene	6.4 ppb	(x10)
	Ethyl Benzene	0.71 ppb	(x5)
	m- & p-xylene	1.6 ppb	(x5)

The associated sample results were qualified as 'U', not detected, at the Reporting Limit (RL), where the sample result was less than the respective blank limit and reported at less than the RL. The sample result was reported at 'U', not detected, where the result was less than the respective blank limit but reported over the RL.

Please contact me by telephone at 301-294-6144, should you require additional information or clarification regarding this Letter Report.

Sincerely,

Andrea P. Schuessler

Andrea P. Schuessler, CHMM
ChemWorld Environmental, Inc.

c: EE-9801 file

ATTACHMENT A

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : AMB-1
PAI Sample ID : P9800887-001

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.200 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	5.0	ND	2.0
75-00-3	Chloroethane	ND	5.0	ND	1.9
75-35-4	1,1-Dichloroethene	ND	5.0	ND	1.3
75-09-2	Methylene Chloride	13	5.0	3.7	1.4
156-60-5	trans-1,2-Dichloroethene	ND	5.0	ND	1.3
75-34-3	1,1-Dichloroethane	ND	5.0	ND	1.2
156-59-2	cis-1,2-Dichloroethene	ND	5.0	ND	1.3
107-06-2	1,2-Dichloroethane	ND	5.0	ND	1.2
71-55-6	1,1,1-Trichloroethane	2.7 TR	5.0	0.49 TR	0.92
71-43-2	Benzene	ND	5.0	ND	1.6
79-01-6	Trichloroethene	5.3	5.0	0.99	0.93
108-88-3	Toluene	24	5.0	6.4	1.3
100-41-4	Ethylbenzene	3.1 TR	5.0	0.71 TR	1.2
1330-20-7	m- & p-Xylene	7.0	5.0	1.6	1.2
95-47-6	o-Xylene	ND	5.0	ND	1.2

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RG **Date:** 6/15/98

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-1
PAI Sample ID : P9800887-002

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m^3	REPORTING LIMIT ug/m^3	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	9,800	200	2,400	49
156-59-2	cis-1,2-Dichloroethene	860	200	220	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	8,800	200	1,600	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	8,600	200	1,600	37
108-88-3	Toluene	200 ~~110 TR~~ U	200	53 ~~28 TR~~ U	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	ND	200	ND	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RC **Date:** 6/15/98

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-2
PAI Sample ID : P9800887-003

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m^3	REPORTING LIMIT ug/m^3	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	7,300	200	1,800	49
156-59-2	cis-1,2-Dichloroethene	730	200	180	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	7,600	200	1,400	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	11,000	200	2,000	37
108-88-3	Toluene	ND	200	ND	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	ND	200	ND	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RC **Date:** 6/15/98

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818-709-1339 • Fax 818-709-2015

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-3
PAI Sample ID : P9800887-004

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	6,900	200	1,700	49
156-59-2	cis-1,2-Dichloroethene	680	200	170	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	7,200	200	1,300	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	11,000	200	2,000	37
108-88-3	Toluene	ND	200	ND	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	ND	200	ND	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected

TR = Below Indicated Reporting Limit

Verified By: RG **Date:** 6/15/98

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-4
PAI Sample ID : P9800887-005

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	6,700	200	1,700	49
156-59-2	cis-1,2-Dichloroethene	680	200	170	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	7,400	200	1,400	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	11,000	200	2,100	37
108-88-3	Toluene	ND	200	ND	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	ND	200	ND	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RC **Date:** 6/15/98

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-5
PAI Sample ID : P9800887-006

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	5,300	200	1,300	49
156-59-2	cis-1,2-Dichloroethene	530	200	130	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	5,900	200	1,100	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	9,100	200	1,700	37
108-88-3	Toluene	~~200 110 TR~~ U	200	~~53 29 TR~~ U	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	ND	200	ND	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected

TR = Below Indicated Reporting Limit

Verified By: RC **Date:** 6/15/98

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1339 • Fax 818 709-7915

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-6
PAI Sample ID : P9800887-007

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.020 (liters)
0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	50	50	20	20
75-00-3	Chloroethane	ND	50	ND	19
75-35-4	1,1-Dichloroethene	36 TR	50	9.1 TR	13
75-09-2	Methylene Chloride	ND	50	ND	14
156-60-5	trans-1,2-Dichloroethene	42 TR	50	11 TR	13
75-34-3	1,1-Dichloroethane	3,600	50	900	12
156-59-2	cis-1,2-Dichloroethene	400	50	100	13
107-06-2	1,2-Dichloroethane	ND	50	ND	12
71-55-6	1,1,1-Trichloroethane	4,000	50	730	9.2
71-43-2	Benzene	ND	50	ND	16
79-01-6	Trichloroethene	7,900	50	1,500	9.3
108-88-3	Toluene	ND	50	ND	13
100-41-4	Ethylbenzene	ND	50	ND	12
1330-20-7	m- & p-Xylene	ND	50	ND	12
95-47-6	o-Xylene	ND	50	ND	12

ND = Not Detected

TR = Below Indicated Reporting Limit

Verified By: RG **Date:** 6/15/98

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-7
PAI Sample ID : P9800887-008

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.0050 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	200	ND	78
75-00-3	Chloroethane	ND	200	ND	76
75-35-4	1,1-Dichloroethene	ND	200	ND	50
75-09-2	Methylene Chloride	ND	200	ND	58
156-60-5	trans-1,2-Dichloroethene	ND	200	ND	50
75-34-3	1,1-Dichloroethane	3,600	200	900	49
156-59-2	cis-1,2-Dichloroethene	390	200	97	50
107-06-2	1,2-Dichloroethane	ND	200	ND	49
71-55-6	1,1,1-Trichloroethane	4,000	200	730	37
71-43-2	Benzene	ND	200	ND	63
79-01-6	Trichloroethene	6,600	200	1,200	37
108-88-3	Toluene	220 u	200	59 u	53
100-41-4	Ethylbenzene	ND	200	ND	46
1330-20-7	m- & p-Xylene	150 TR	200	34 TR	46
95-47-6	o-Xylene	ND	200	ND	46

ND = Not Detected

TR = Below Indicated Reporting Limit

Verified By: RG **Date:** 6/15/98

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-8
PAI Sample ID : P9800887-009

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.020 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	40 TR	50	15 TR	20
75-00-3	Chloroethane	ND	50	ND	19
75-35-4	1,1-Dichloroethene	ND	50	ND	13
75-09-2	Methylene Chloride	ND	50	ND	14
156-60-5	trans-1,2-Dichloroethene	ND	50	ND	13
75-34-3	1,1-Dichloroethane	1,900	50	470	12
156-59-2	cis-1,2-Dichloroethene	230	50	57	13
107-06-2	1,2-Dichloroethane	ND	50	ND	12
71-55-6	1,1,1-Trichloroethane	2,100	50	380	9.2
71-43-2	Benzene	ND	50	ND	16
79-01-6	Trichloroethene	3,700	50	690	9.3
108-88-3	Toluene	50 ~~30 TR~~ U	50	13 ~~7.8 TR~~ U	13
100-41-4	Ethylbenzene	ND	50	ND	12
1330-20-7	m- & p-Xylene	ND	50	ND	12
95-47-6	o-Xylene	ND	50	ND	12

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RG **Date:** 6/15/98

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : SVE-9
PAI Sample ID : P9800887-010

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : 5/27/98
Date Received : 5/28/98
Date Analyzed : 5/29/98
Volume(s) Analyzed : 0.200 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	5.0	ND	2.0
75-00-3	Chloroethane	ND	5.0	ND	1.9
75-35-4	1,1-Dichloroethene	ND	5.0	ND	1.3
75-09-2	Methylene Chloride	5.9 U	5.0	1.7 U	1.4
156-60-5	trans-1,2-Dichloroethene	ND	5.0	ND	1.3
75-34-3	1,1-Dichloroethane	35	5.0	8.6	1.2
156-59-2	cis-1,2-Dichloroethene	7.7	5.0	1.9	1.3
107-06-2	1,2-Dichloroethane	ND	5.0	ND	1.2
71-55-6	1,1,1-Trichloroethane	53	5.0	9.8	0.92
71-43-2	Benzene	2.8 TR	5.0	0.88 TR	1.6
79-01-6	Trichloroethene	400	5.0	74	0.93
108-88-3	Toluene	18 U	5.0	4.8 U	1.3
100-41-4	Ethylbenzene	~~3.0 TR~~ 5.0 U	5.0	~~0.69 TR~~ 1.2 U	1.2
1330-20-7	m- & p-Xylene	9.1 U	5.0	2.1 U	1.2
95-47-6	o-Xylene	2.8 TR	5.0	0.63 TR	1.2

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RG **Date:** 6/15/98

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : Ecology & Environment, Inc.

Client Sample ID : N/A
PAI Sample ID : Method Blank

Test Code : GC/MS Mod. EPA TO-14
Analyst : Cindy Yoon
Instrument : Tekmar AutoCan/HP 5973 MSD
Matrix : Tedlar Bag

Date Sampled : N/A
Date Received : N/A
Date Analyzed : 5/29/98
Volume(s) Analyzed : 1.000 (liters)

D.F. = 1.00

CAS #	COMPOUND	RESULT ug/m³	REPORTING LIMIT ug/m³	RESULT ppb	REPORTING LIMIT ppb
75-01-4	Vinyl Chloride	ND	1.0	ND	0.39
75-00-3	Chloroethane	ND	1.0	ND	0.38
75-35-4	1,1-Dichloroethene	ND	1.0	ND	0.25
75-09-2	Methylene Chloride	ND	1.0	ND	0.29
156-60-5	trans-1,2-Dichloroethene	ND	1.0	ND	0.25
75-34-3	1,1-Dichloroethane	ND	1.0	ND	0.25
156-59-2	cis-1,2-Dichloroethene	ND	1.0	ND	0.25
107-06-2	1,2-Dichloroethane	ND	1.0	ND	0.25
71-55-6	1,1,1-Trichloroethane	ND	1.0	ND	0.18
71-43-2	Benzene	ND	1.0	ND	0.31
79-01-6	Trichloroethene	ND	1.0	ND	0.19
108-88-3	Toluene	ND	1.0	ND	0.27
100-41-4	Ethylbenzene	ND	1.0	ND	0.23
1330-20-7	m- & p-Xylene	ND	1.0	ND	0.23
95-47-6	o-Xylene	ND	1.0	ND	0.23

ND = Not Detected **TR = Below Indicated Reporting Limit**

Verified By: RG **Date:** 6/15/98

ORGANIC DATA QUALIFIERS

U - Indicates that the compound was analyzed for, but not detected at or above the Contract Required Quantitation Limit (CRQL), or the compound is not detected due to qualification through the method or field blank.

J - The associated numerical value is an estimated quantity.

JN - Tentatively identified with approximated concentrations (Volatile and Semi-Volatile Organics). Presumptively present at an approximated quantity (Pesticides/PCBs).

UJ - The compound was analyzed for, but not detected. The sample quantitation limit is an estimated quantity due to variance from quality control limits.

C - Applies to Pesticide results where the identification has been confirmed by GC/MS.

E - Reported value is estimated due to quantitation above the calibration range.

D - Reported result taken from diluted sample analysis.

A - Aldol condensation product.

R - Reported value is unusable and rejected due to variance from quality control limits.

NA - Not Analyzed.