Quadrel Report No. QS1347

EMFLUX® Passive, Non-Invasive Soil-Gas Survey:

ACID NEUTRALIZATION LIME PITS (CW-1 and CW-2) FORT MONMOUTH, NEW JERSEY

Prepared for

Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

by

Quadrel Services, Inc.
1896 Urbana Pike
Suite 20
Clarksburg, MD 20871

December 28, 1995

Quadrel Services Inc.
Tel: (301) 874-5510 Fax: (301) 874-5567
1896 Urbana Pike, Suite 20, Clarksburg, MD 20871

December 28, 1995

Richard Shimko
Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

Dear Richard:

Enclosed are two copies of the report covering our recent EMFLUX® Soil-Gas Demonstration Survey of the Acid Neutralization Lime Pits in Fort Monmouth, NJ. If you have questions, please give us a call.

We look forward to working with you again in the future.

Sincerely,

Matthew T. Coursey
Technical Editor
for: Harry St. A. O'Neill

MTC

Enclosures

EMFLUX® Survey Number: QS1347

Acid Neutralization Lime Pits (CW-1 and CW-2)
Fort Monmouth, New Jersey

This EMFLUX® Soil-Gas Survey Report has been prepared for Roy F. Weston, Inc. by Quadrel Services, Inc. (Quadrel) in accordance with the terms of the letter agreement dated December 15, 1995. Quadrel's principal technical contact at Roy F. Weston for the tasks addressed here has been Mr. Richard Shimko.

1. Objectives:

This EMFLUX® Soil-Gas Survey was performed to demonstrate the ability of the EMFLUX® System to detect the vapor phase of targeted compounds. No background information was provided to Quadrel concerning the Site.

2. Target Compounds:

1,2-Dichlorobenzene
Tetrachloroethene
Trichloroethene

3. Investigation Plan:

- No. of Field Sample Points: 8
- No. of Trip Blanks: 1
- Total No. of EMFLUX® Cartridges: 9
- Field sample locations: **Figures 1 and 2**

As **Figures 1 and 2** shows, four EMFLUX® Collectors were emplaced in each of the two acid neutralization lime pits (CW-1 and CW-2).

4. Field Work:

Quadrel provided Roy F. Weston an EMFLUX® Field Kit with the equipment needed to conduct an eight-point EMFLUX® Soil-Gas Survey. A detailed description of field procedures is provided in **Attachment 1**. Collectors were deployed on December 7 and retrieved December 11, 1995. Individual deployment and retrieval times can be found in the Field Deployment Report (**Attachment 2**) completed by Roy F. Weston field personnel.

5. Analysis and Reporting Dates of Maryland Spectral Services, Inc. (MSS), QSI's Contract Laboratory:

- MSS received nine sample cartridges on December 12, 1995.
- Analysis completed on December 12, 1995.
- Quadrel received MSS data (**Attachment 3**) on December 14, 1995.

6. Quality Assurance/Quality Control Factors:

EMFLUX® cartridges were analyzed by thermal-desorption using gas chromatography/mass spectrometry (GC/MS) equipment for the compounds listed previously. Laboratory procedures included standards, surrogates, and blanks appropriate to the modified EPA Method 8240 (**Attachment 4**). Field work and reporting were done in accordance with Quadrel's Quality Assurance Program Plan. MSS performed analyses under the laboratory's own Quality Assurance Plan.

7. Report Notes:

- MSS analyzed each EMFLUX® cartridge for the targeted contaminants previously listed. Laboratory data, in nanograms (ng) of specific compound per cartridge, are included as **Attachment 3.**

- **Table 1** provides the Survey results in soil-gas concentrations (ng/L). Laboratory values were converted to soil-gas concentrations using the following formula:

$$C_{(p)} = 10^3 KW/TR$$

where: $C_{(p)}$ = Avg. soil-gas conc. in probe (ng/L)
K = Probe collection constant (1.24 sec/cm^3)
W = Contaminant mass (ng)
T = Collection period (sec)
R = Adsorbent recovery factor (decimal fraction)

The collection periods for individual sample points are taken from the Field Deployment Report (**Attachment 2**).

Note: Quadrel's derivation of the EMFLUX® probe collection constant, K, involved (i) adoption of 0.05 cm^2/sec as a typical diffusion coefficient, D, for VOCs in free air and (ii) evaluation of experimental laboratory data to determine the relationship between collector area, A, and depth, Z. The latter relationship, based on work done to date, indicates that A/Z = 16.19 cm. Given these values, Quadrel has computed the value of the constant to be:

$$K = 1/D(A/Z) \text{ sec/cm}^3$$
$$= 20/(16.19) \text{ sec/cm}^3$$
$$= 1.24 \text{ sec/cm}^3$$

- The trip blank is a cartridge prepared, transported, and analyzed with other samples but intentionally not exposed. Contamination on this QA/QC sample is normally subtracted from measurements of the same compounds on other samples prior to their conversion to soil-gas concentrations. Here, the trip blank (trap 8 in **Attachment 3**) recorded none of the targeted compounds, indicating that the survey site itself is the source of detected contamination.

- Because this was a limited survey and considered a demonstration, no ambient-air control samples were collected. MSS did, however, include a laboroatory method blank; the blank did not detect any of the targeted contaminants.

- The following Attachments are included:

  -1- EMFLUX® Field Procedures
  -2- Field Deployment Report
  -3- MSS Laboratory Report
  -4- MSS Laboratory Procedures
  -5- Chain-of-Custody Form

8. Discussion:

- **Table 1** provides Survey results in soil-gas concentrations by sample-point number and compound name. Interpretations of contaminant levels (*i.e.*, as low, moderate, or high) are relative solely to the findings of this Survey and should not routinely be compared with results of other EMFLUX® Surveys. To establish correlations between reported soil-gas concentrations and actual subsurface contaminant concentrations, it is necessary to do follow-on intrusive sampling at selected locations with high and moderate soil-gas concentrations. Results from such sampling can be used to determine those values that represent significant subsurface contamination.

- Trichloroethene (TCE), the only compound identified in this Survey, was found at each of the four sample locations deployed in Pit CW-1 but at none of the locations in Pit CW-2. As **Figures 3 and 4** show, the highest TCE measurement (32.25 ng/L) was recorded at sample location 6; the remaining detections were as follows: point 5 (3.69 ng/L), point 7 (2.86 ng/L), and point 9 (0.23 ng/L).

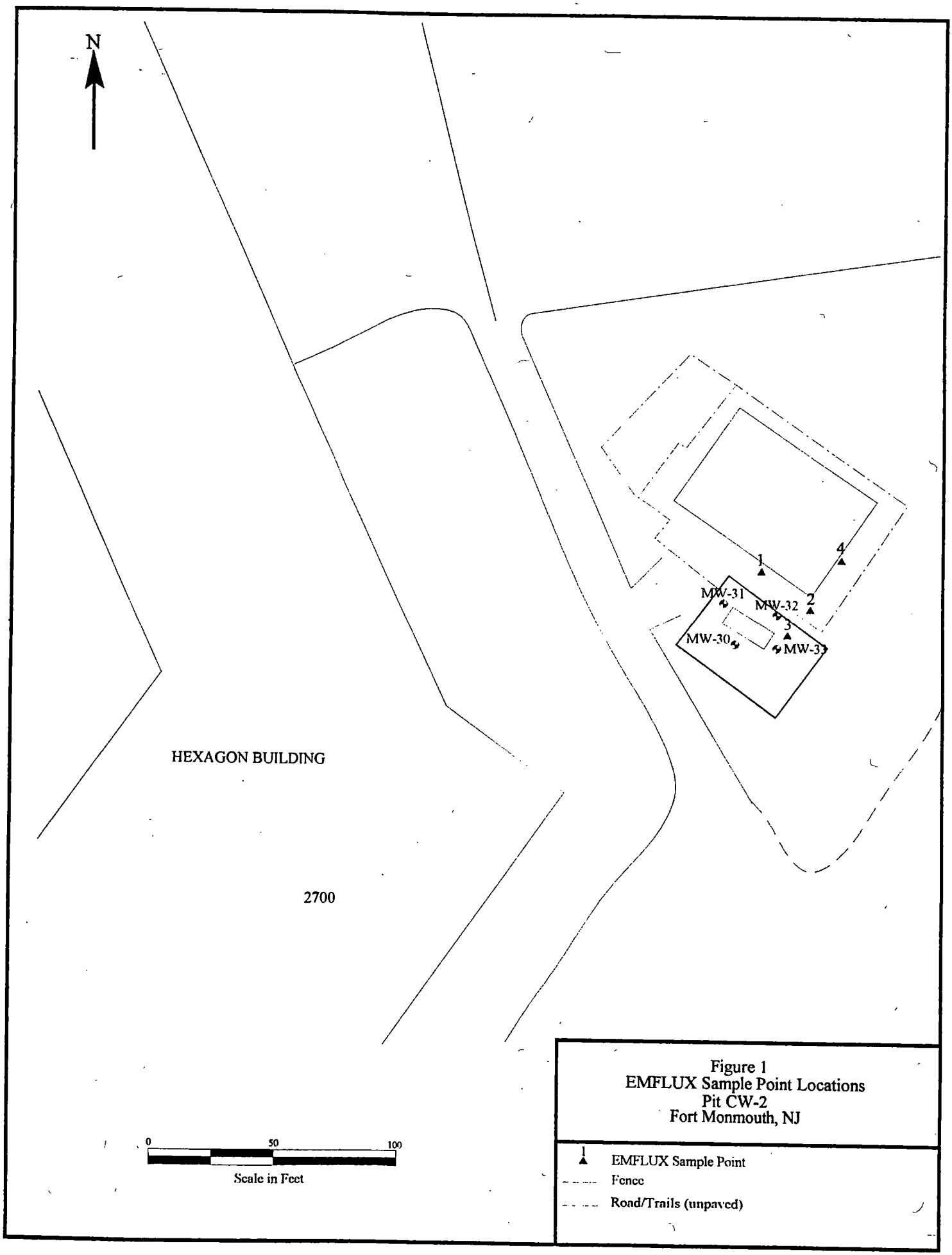
Table 1

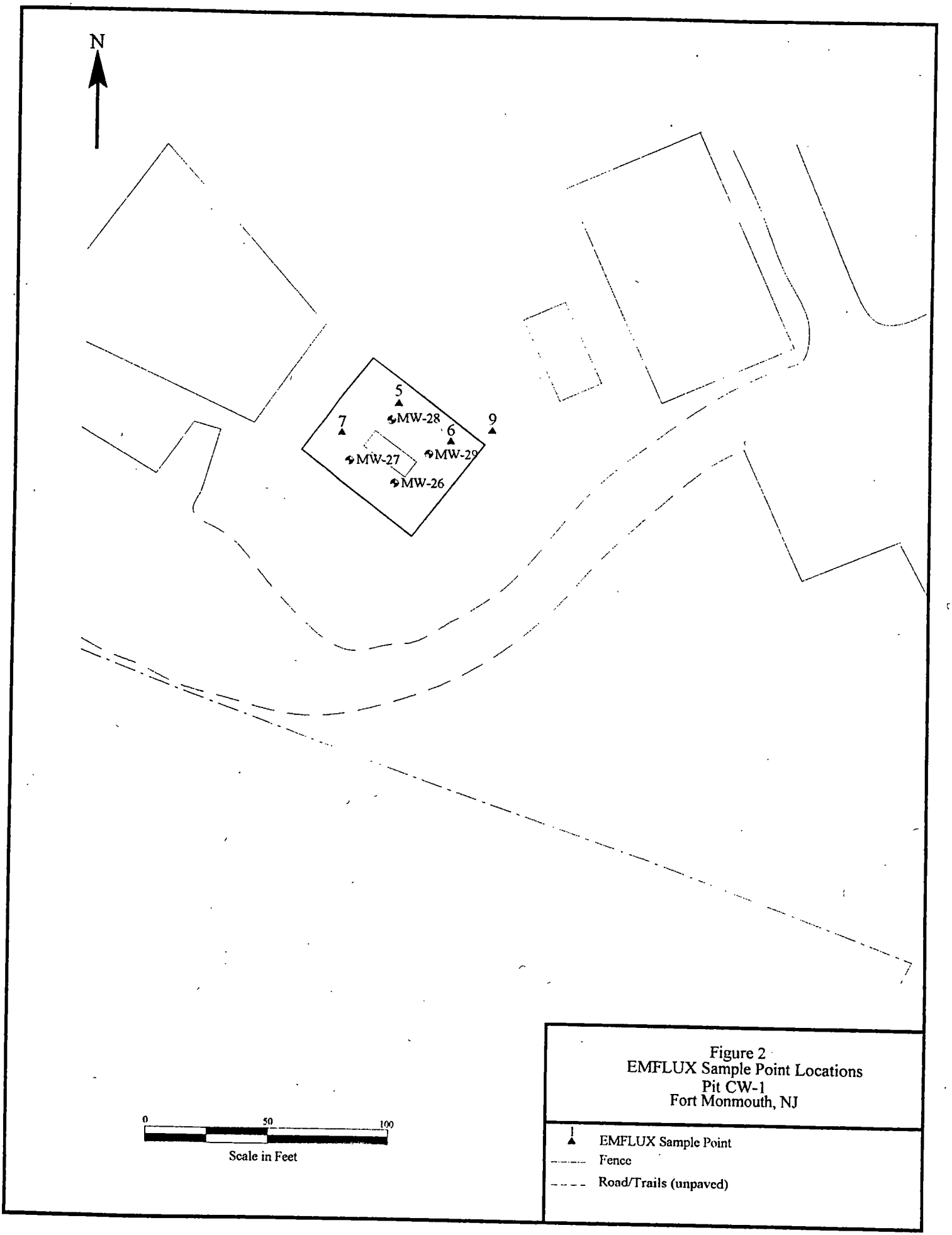
Soil-Gas Concentrations (ng/L)
Fort Monmouth, NJ Site

SAMPLE LOCATION	Q.L.	1	2	3	4	5	6	7	9
CONTAMINANTS									
Trichloroethene	0.09	--	--	--	--	3.69	32.25	2.86	0.23

NOTES:

1) The value listed under "Q.L." is the reported soil-gas concentration quantitation level.
2) "--" denotes value below the reported quantitation level.
3) Sample point 8 was designated as the trip blank.


N
HEXAGON BUILDING
2700
1
2
3
4
MW-31
MW-32
MW-30
MW-33
0
50
100
Scale in Feet
Figure 1
EMFLUX Sample Point Locations
Pit CW-2
Fort Monmouth, NJ
EMFLUX Sample Point
Fence
Road/Trails (unpaved)


N
5
7
MW-28
6
9
MW-27
MW-29
MW-26
0
50
100
Scale in Feet
Figure 2
EMFLUX Sample Point Locations
Pit CW-1
Fort Monmouth, NJ
EMFLUX Sample Point
Fence
Road/Trails (unpaved)

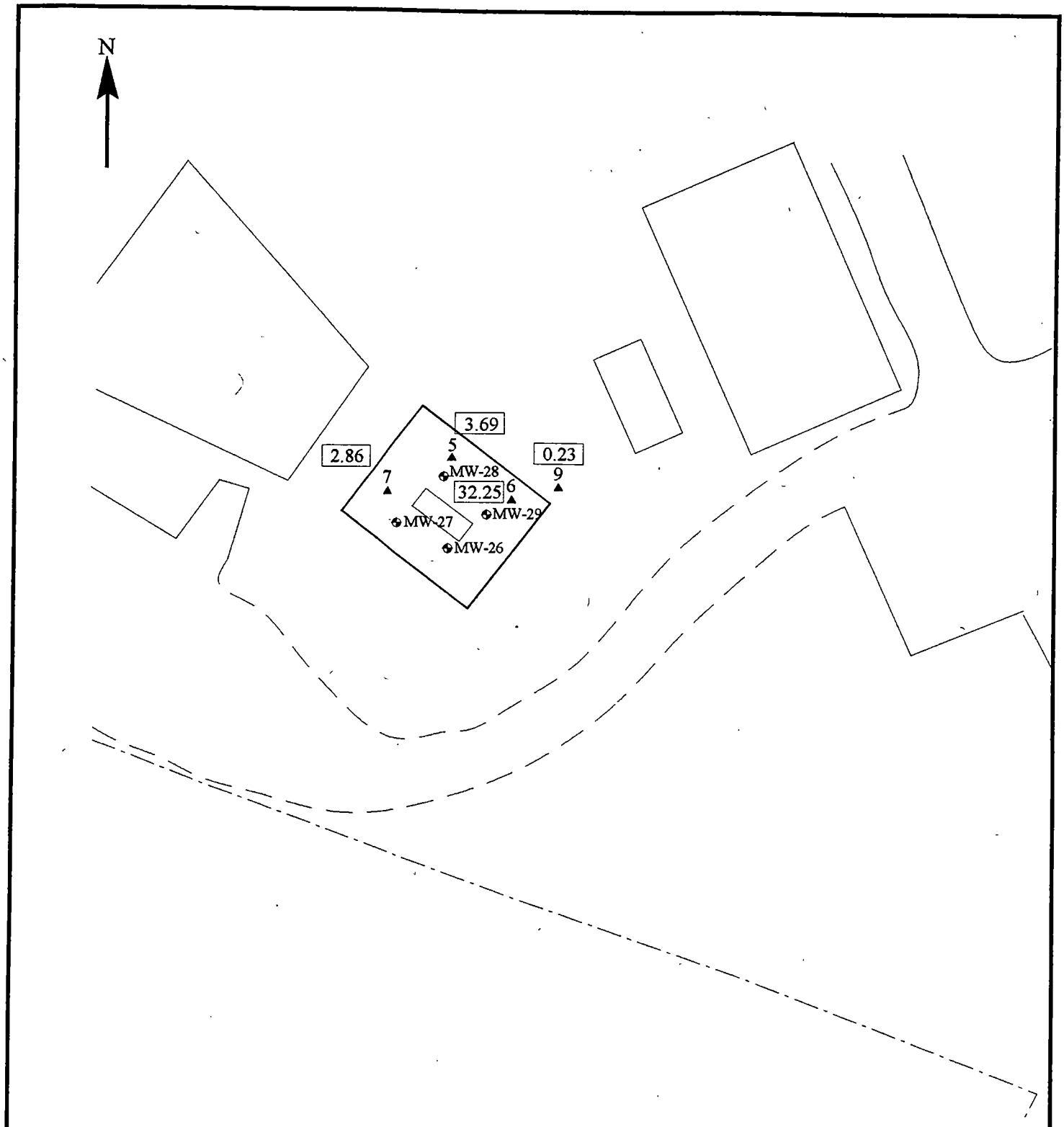


Figure 3
Trichloroethene Detections
Pit CW-1
Fort Monmouth, NJ

1 ▲ EMFLUX Sample Point

Fence ---- Road/Trails (unpaved)

0.23 Trichloroethene soil-gas concentrations (ng/L)

NOTES: The reported soil-gas concentration quantitation level for Trichloroethene is 0.09 ng/L.

Sample point 8 was designated as the trip blank.

0 50 100

Scale in Feet

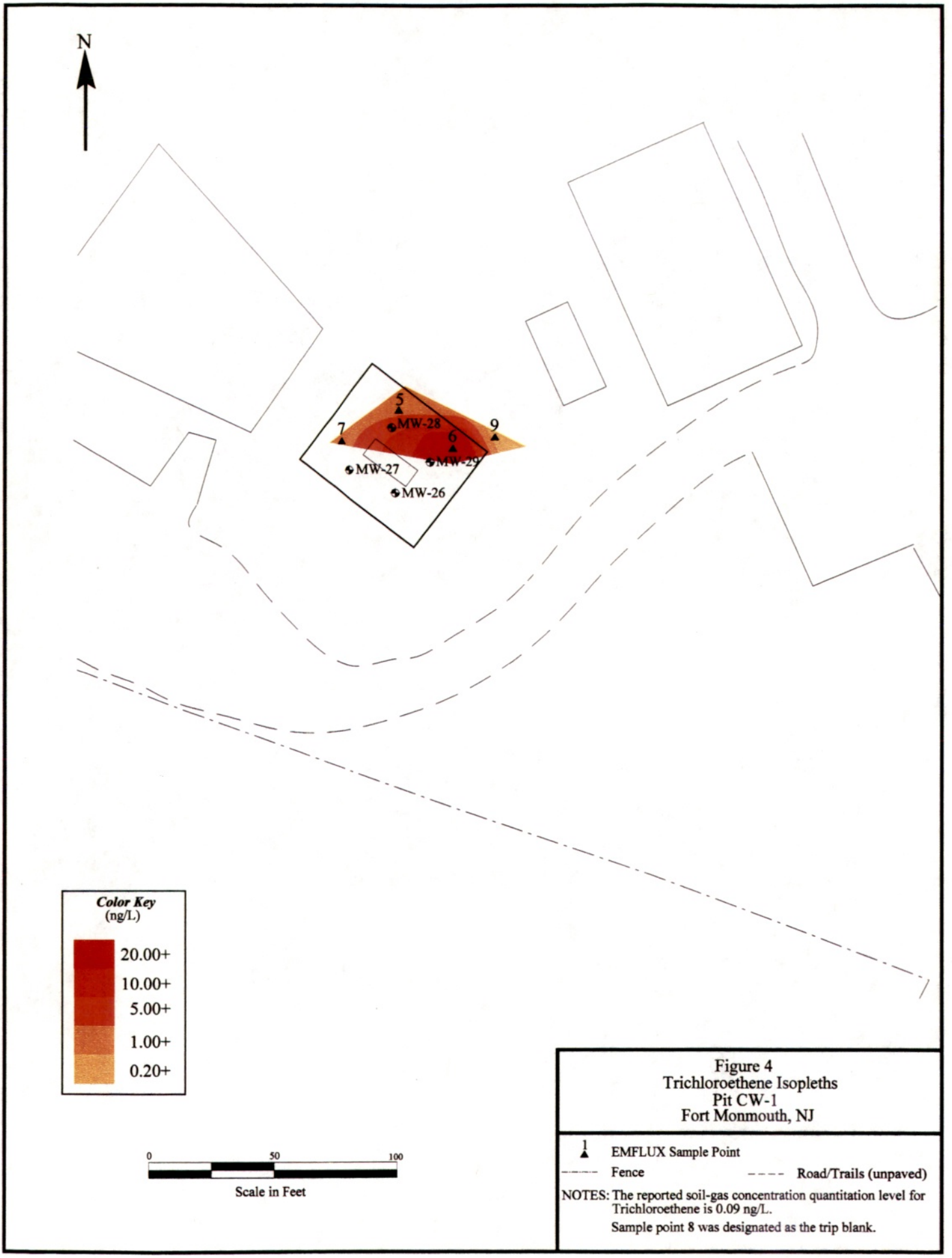


Figure 4
Trichloroethene Isopleths
Pit CW-1
Fort Monmouth, NJ

1 EMFLUX Sample Point

Fence

Road/Trails (unpaved)

NOTES: The reported soil-gas concentration quantitation level for Trichloroethene is 0.09 ng/L.

Sample point 8 was designated as the trip blank.

Attachment 1

FIELD PROCEDURES FOR EMFLUX® SOIL-GAS SURVEYS

The following field procedures are routinely used during EMFLUX® Soil-Gas Surveys. Modifications can be and are incorporated from time to time in response to individual project requirements. In all instances, Quadrel adheres to EPA-approved Quality Assurance and Quality Control practices.

A. Field personnel carry EMFLUX® system components and support equipment to the site and deploy the EMFLUX® Collectors in a prearranged survey pattern. Although EMFLUX® Collectors require only one person for emplacement and retrieval, the specific number of field personnel required depends upon the scope and schedule of the project. Each Collector emplacement generally takes less than two minutes.

B. For those sample locations covered with soils or vegetation, a field technician clears vegetation and debris exposing the ground surface. Using a hammer and a ¾-inch-diameter pointed metal stake, the technician creates a hole approximately three inches deep. For those locations covered with an asphalt or concrete cap, the field technician drills a one-inch-diameter hole through the cap to the soils beneath. [If necessary, the Collector can be sleeved with a ¾-inch i.d. copper pipe for either capped or uncapped locations).

C. The technician then removes the solid plastic cap from an EMFLUX® Collector (a glass vial containing an adsorbent cartridge with a length of wire attached to the vial for retrieval) and replaces it with a Sampling Cap (a plastic cap with a hole covered by screen meshing). The technician inserts the Collector, with the Sampling Cap end facing down, into the hole **(see attached figure)**. The Collector is then covered with either local soils for uncapped locations or, for capped locations, aluminum foil and a concrete patch. The Collector's location, time and date of emplacement, and other relevant information are recorded on the Field Deployment Form.

D. As a quality-control check during emplacement and retrieval, the technician takes periodic ambient-air control samples and records the date, time, and location of each. (One or more trip blanks are also included as part of the quality-control procedures).

E. Once all EMFLUX® Collectors have been deployed, field personnel schedule Collector recovery (approximately 72 hours after emplacement) and depart, taking all no-longer-needed equipment and materials with them.

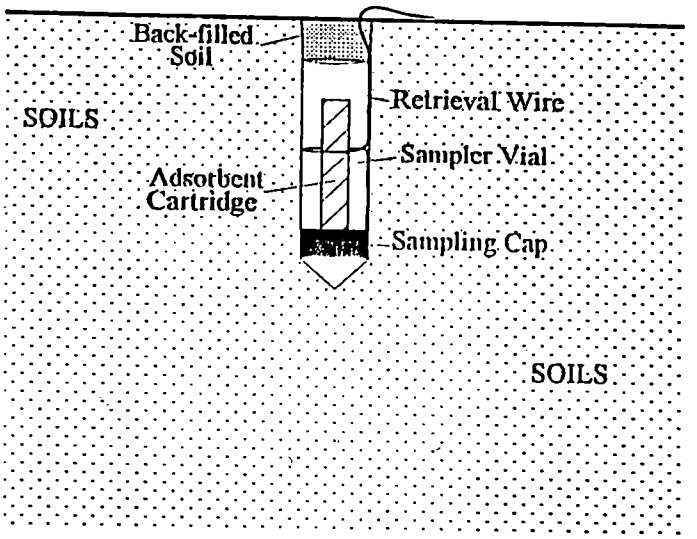
F. Field personnel retrieve the Collectors at the end of the 72-hour exposure period. At each location, a field technician withdraws the Collector from its hole and wipes the outside of the vial clean using gauze cloth; following removal of the Sampling Cap, the threads of the vial are also cleaned. A solid plastic cap is screwed onto the vial and the sample location number is written on the label. The technician then records sample-point location, date, time, etc. on the Field Deployment Form.

G. Sampling holes are refilled with soil, sand, or other suitable material. If Collectors have been installed through asphalt or concrete, the hole if filled to grade with a plug of cold patch or cement.

H. Following retrieval, field personnel ship or carry the EMFLUX® Collectors to analytical laboratories under contract to Quadrel Services. The remaining equipment is returned to Quadrel's preparation facility.

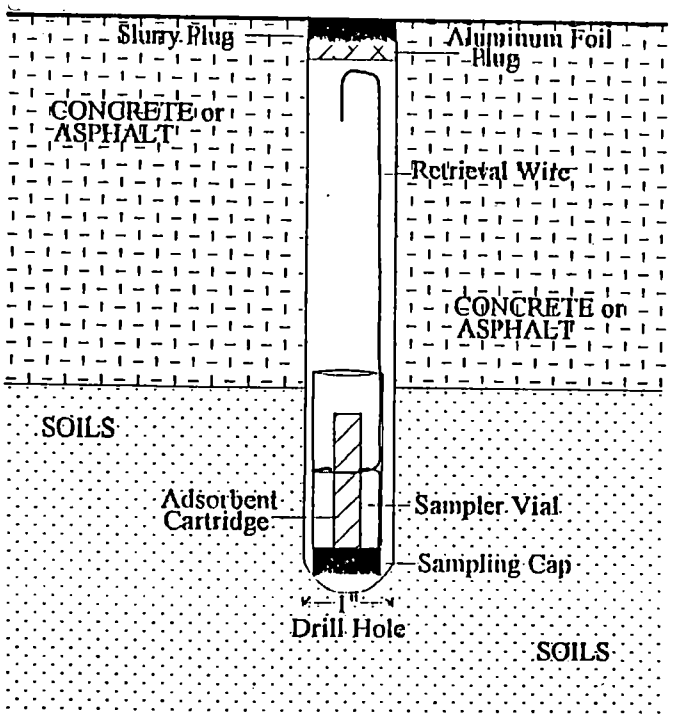
EMFLUX® COLLECTOR

DEPLOYMENT THROUGH SOILS

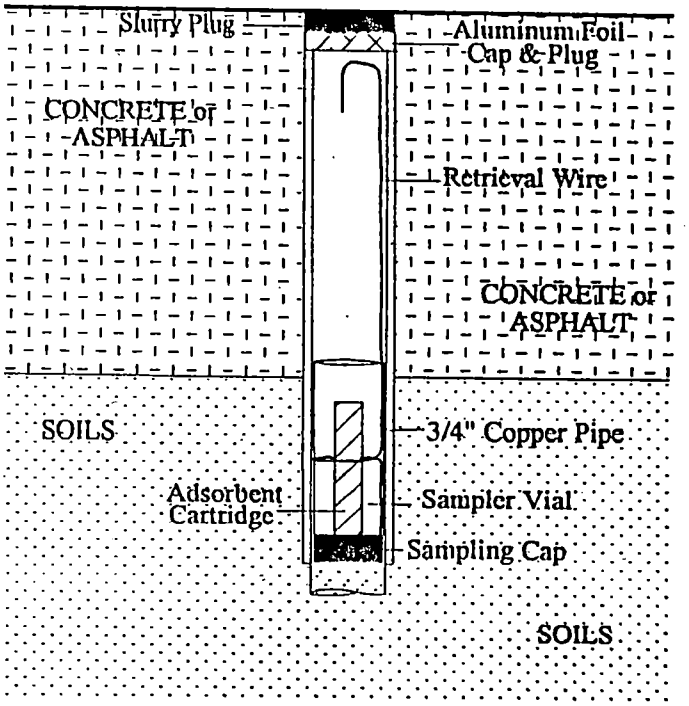


DEPLOYMENT THROUGH AN ASPHALT/CONCRETE CAP

WITHOUT COPPER-PIPE SLEEVE



WITH COPPER-PIPE SLEEVE



Attachment 2

Field Deployment Report

QUADREL SERVICES, INC.
FIELD DEPLOYMENT REPORT

CLIENT: Ray F. Weston | SITE: Fort Monmouth, NJ

INDIVIDUAL SAMPLE INFORMATION

EMPLACEMENT DATE: ~~12/4/95~~ 12/7/95 | RETRIEVAL DATE: ~~12/8/95~~ 12/11/95

SAMPLE NUMBER	TIME		FIELD NOTES (e.g., description of sample location, condition of cartridge/vial)
	Emplaced	Retrieved	
1	1040	1345	COORDINATE: 25N/ØE SITE CW-2
2	1053	1358	" 25N/25E SITE CW-2
3	1102	1406	" 12.5N/25E SITE CW-2
4	1121	1416	" 50N/25E SITE CW-2
5	1430	1437	" 25N/ØE SITE CW-1
6	1440	1448	" 25N/25E SITE CW-1
7	1450	1507	" ØN/10W SITE CW-1 (BKG.)
8	—	—	Trip Blank
9	1500	1458	COORDINATE: 37N/37E SITE CW-1 (BKG)

Attachment 3

MSS Laboratory Report

MARYLAND SPECTRAL SERVICES, INC.
1500 Caton Center Drive Baltimore, MD 21227

VOLATILE ORGANICS BY EPA GC/MS METHOD MODIFIED 8240

CLIENT SAMPLE ID:	1	2	3	4	5	6
	QS1327	QS1327	QS1327	QS1327	QS1327	QS1327
LAB SAMPLE ID:	95121201	95121202	95121203	95121204	95121205	95121206
RECEIVED DATE:	12/12/95	12/12/95	12/12/95	12/12/95	12/12/95	12/12/95
ANALYSIS DATE:	12/12/95	12/12/95	12/12/95	12/12/95	12/12/95	12/12/95
FILE NAME:	121201	121202	121203	121204	121205	121206
INSTRUMENT ID:	MSD	MSD	MSD	MSD	MSD	MSD
UNITS:	NG/TRAP	NG/TRAP	NG/TRAP	NG/TRAP	NG/TRAP	NG/TRAP
VOLATILE COMPOUNDS						
1,2-Dichlorobenzene	25 U	25 U	25 U	25 U	25 U	25 U
Tetrachloroethene	25 U	25 U	25 U	25 U	25 U	25 U
Trichloroethene	25 U	25 U	25 U	25 U	1030	9000

B - Detected in Lab Blank. U - Below Reported Quantitation Level. J - Estimated Value.

MARYLAND SPECTRAL SERVICES, INC.
1500 Caton Center Drive Baltimore, MD 21227

VOLATILE ORGANICS BY EPA GC/MS METHOD MODIFIED 8240

CLIENT SAMPLE ID:	7	8	9	VBLK1212D1
	QS1327	QS1327	QS1327	
LAB SAMPLE ID:	95121207	95121208	95121209	METHOD_BLANK
RECEIVED DATE:	12/12/95	12/12/95	12/12/95	12/12/95
ANALYSIS DATE:	12/12/95	12/12/95	12/12/95	12/12/95
FILE NAME:	121207	121208	121209	1212VBLKD1
INSTRUMENT ID:	MSD	MSD	MSD	MSD
UNITS:	NG/TRAP	NG/TRAP	NG/TRAP	NG/TRAP
VOLATILE COMPOUNDS				
1,2-Dichlorobenzene	25 U	25 U	25 U	25 U
Tetrachloroethene	25 U	25 U	25 U	25 U
Trichloroethene	800	25 U	65	25 U

B - Detected in Lab Blank. U - Below Reported Quantitation Level. J - Estimated Value.

Attachment 4

MSS LABORATORY PROCEDURES FOR EMFLUX® ADSORBENT CARTRIDGES

After exposure, EMFLUX® cartridges are analyzed using U.S. EPA Method 8240 as described in the Solid Waste Manual (SW-846), a purge-and-trap capillary gas chromatographic/mass spectrometric method, modified to accommodate thermal desorption of the adsorbent cartridges. This procedure is summarized as follows:

A. The adsorbent cartridges are thermally desorbed at 300°C for 11 minutes in a 40 mL/min helium flow, through 5mL of reagent water held in the purge-and-trap vessel, and adsorbed onto a standard three-component trap (Tenax, silica gel, coconut charcoal). The blank water is spiked with 250 ng of the internal standards and surrogate compounds specified in Method 8240.

B. Following cryofocusing, the three-component trap is thermally desorbed at 220°C onto a Restek 502.2 capillary column, per the U.S. EPA CLP Statement of Work (SOW) for the method.

C. Following the SOW, the GC/MS is scanned between 35 and 260 Atomic Mass Units (AMU) at one second per scan.

D. The internal standard method is used to determine amounts of analytes found.

E. Analytical instrument calibration and internal quality control procedures follow the requirements of Method 8240 as modified to accommodate thermal desorption of the adsorbent cartridges.

F. The instrumentation used for these analyses includes:

- Finnigan Model OWA 1050 Gas Chromatograph/Mass Spectrometer;
- Tekmar Model 6016 Aero Trap Autosampler;
- Tekmar Model LSC 2000 Liquid Sample Concentrator; and
- Tekmar Model ALS 2016 Autosampler.

Attachment 5

Chain-of-Custody Form

QUADREL SERVICES, INC.
CHAIN-OF-CUSTODY FORM

PROJECT NUMBER: Q5 1347	PROJECT NAME: Client Property
LOCATION: Fort Monmouth, NJ	CLIENT: Roy F. Weston
TARGET COMPOUNDS: Tetrachloroethene ; Trichloroethene ; 1,2- Dichlorobenzene	

SAMPLE NUMBER	LAB ID No. (for lab use only)	REMARKS (e.g., condition of sample/vial)	DATE	TIME	INIT.
1			12-11-95	1345	BEP
2		VIAL BROKE AT THREADS; USED EXTRA VIAL #10		1358	BEP
3				1406	BEP
4				1416	BEP
5				1437	BEP
6				1448	BEP
7				1507	BEP
8	/			—	BEP
9				1458	BEP

RELINQUISHED BY		DATE	TIME	RECEIVED BY	
Signature	Printed Name			Signature	Printed Name
Ben Breese	Ben Breese	11/29/95	1500	—	U.P.S.
—	U.P.S.				
Brett E. Pasapane	BRETT E. PASAPANE	12-11-95	1600		UPS
	UPS	12-12-95	9 AM	[signature]	S HAMNER