

APPENDIX L

Soil Gas Survey Results

L1.0 INTRODUCTION

Between June 28th and July 2nd, 1993, EBASCO Environmental performed a soil gas survey as part of the RI/FS at the Tooele Army Depot South Area. The survey was performed at SWMU 5 (one of the group's two SWMU's) to identify the presence of volatile organic compounds potentially present in the soil or groundwater. SWMU 5 is located at the old building 600 foundation, and where a drainage pond and ditch lead from the site of the foundation. The area surrounding SWMU 5 is not currently being used. Previous activities included high explosive munitions washout; white phosphorus grenade, smoke pot and mustard projectile renovation; and a truck decontamination area.

L2.0 SAMPLING AND ANALYSIS PROCEDURES

Soil gas samples were collected by advancing a 5/8-inch diameter solid steel probe 3 feet into the ground and then withdrawing it. A sampling probe with a diameter slightly larger than 5/8 inch was then advanced 2 feet into the hole. At least four probe volumes were purged from the sampling probe using a hand-operated vacuum pump. A sample was then collected through a septa located between the sampling probe and vacuum pump with a Hamilton 1.0 milliliter (ml) gas-tight sampling syringe by extracting 1.0 ml of soil gas. The sample was injected into the portable gas chromatograph (GC) for analysis.

A Photovac 10S70 portable GC was used for analysis. The GC was calibrated to recognize trichloroethylene (TCE), tetrachloroethylene (PCE), benzene, toluene and xylene. Standards were prepared from commercially available, spectroscopic-grade reagents purchased from Aldrich Chemical. To prepare the standards, calculated volumes of the above-mentioned compounds were added to a 250-ml amber glass bottle purged with hydrocarbon-free air. This vapor standard was diluted into a second 250-ml amber glass bottle to make the working standard, which was used to calibrate the GC. Calibration consisted of injecting the standard and setting the Photovac computer to recognize and quantify the chromatographic peak of each compound. New standards were prepared daily. All concentrations were reported in microliters of analyte vapor per liters of air (parts per billion, ppb).

In addition to the quantitative determination of these compounds, a qualitative determination was made for any unknown peaks recorded on the chromatograms which include any hydrocarbons, including fuel products, that the Photovac is capable of detecting. These nontarget compounds were reported as total petroleum hydrocarbons (TPH) with relative concentrations noted.

L3.0 QUALITY ASSURANCE/QUALITY CONTROL

QA/QC samples were run throughout the field investigation to ensure the quality and reproducibility of the data. A minimum of three QA/QC samples were run for every ten unique samples analyzed. Standards were run to confirm the calibration of the GC. Sample duplicates (two samples for the same point) were run to check the reproducibility of the sampling and analysis procedures.

Blanks were run to check for carry-over (cross-contamination) between samples. Although carry-over associated with the GC is uncommon, no-injection blanks were run to ensure that there was no carry-over in the GC. No-injection blanks consist of running an analysis but not injecting a sample into the GC. Ambient air blanks were run to check for carry-over in the sampling syringe. Ambient air blanks consist of injecting ambient air into the GC. Probe blanks were run to check for carry-over in the sampling probe. Probe blanks consist of pumping ambient air through the probe, collecting a sample, and analyzing the sample.

A total of 23 standards, 19 blanks, and 9 duplicate samples were analyzed throughout the soil gas survey. The results of these QA/QC samples are consistent with the data quality objectives typically set for soil gas screening, and therefore, indicative of good data quality.

Detection limits for the target analytes were set based on the results of the QA/QC analyses and the GC's sensitivity for each target analyte. The QA/QC results provide a measure of site specific background and interferences. Detection limits ensure that all quantitative data are reproducible and are supported by the QA/QC data.

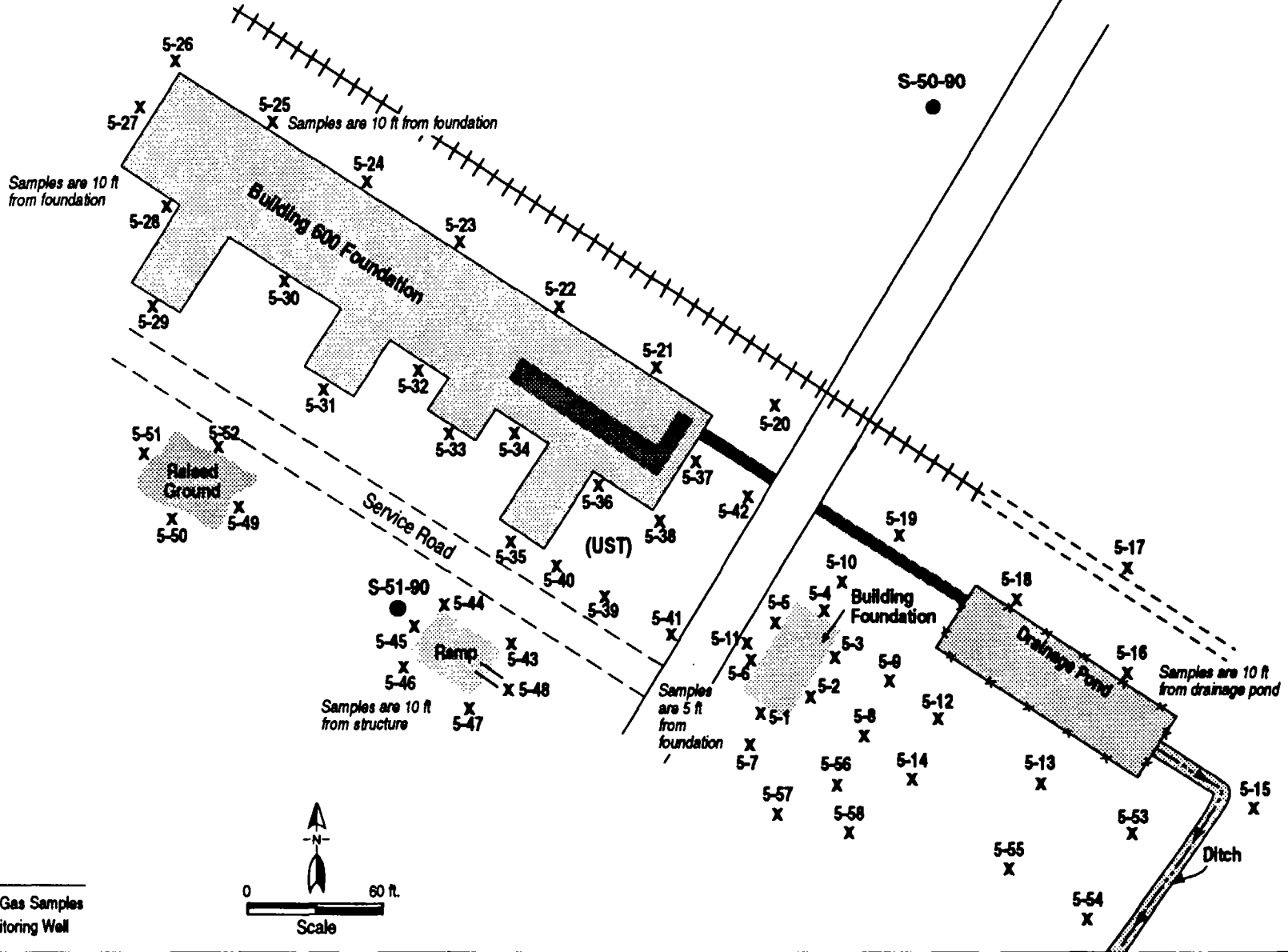
L4.0 RESULTS AND CONCLUSIONS

During the Phase I investigation, performed by Ebasco, soil samples taken from the drainage pond indicated heavy metals concentrations. Previous groundwater sampling results indicate the presence of toluene and trichlorethylene, with some other possible chlorinated VOC's, in the groundwater. The soil gas survey was prompted by these results. Figures L4.0-1 and L4.0-2 show the locations and concentrations of target analytes, and Table L4.0-1 lists the target analyte concentrations. Figure L4.0-3 shows isoconcentration contours of TCE.

Trichloroethylene (TCE) was present in many of the sample locations at elevated levels. Samples 5-1 through 5-5, 5-8 through 5-10, 5-19 and 5-56 show levels between 100 and 1,000 ppb. Samples 5-6, 5-11, 5-13, 5-16, 5-17, 5-34, 5-36, 5-40, 5-41, 5-44, 5-53, and 5-54 indicate levels between the detection limit of 25 ppb and 100 ppb. The elongation of the TCE contours are consistent with the direction of groundwater flow.

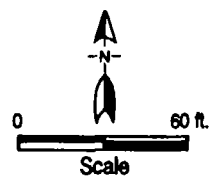
The TCE detections are centered around the building foundation that lies to the west of the drainage pond but to the east of the main road and building 600. Samples 5-16, 5-17, and 5-18 to the north of the pond show no indication of TCE detections. Groundwater flow is to the southeast at this particular area of the SWMU, and only minor detections were shown at 5-13, 5-53, and 5-54. This is an indication that the drainage pond is not the source of the TCE contamination. The levels of concentration of TCE are highest to the east of the foundation, and adjacent TCE detections decrease indicating a single "hot spot" with potentially some migration. The occurrence of TCE cannot be tied to the history of the building and pond use.

While TCE appears to be the most common organic compound present, toluene also appears to be present at some of the locations (see Table L4.0-1 and Figure L4.0-2). These detections are indicated by asterisks in the table and on the figures. The detections are near the analytical detection limit of 50 ppb, but due to matrix interference not necessarily large enough to report. Since there are no high level toluene detections, and no pattern to the detections, it is possible these low level detections are just anomalies, and not an indication of toluene contamination.



L-4

Legend
 X Soil Gas Samples
 ● Monitoring Well



T3G2 6.94.jb

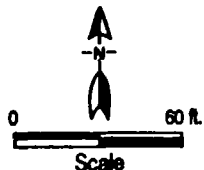
Figure L4.0-1
Soil Gas Survey Locations at SWMU 5
 Tooele Army Depot - South Area
 Prepared by: Ebasco Services Incorporated

L-5

Legend

- Monitoring Well
- X Soil Gas Sample
- TCE | 40 TCE concentration in ppb

* Detection cannot be quantified
 No organics detected where no data shown



T3G2 6.94.jb

Figure LA.0-2
Soil Gas Survey Results at SWMU 5
Drainage Pond Enlargement

Tooele Army Depot - South Area
 Prepared by: Ebasco Services Incorporated

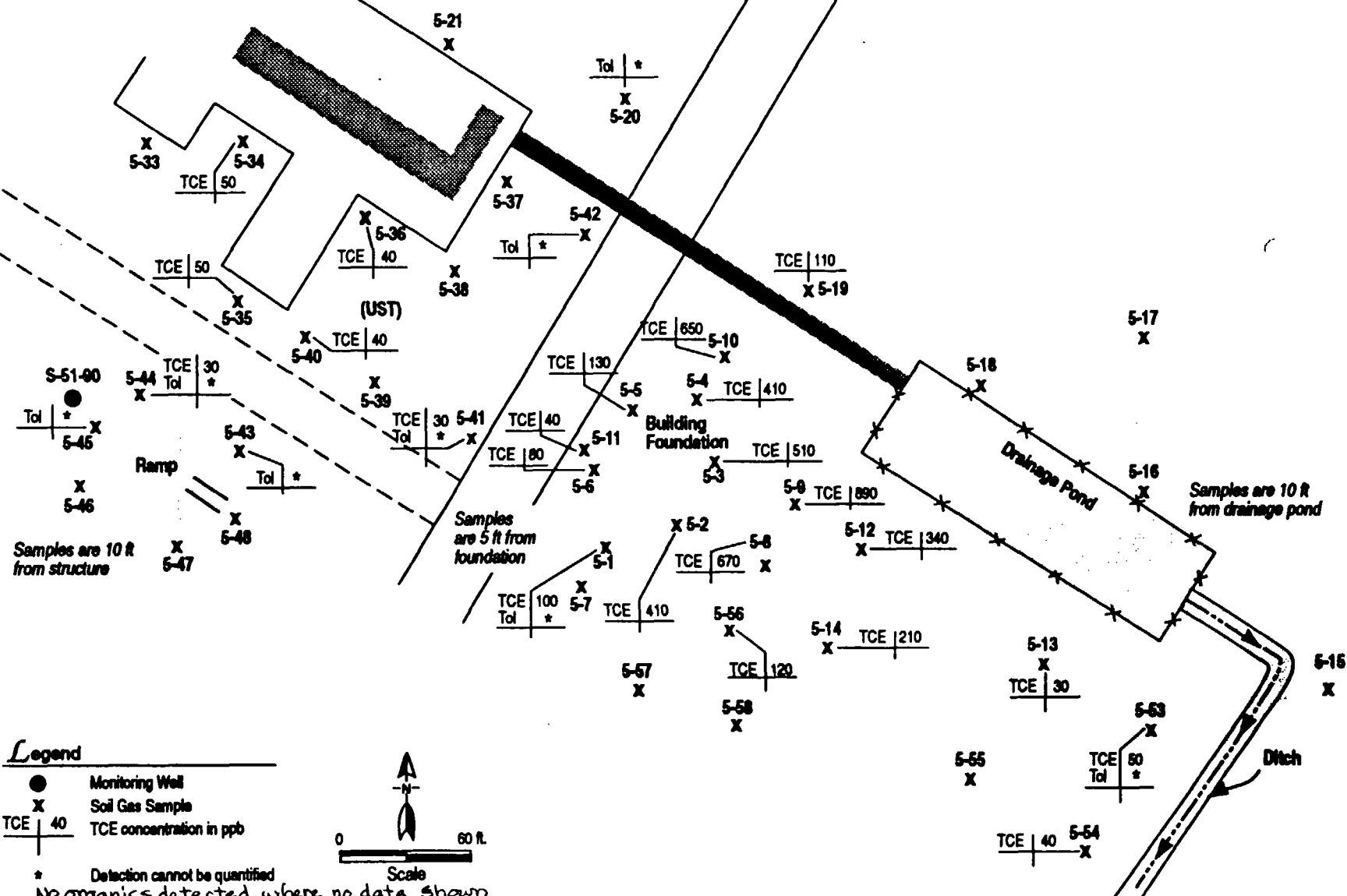


Table L4.0-1 Tooele Army Depot South Area/SWMU 5 Soil Gas Survey

Sample #	Target Analyte Concentration (ppb)					Remarks
	Benzene	TCE	Toluene	PCE	Xylene	
DL=	25	25	50	100	100	
5-1		100				
5-2		410				
5-2-DUP		490				
5-3		510				
5-4		410				
5-5		130				
5-6		80				
5-7						
5-8		670				
5-9		890				
5-10		650				
5-11		40				
5-12		340				
5-12-DUP		190				
5-13		30				
5-14		210				
5-15						
5-16		30				
5-17		30				
5-18						
5-19		110				
5-19-DUP		110				
5-20			*			
5-21						
5-22						
5-22-DUP						
5-23			*			
5-24			*			
5-26			*			
5-27						
5-28						
5-29						
5-30						
5-31						
5-32						
5-33						
5-34		50				
5-34-DUP		50				
5-35		50				
5-36		30				

DL=detection limit
 ppb=parts per billion
 TCE=trichloroethylene
 PCE=tetrachloroethylene
 *=qualitative toluene detection near detection value limit

Sample #	Target Analyte Concentration (ppb)					Remarks
	Benzene	TCE	Toluene	PCE	Xylene	
DL=	25	25	50	100	100	
5-37						
5-38						
5-39						
5-40		40				
5-40-DUP		40				
5-41		30	*			
5-42			*			
5-43			*			
5-44		30	*			
5-44-DUP			*			
5-45			*			
5-46						
5-47						
5-47-DUP						
5-48						
5-49						
5-50						
5-51						
5-52			*			
5-53		50	*			
5-54		40				
5-55						
5-56		120				
5-56-DUP		90				
5-57						
5-58						

DL=detection limit

ppb=parts per billion

TCE=trichloroethylene

PCE=tetrachloroethylene

*=qualitative toluene detection near detection value limit

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