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Revision 0

200-PW-1 Operable Unit Report on Step II Sampling and Analysis of the Dispersed Carbon Tetrachloride Vadose-Zone Plume

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Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

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Richland, Washington

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TERMS

Beacon	Beacon Environmental Services, Inc., Bel Air, Maryland
bgs	below ground surface
c/s	counts per second
CAS	Chemical Abstracts Service
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	*Code of Federal Regulations*
COC	contaminant of concern
COI	contaminant of interest
CPT	cone penetrometer
dispersed plume	dispersed carbon tetrachloride vadose-zone plume
DNAPL	dense, nonaqueous-phase liquid
DPT	direct-push technology
DQO	data quality objective
EAPS	Enhanced Access Penetration System
GW	groundwater
HEIS	*Hanford Environmental Information System* database
HHR	hydraulic hammer rig
ID	identification (number)
N/A	not applicable
NA	not analyzed
na	(groundwater) not sampled
OU	operable unit
PFP	Plutonium Finishing Plant
ppmv	parts per million by volume
RI	remedial investigation
RPD	relative percent difference
SAF	Sampling Authorization Form
Step I sampling and analysis plan	DOE/RL-2001-67, *200-PW-1 Operable Unit Dispersed Carbon Tetrachloride Vadose Zone Plume Sampling and Analysis Plan – Step I*
Step I sampling and analysis plan supplement	DOE/RL-2001-01, Appendix C, "200-PW-1 Operable Unit Dispersed Carbon Tetrachloride Vadose Zone Plume Sampling and Analysis Plan-Step I"
Step II sampling and analysis plan	DOE/RL-2001-01, Appendix D, "200-PW-1 Operable Unit Dispersed Carbon Tetrachloride Vadose Zone Plume Sampling and Analysis Plan-Step II"
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989)
Vista Engineering	Vista Engineering Technologies, LLC

VOC	volatile organic compound
Work Plan	DOE/RL-2001-01, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit RI/FS Work Plan, Includes: 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*

METRIC CONVERSION CHART

Into Metric Units			Out of Metric Units		
If you know	*Multiply by*	*To get*	*If you know*	*Multiply by*	*To get*
Length			**Length**		
inches	25.40	millimeters	millimeters	0.0394	inches
inches	2.54	centimeters	centimeters	0.394	inches
feet	0.305	meters	meters	3.281	feet
yards	0.914	meters	meters	1.094	yards
miles (statute)	1.609	kilometers	kilometers	0.621	miles (statute)
Area			**Area**		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.0929	sq. meters	sq. meters	10.764	sq. feet
sq. yards	0.836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.591	sq. kilometers	sq. kilometers	0.386	sq. miles
acres	0.405	hectares	hectares	2.471	acres
Mass (weight)			**Mass (weight)**		
ounces (avoir)	28.349	grams	grams	0.0353	ounces (avoir)
pounds	0.454	kilograms	kilograms	2.205	pounds (avoir)
tons (short)	0.907	ton (metric)	ton (metric)	1.102	tons (short)
Volume			**Volume**		
teaspoons	5	milliliters	milliliters	0.034	ounces (U.S., liquid)
tablespoons	15	milliliters	liters	2.113	pints
ounces (U.S., liquid)	29.573	milliliters	liters	1.057	quarts (U.S., liquid)
cups	0.24	liters	liters	0.264	gallons (U.S., liquid)
pints	0.473	liters	cubic meters	35.315	cubic feet
quarts (U.S., liquid)	0.946	liters	cubic meters	1.308	cubic yards
gallons (U.S., liquid)	3.785	liters			
cubic feet	0.0283	cubic meters			
cubic yards	0.764	cubic meters			
Temperature			**Temperature**		
Fahrenheit	(°F-32)*5/9	Centigrade	Centigrade	(°C*9/5)+32	Fahrenheit
Radioactivity			**Radioactivity**		
picocurie	37	millibecquerel	millibecquerel	0.027	picocurie

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1.0 INTRODUCTION

The sampling and analysis activities summarized in this report were conducted in support of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) remedial investigation (RI) for the 200-PW-1 Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit (OU), located in the 200 West Area of the Hanford Site. The 200-PW-1 OU waste sites received plutonium-rich and organic-rich waste from several processes located within the Z Plant complex (now referred to as the Plutonium Finishing Plant [PFP] complex). A primary component of the organic-rich waste was carbon tetrachloride. The RI consists of two major components: investigation of the known 200-PW-1 OU waste sites and investigation of the dispersed carbon tetrachloride vadose-zone plume (dispersed plume).

The dispersed plume extends beyond the known 200-PW-1 OU waste-site boundaries. The dispersed plume is associated with the 200-PW-1 OU because of the large carbon tetrachloride inventories that were discharged to the soil column as a result of both deliberate discharges and unplanned releases to the known 200-PW-1 OU waste sites. The carbon tetrachloride in the 200-PW-1 OU waste subsequently migrated from the waste sites through the vadose zone, reaching groundwater beneath some waste sites. The carbon tetrachloride also migrated laterally from the waste sites within the vadose zone. The objective of the dispersed-plume investigation is to characterize the nature and extent of the carbon tetrachloride vadose-zone plume, determine whether carbon tetrachloride also may have been released at unknown locations within the vadose zone, and locate and characterize the sources of carbon tetrachloride contamination that presently are impacting groundwater as well as the known and suspect release sites, with the potential to impact groundwater in the future.

The RI of the dispersed plume was conducted in two steps. The study area for Step I of the investigation was the vadose zone overlying the highest concentration portion of the carbon tetrachloride groundwater plume. Step I was focused only on characterizing the shallow portion of the vadose zone (i.e., above the Cold Creek unit). Based on the results of Step I vapor sampling, additional locations were identified for Step II characterization to groundwater (approximately 70 m below ground surface [bgs]). The study area for the Step II investigation included the vadose zone overlying the entire carbon tetrachloride groundwater plume. The data collected in Step I and Step II were augmented with results from other planned and ongoing characterization activities within the 200 West Area, as well as compilation of any existing data.

The Step I RI was conducted between May and October 2002. Characterization was performed in accordance with DOE/RL-2001-67, *200-PW-1 Operable Unit Dispersed Carbon Tetrachloride Vadose Zone Plume Sampling and Analysis Plan – Step I* (Step I sampling and analysis plan). This sampling plan was later incorporated in its entirety into the Work Plan (DOE/RL-2001-01, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit RI/FS Work Plan, Includes: 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*) as Appendix C (Step I sampling and analysis plan supplement). The results of the Step I RI of the dispersed plume were provided in CP-13514, *200-PW-1 Operable Unit Report on Step I Sampling and Analysis of the Dispersed Carbon Tetrachloride Vadose Zone Plume.*

The Step II RI was conducted between July 2003 and November 2006. Characterization was performed in accordance with Appendix D of DOE/RL-2001-01 ("200-PW-1 Operable Unit Dispersed Carbon Tetrachloride Vadose Zone Plume Sampling and Analysis Plan – Step II") (Step II sampling and analysis plan). This report provides the results of the Step II RI of the dispersed plume.

In 2004, Vista Engineering Technologies, LLC (Vista Engineering) was selected by the U.S. Department of Energy, Richland Operations Office, to conduct the Alternatives for Carbon Tetrachloride Source Term Location project (Alternatives project). Completion of this project was part of the dense, nonaqueous-phase liquid (DNAPL) investigation strategy agreed to by the U.S. Environmental Protection Agency and the Richland Operations Office during the fiscal year 2003 data quality objectives (DQO) process for investigation of DNAPL in the 200 West Area (DOE/RL-2001-01, Chapter 6.0). Fluor Hanford and Vista Engineering closely coordinated the activities conducted by Fluor as part of the Step II RI of the dispersed plume and the activities conducted by Vista Engineering as part of the Alternatives project. Some of the data collected by Vista Engineering were used to meet the intent of the Step II sampling design. The Alternatives project RI was conducted in accordance with DOE/RL-2004-78, *Work Plan for Integrated Approach for Carbon Tetrachloride Source Term Location in the 200 West Area of the Hanford Site*. All of the data collected as part of the Alternatives project are provided in DOE/RL-2006-58, *Carbon Tetrachloride Dense Non-Aqueous Phase Liquid (DNAPL) Source Term Interim Characterization Report*, and DOE/RL-2007-22, *Carbon Tetrachloride Dense Non-Aqueous Phase Liquid (DNAPL) Source Term Characterization Report Addendum*.

1.1 PURPOSE OF REPORT

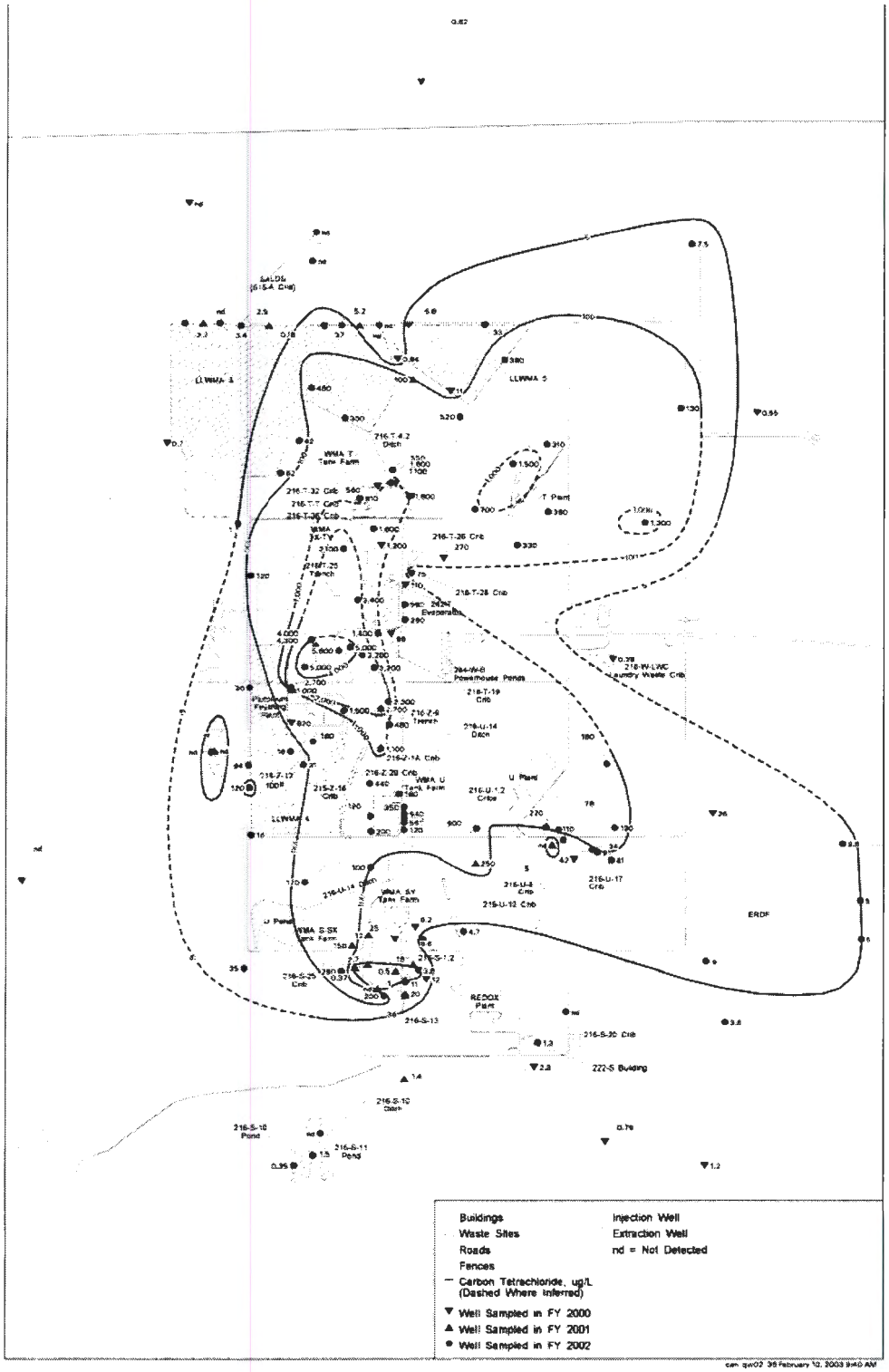
The purpose of this report is to summarize the sampling methodology and the analytical results from the Step II RI of the 200-PW-1 OU dispersed plume, as described in DOE/RL-2001-01, Section 5.2.2.6. All of the dispersed-plume investigation results will be used as supporting information in the 200-PW-1 OU RI report (DOE/RL-2006-51, *Remedial Investigation Report for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*). A data quality assessment of the RI data was performed, and the results are presented in D&D-30565, *Data Quality Assessment Reports for the 200-PW-1 and 200-PW-3 Operable Units: 216-Z-9 Trench Vertical Borehole C3426, 216-Z-9 Trench Slant Borehole C3427, Dispersed Carbon Tetrachloride Vadose-Zone Plume Investigation, and 216-A-8 Crib Borehole C4545*.

1.2 FIELD-SAMPLING PLAN

The field-sampling plan was based on the sampling design developed during the DQO process, as documented in CP-15372, *Remedial Investigation Data Quality Objective Summary Report for the 200-PW-1 Operable Unit Dispersed Carbon Tetrachloride Vadose Zone Plume – Step II*. For the dispersed plume, carbon tetrachloride is the sole contaminant of concern. Soil-vapor samples were collected during Step II to cost-effectively explore a large area using field-screening methods. The sampling plan included contingency soil sampling, based on the results of the soil-vapor field screening. Groundwater samples were collected to compare carbon tetrachloride concentrations dissolved in the uppermost aquifer to soil-vapor concentrations in

the deep vadose zone. The study area for the Step II RI of the dispersed plume is shown in Figure 1-1.

Figure 1-1. Study Area for Step II of the Dispersed Carbon Tetrachloride Vadose-Zone Plume Investigation. (From DOE/RL-2001-01)



During the DQO process for the Step II investigation, two approaches were used to identify additional characterization activities. In one approach, the Step I investigation results and additional information were used to identify known or potential carbon tetrachloride release sites that need to be characterized. Release sites are near-surface engineered facilities (or unplanned releases) that have the potential to release carbon tetrachloride to the vadose zone. In the other approach, areas of elevated concentrations in the groundwater plume were identified that may indicate the locations of carbon tetrachloride sources in the deep vadose zone that are contributing mass to the groundwater and that should be characterized.

The sampling design in the Step II sampling and analysis plan outlined a sequence of sampling events (DOE/RL-2001-01, Appendix D). The logic was developed to allow some sampling decisions to be made based on the initial sampling results. For example, the sampling design specified that soil samples would be collected, if feasible, at locations with carbon tetrachloride soil-vapor concentrations exceeding 1,200 parts per million by volume (ppmv). The concentration of 1,200 ppmv is 10 percent of the concentration of saturated carbon tetrachloride vapor.

The Step II sampling design is summarized in Table D-8 in the Work Plan (DOE/RL-2001-01, Appendix D). That table is reproduced in this report as Table 1-1. Under the "Sample-Collection Methodology" column, the boldface type has been added to help the reader locate the discussion of the specific investigation activities and the results of those investigations in this report.

Based on the Step I investigation results and evaluation of sites outside the Step I study area, the following known or potential carbon tetrachloride release sites were identified for further characterization in Step II during the DQO process (CP-15372):

- 216-Z-1A Tile Field
- 216-Z-9 Trench
- 216-Z-18 Crib
- 216-T-19 Crib
- 216-Z Ditch system (216-Z-1D, 216-Z-11, 216-Z-19 Ditches, and 216-Z-20 Crib)
- 216-Z-7 Crib
- 216-Z-12 Crib
- 216-Z-16 Crib
- 216-Z-17 Trench
- Trench T-04 in the 218-W-4C Burial Ground
- 216-S-25 Crib
- 218-W-3A Burial Ground.

Table 1-1. Step II Sampling Design. (Table D-8 from DOE/RL-2001-01, Appendix D) (6 Pages)

Sample-Collection Methodology	Key Features of Design*	Basis for Sampling Design
	Release Sites	
Sampling using direct-push technology and/or passive, sorbent soil-vapor collectors to evaluate lateral extent of dispersed carbon tetrachloride vadose-zone plumes at the 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib. **Investigation activities are described in Section 2.1, and the results are described in Section 3.1.**	Use a direct-push technology to collect soil-vapor samples to the north, south, and east of the 216-Z-9 Trench. Starting near the trench boundary, collect samples at approximately 15.2 m (50-ft) intervals, moving progressively farther from the trench. At a minimum, continue until the sampling locations are at least 225 m (750 ft) away from the 216-Z-9 Trench. Continue sampling until carbon tetrachloride concentrations are below detection. At a maximum, continue until the sampling locations are 300 m (1,000 ft) away from the trench. At each sampling location, collect samples from depths of 4.6 and 7.6 m (15 and 25 ft) below ground surface. Continue sampling at 7.6 m (25-ft) depth intervals until reaching 38.1 m (125 ft) below ground surface or until the direct-push technology cannot advance deeper into the subsurface (i.e., refusal) (DOE/RL-2001-01, Table D-9). Analyze soil-vapor samples for VOCs using field-screening instrument. Passive, sorbent soil-vapor collectors may be used instead of, or in addition to, the direct-push technology to characterize the soil-vapor plume. During recent drilling of a vertical well on the south side of the 216-Z-9 Trench as part of the DNAPL investigation (DOE/RL-2001-01, Appendix E), a silt layer was identified from 19.8 to 20.4 m (65 to 67 ft) bgs. This silt layer appears to be associated with relatively high carbon tetrachloride vapor concentrations and the potential presence of DNAPL. The lateral distribution of the silt layer in the vicinity of the 216-Z-9 Trench will be investigated as an area of focus for the dispersed plume. Sampling in the vicinities of the 216-Z-1A Tile Field and 216-Z-18 Crib will be considered as the second phase of this task. If the results of the 216-Z-9 Trench sampling indicate that this sampling design should be modified, those proposed changes will be discussed with the U.S. Environmental Protection Agency.	This characterization will be conducted in the vicinities of the primary carbon tetrachloride disposal sites to evaluate lateral migration beyond the waste-site boundaries. As part of airflow modeling of soil-vapor extraction operations at the 216-Z-9 Trench, the applied vacuum in the Hanford sand was calculated to extend approximately 80 to 140 m (260 to 460 ft) beyond the trench boundaries for different configurations of on-line wells (BHI-00882). Therefore, sampling at the 216-Z-9 Trench will continue to distances at least 225 m (750 ft) beyond the trench boundaries. The vertical sampling scheme is consistent with the Step I sampling (DOE/RL-2001-01, Appendix C). The Enhanced Access Penetration System will be considered for investigating the silt layer at the 216-Z-9 Trench. Sampling at the 216-Z-1A Tile Field and 216-Z-18 Crib will be considered using a similar strategy.

Table 1-1. Step II Sampling Design. (Table D-8 from DOE/RL-2001-01, Appendix D) (6 Pages)

Sample-Collection Methodology	Key Features of Design*	Basis for Sampling Design
Sampling using direct-push technology to evaluate potential accumulation areas at the 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib. **Investigation activities are described in Section 2.2, and the results are described in Section 3.2.**	1. Develop Cold Creek unit topographic maps in the area surrounding the three primary carbon tetrachloride waste sites using technologies such as seismic response, barometric pressure response, and/or geophysical logging of existing boreholes. 2. Collect soil-vapor samples above and within the Cold Creek unit low points and/or breakthrough locations using direct-push technology for confirmation of potential DNAPL or source presence (DOE/RL-2001-01, Table D-9). 3. Collect soil-vapor samples above and within the Cold Creek unit at the locations northwest and southwest of the 216-Z-9 Trench, where an anomaly that potentially could indicate DNAPL was identified during the seismic-reflection survey in 1999. At each sampling location, collect samples from depths of 4.6 and 7.6 m (15 and 25 ft) below ground surface. Continue sampling at 7.6 m (25-ft) depth intervals until reaching 38.1 m (125 ft) below ground surface or until the direct-push technology cannot advance deeper into the subsurface (i.e., refusal). Analyze soil-vapor samples for VOCs using field-screening instrument.	This characterization will be conducted near the 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib waste sites to evaluate lateral migration beyond the waste-site boundaries. The results will be used to identify low points in the formation that could be source or DNAPL accumulation points. This information will support deep vadose-zone investigations for source or DNAPL effects on groundwater.
Sampling using direct-push technology adjacent to the 216-T-19 Crib, 216-Z-Ditches, 216-Z-7 Crib, 216-Z-12 Crib, 216-Z-16 Crib, and 216-Z-17 Trench liquid-waste discharge sites. **Investigation activities are described in Section 2.3, and the results are described in Section 3.3.**	Collect and analyze soil-vapor samples above, within, and below the Cold Creek unit. At each sampling location, collect samples from depths of 4.6 and 7.6 m (15 and 25 ft) below ground surface. Continue sampling at 7.6 m (25-ft) depth intervals until reaching groundwater at approximately 69 m (225 ft) below ground surface or until the direct-push technology cannot advance deeper into the subsurface (i.e., refusal) (DOE/RL-2001-01, Table D-9). Analyze soil-vapor samples for VOCs using field-screening instrument.	Data collected at these release sites during Step I did not extend through the upper vadose zone. Data are needed during Step II in the deep vadose zone. If possible, soil and soil-vapor sampling conducted during drilling of a borehole planned for the 216-Z-7 Crib as part of the 200-LW-2 Operable Unit remedial investigation (DOE/RL-2001-66) may be used to collect soil-vapor and soil-sampling data at that site instead of the DPT methods specified in this sampling design.
Contingency soil sampling at the 216-T-19 Crib, 216-Z-Ditches, 216-Z-7 Crib, 216-Z-12 Crib, 216-Z-16 Crib, and 216-Z-17 Trench liquid-waste discharge sites. **No soil sampling was conducted, because vapor concentrations did not exceed 1,200 ppmv (Section 3.3).**	If feasible, collect and analyze soil samples at locations with carbon tetrachloride vapor concentrations exceeding 12,000 ppmv to evaluate the presence of DNAPL. Analyze the soil samples for the COCs, COIs, and physical properties identified in DOE/RL-2001-01, Section D1.3. If sufficient soil volume is not available, prioritize analyses based on DOE/RL-2001-01, Table D-7. If feasible, collect and analyze soil samples at locations with carbon tetrachloride vapor concentrations exceeding 1,200 ppmv to evaluate the presence of a nearby carbon tetrachloride source. Analyze the soil samples for carbon tetrachloride.	If possible, a direct-push technology with soil-sampling capability (e.g., wireline cone penetrometer, Enhanced Access Penetration System) will be used to collect soil samples. The concentration of 12,000 ppmv is 10 percent of the concentration of saturated carbon tetrachloride vapor.

Table 1-1. Step II Sampling Design. (Table D-8 from DOE/RL-2001-01, Appendix D) (6 Pages)

Sample-Collection Methodology	Key Features of Design*	Basis for Sampling Design
Sampling using direct-push technology at Trench T-04 in the 218-W-4C Burial Ground **No soil-vapor sampling was conducted because of sufficient existing data.** **Investigation activities are described in Section 2.4.**	Collect and analyze soil-vapor samples above, within, and below the Cold Creek unit in the vadose zone adjacent to vent riser T4-04. Sample to both the north and south sides of Trench T-04. If possible, sample soil vapor directly under Trench T-04. At each sampling location, collect samples from depths of 4.6 and 7.6 m (15 and 25 ft) below ground surface. Continue sampling at 7.6 m (25-ft) depth intervals until reaching 69 m (225 ft) below ground surface or until the direct-push technology cannot advance deeper into the subsurface (i.e., refusal) (DOE/RL-2001-01, Table D-9). Analyze soil-vapor samples for VOCs using field-screening instrument. Coordination is needed with the 218-W-4C Burial Ground waste-retrieval project.	Data collected near the hot spot in Trench T-04 at the 218-W-4C Burial ground did not extend through the upper vadose zone.
Contingency soil sampling at Trench T-04 in the 218-W-4C Burial Ground **No soil sampling was conducted, because no further investigation was required at this site (Section 2.4).**	If feasible, collect and analyze soil samples at locations with carbon tetrachloride vapor concentrations exceeding 12,000 ppmv to evaluate the presence of DNAPL. Analyze the soil samples for the COCs, COIs, and physical properties identified in DOE/RL-2001-01, Section D1.3. If sufficient soil volume is not available, prioritize analyses based on DOE/RL-2001-01, Table D-7. If feasible, collect and analyze soil samples at locations with carbon tetrachloride vapor concentrations exceeding 1,200 ppmv to evaluate the presence of a nearby carbon tetrachloride source. Analyze the soil samples for carbon tetrachloride.	If possible, a DPT with soil-sampling capability (e.g., wireline cone penetrometer, Enhanced Access Penetration System) will be used to collect soil samples. The concentration of 12,000 ppmv is 10 percent of the concentration of saturated carbon tetrachloride vapor.
Potential sampling using direct-push technology at Plutonium Finishing Plant Protected Area suspect release sites **Investigation activities are described in Section 2.5, and the results are described in Section 3.5.**	Evaluate fiscal year 2003 Step I characterization results for Step II characterization requirements.	Carbon tetrachloride soil-vapor data from the Step I characterization must be evaluated to determine the potential for deeper vadose-zone sources.
Sampling using direct-push technology adjacent to the 216-S-25 Crib liquid-waste discharge site. **Investigation activities are described in Section 2.6, and the results are described in Section 3.6.**	Collect and analyze soil-vapor samples above, within, and below the Cold Creek unit. At each sampling location, collect samples from depths of 4.6 and 7.6 m (15 and 25 ft) below ground surface. Continue sampling at 7.6 m (25-ft) depth intervals until reaching groundwater at approximately 69 m (225 ft) below ground surface or until the direct-push technology cannot advance deeper into the subsurface (i.e., refusal) (DOE/RL-2001-01, Table D-9). Analyze soil-vapor samples for VOCs using field-screening instrument.	This potential release site was not investigated during Step I. Soil-vapor data adjacent to the 216-S-25 Crib site will be collected during Step II. The 216-S-25 Crib site is outside of the Step I study area.

Table 1-1. Step II Sampling Design. (Table D-8 from DOE/RL-2001-01, Appendix D) (6 Pages)

Sample-Collection Methodology	Key Features of Design*	Basis for Sampling Design
Contingency soil sampling at the 216-S-25 Crib liquid-waste discharge site. **No soil sampling was conducted, because vapor concentrations did not exceed 1,200 ppmv (Section 3.6).**	If feasible, collect and analyze soil samples at locations with significant carbon tetrachloride vapor concentrations (exceeding 12,000 ppmv) to evaluate the presence of DNAPL. Analyze the soil samples for the COC, COIs, and physical properties identified in DOE/RL-2001-01, Section D1.3. If sufficient soil volume is not available, prioritize analyses based on DOE/RL-2001-01, Table D-7. If feasible, collect and analyze soil samples at locations with carbon tetrachloride vapor concentrations exceeding 1,200 ppmv to evaluate the presence of a nearby carbon tetrachloride source. Analyze the soil samples for carbon tetrachloride.	If possible, a direct-push technology with soil-sampling capability (e.g., wireline cone penetrometer, Enhanced Access Penetration System) will be used to collect soil samples. The concentration of 12,000 ppmv is 10 percent of the concentration of saturated carbon tetrachloride vapor.
Sampling at the 218-W-3A Burial Ground. **Investigation activities are described in Section 2.7, and the results are described in Section 3.7.**	1. Collect vapor samples within engineered trenches through caisson risers or vent risers, if caisson risers or vent risers are accessible. 2. If feasible, use passive soil-vapor sampling methods (e.g., sorbent collectors flux chambers) or active vapor-sampling methods (e.g., sampling from driven soil-vapor probes) on tops of trenches if vent risers are not available. Sample every 15 m (50 ft) along the length of the trench. The depth of the active vapor-sampling probes would be determined by ground-penetrating radar surveys. 3. Use direct-push technology to collect soil-vapor samples above the Cold Creek unit to the sides of the trenches, if vent risers and passive or active shallow measurements are not available. Sample every 15 m (50 ft) along the length of the trench. Exploration using the direct-push technology should extend to a maximum depth of 15 m (50 ft). Sampling using passive or active methods or direct-push technology should be conducted approximately every 15 m (50 ft) along the length of the trench being investigated. At each sampling location, collect samples from depths of 4.6 and 7.6 m (15 and 25 ft) below ground surface. Continue sampling at 7.6 m (25-ft) depth intervals until reaching 15 m (50 ft) below ground surface or until the direct-push technology cannot advance deeper into the subsurface (i.e., refusal) (DOE/RL-2001-01, Table D-9). Analyze soil-vapor samples for VOCs using field-screening instrument.	Cost-effective method to focus vadose-zone sampling in suspect burial ground release sites. The passive and active soil-vapor sampling methods will be deployed at locations of known shallow carbon tetrachloride contamination to evaluate their effectiveness. This sampling will provide soil-vapor concentration data from the vadose zone adjacent to hot spots identified in burial ground trenches.
Contingency soil-vapor sampling at hot spots at the 218-W-3A Burial Ground. **Soil-vapor sampling results did not warrant further vadose-zone investigation (Section 3.7).**	If elevated carbon tetrachloride-concentration hot spots are detected in activity #3 above, use direct-push technology to collect soil-vapor samples above, within, and below the Cold Creek unit to the sides of the trenches at locations of carbon tetrachloride hot spots. At each sampling location, collect samples from depths of 4.6 and 7.6 m (15 and 25 ft) below ground surface. Continue sampling at 7.6 m (25-ft) depth intervals until reaching groundwater at approximately 69 m (225 ft) below ground surface or until the direct-push technology cannot advance deeper into the subsurface (i.e., refusal) (DOE/RL-2001-01, Table D-9). Analyze soil-vapor samples for VOCs using field-screening instrument.	This sampling will provide soil-vapor concentration data from the vadose zone adjacent to hot spots identified in burial ground trenches.

Table 1-1. Step II Sampling Design. (Table D-8 from DOE/RL-2001-01, Appendix D) (6 Pages)

Sample-Collection Methodology	Key Features of Design*	Basis for Sampling Design
Contingency soil sampling at the 218-W-3A Burial Ground. **No soil sampling was conducted, because soil-vapor sampling results did not warrant further vadose-zone investigation (Section 3.7).**	If feasible, collect and analyze soil samples at locations with carbon tetrachloride vapor concentrations exceeding 12,000 ppmv to evaluate the presence of DNAPL. Analyze the soil samples for the COCs, COIs, and physical properties identified in DOE/RL-2001-01, Section D1.3. If sufficient soil volume is not available, prioritize analyses based on DOE/RL-2001-01, Table D-7. If feasible, collect and analyze soil samples at locations with carbon tetrachloride vapor concentrations exceeding 1,200 ppmv to evaluate the presence of a nearby carbon tetrachloride source. Analyze the soil samples for carbon tetrachloride.	If possible, a DPT with soil-sampling capability (e.g., wireline cone penetrometer, Enhanced Access Penetration System) will be used to collect soil samples. The concentration of 12,000 ppmv is 10 percent of the concentration of saturated carbon tetrachloride vapor.
Source Locations		
Soil-vapor and groundwater sampling to investigate the following carbon tetrachloride groundwater "hot spots" (and possible associated release sites/sources): **Investigation activities are described in Section 2.8, and the results are described in Section 3.8.** **Plume** (well or location) (numbers refer to areas on DOE/RL-2001-01, Figure D-10) / **Associated Potential Release Site** 1. 299-W10-20 well / 218-W-3A Burial Ground 2. T Tank Farm / T Tank Farm 3. T Plant / 218-W-8 Burial Ground, T Plant 4. 299-W11-10 well / T Plant 5. 216-T-25 Trench / 216-T-25 Trench, 218-W-1 and 218-W-2 Burial Grounds, TX and TY Tank Farms	1. Conduct soil-vapor sampling in nearby deep wells with full or partial screens in vadose zone to evaluate direction of carbon tetrachloride migration. Sampling could be one-time with downhole packer, or continuous sampling using passive soil-vapor extraction well setup. Approximately 36 wells will be sampled. DOE/RL-2001-01, Table D-10, lists potential wells to be sampled. Changes to this list may be made based on additional information obtained during pre-job planning. DOE/RL-2001-01, Table D-11, provides an estimated summary of samples to be collected. 2. Collect groundwater samples using microsampling techniques that allow a sampling device to fit through a small opening in the landing plate in existing wells, without requiring that the pump be removed. Conduct microsampling at the top of the aquifer in nearby groundwater wells to evaluate proximity to a source and/or type of source (e.g., vapor, DNAPL). Analyze the groundwater-sample headspace vapor for carbon tetrachloride using field-screening instrument. 3. Use direct-push technology to conduct the soil-vapor sampling above, within, and below Cold Creek unit at locations of apparent continuing sources, based on evaluation of results of sampling described above. At each sampling location, collect samples from depths of 4.6 and 7.6 m (15 and 25 ft) below ground surface. Continue sampling at 7.6 m (25-ft) depth intervals until reaching groundwater at approximately 69 m (225 ft) below ground surface or until the direct-push technology cannot advance deeper into the subsurface (i.e., refusal) (DOE/RL-2001-01, Table D-11). Analyze soil-vapor samples for VOCs using field-screening instrument.	Existing groundwater hot spots are evidence for localized concentrations of carbon tetrachloride. "Looking up" from the hot spots may identify the source of the contamination. Persistent hot spots are indicative of a continuing source at that location. Wells that are unsealed to atmosphere should be sampled during declining barometric pressure.

Table 1-1. Step II Sampling Design. (Table D-8 from DOE/RL-2001-01, Appendix D) (6 Pages)

Sample-Collection Methodology		Key Features of Design*	Basis for Sampling Design
6. 299-W15-15 well	218-W-4B, 218-W-4C Burial Grounds		
7. 299-W15-16 well	218-W-4C Burial Ground		
8. West of S and SX Tank Farms	216-S-25 Crib, S and SX Tank Farms		
Contingency soil sampling **No soil sampling was conducted, because vapor concentrations did not exceed 1,200 ppmv (Section 3.8).** **The investigation activities of other potential release sites/ sources are described in Section 2.9, and the results are described in Section 3.9.**		If feasible, collect and analyze soil samples at locations with significant carbon tetrachloride vapor concentrations (exceeding 12,000 ppmv) to evaluate the presence of DNAPL. Analyze the soil samples for the COCs, COIs, and physical properties identified in DOE/RL-2001-01, Section D1.3. If sufficient soil volume is not available, prioritize analyses based on DOE/RL-2001-01, Table D-7. If feasible, collect and analyze soil samples at locations with carbon tetrachloride vapor concentrations exceeding 1,200 ppmv to evaluate the presence of a nearby carbon tetrachloride source. Analyze the soil samples for carbon tetrachloride.	If possible, a direct-push technology with soil-sampling capability (e.g., wireline cone penetrometer, Enhanced Access Penetration System) will be used to collect soil samples. The concentration of 12,000 ppmv is 10 percent of the concentration of saturated carbon tetrachloride vapor.
Evaluation of groundwater plumes (Note: not a sampling activity) **The evaluation is discussed in Section 2.8.**		Conduct a statistical evaluation of groundwater concentrations over time to identify persistent hot spots that suggest a continuing source at that location. Track "new" or transient plumes to investigate whether they become persistent, indicating a new continuing source, or whether they can be traced back to the original source	The statistical evaluation will identify groundwater plumes that may be indicative of vadose-zone sources.

*Step II sampling does not address all of the data gaps identified during the data quality objectives process. See the potential sampling-design limitations discussion in DOE/RL-2001-01, Section D3.2.4.

BHI-00882, *Airflow Modeling Report for Vapor Extraction Operations at the 200-ZP-2 Operable Unit (Carbon Tetrachloride Expedited Response Action).*

DOE/RL-2001-01, *200-PW-1 Plutonium-Rich/Organic-Rich Process Waste Group Operable Unit RI/FS Work Plan.*

DOE/RL-2001-66, *200-LW-1 300 Area Chemical Laboratory Waste Group Operable Unit RI/FS Work Plan.*

COC = contaminant of concern.
COI = contaminant of interest.
DNAPL = dense, nonaqueous-phase liquid.
DPT = direct-push technology.
ppmv = parts per million by volume.
VOC = volatile organic compound.

Based on evaluation of elevated concentrations in the carbon tetrachloride groundwater plume that may indicate potential sources in the deep vadose zone, eight areas were identified for further characterization in Step II during the DQO process (CP-15372):

- Well 299-W10-20 adjacent to the 218-W-3A Burial Ground (Area 1)
- T Tank Farm (Area 2)
- T Plant (Area 3)
- Well 299-W11-10 east of T Plant (Area 4)
- Wells 299-W15-40 and 299-W10-5 near the 216-T-21 to 216-T-25 Trenches (Area 5)
- Well 299-W15-15 between the 218-W-4B and 218-W-4C Burial Grounds (Area 6)

- Well 299-W15-16 northeast of the 218-W-4C Burial Ground (Area 7)
- S-SX Tank Farm (Area 8).

The location of the eight areas of elevated concentrations in the carbon tetrachloride groundwater plume that were characterized in Step II is shown in Figure 1-2.

In addition to the field activities described in the sampling and analysis plan for the Step II investigation (DOE/RL-2001-01, Appendix D), data integration and numerical modeling were conducted to support refinement of the conceptual model. Specific tasks included the following:

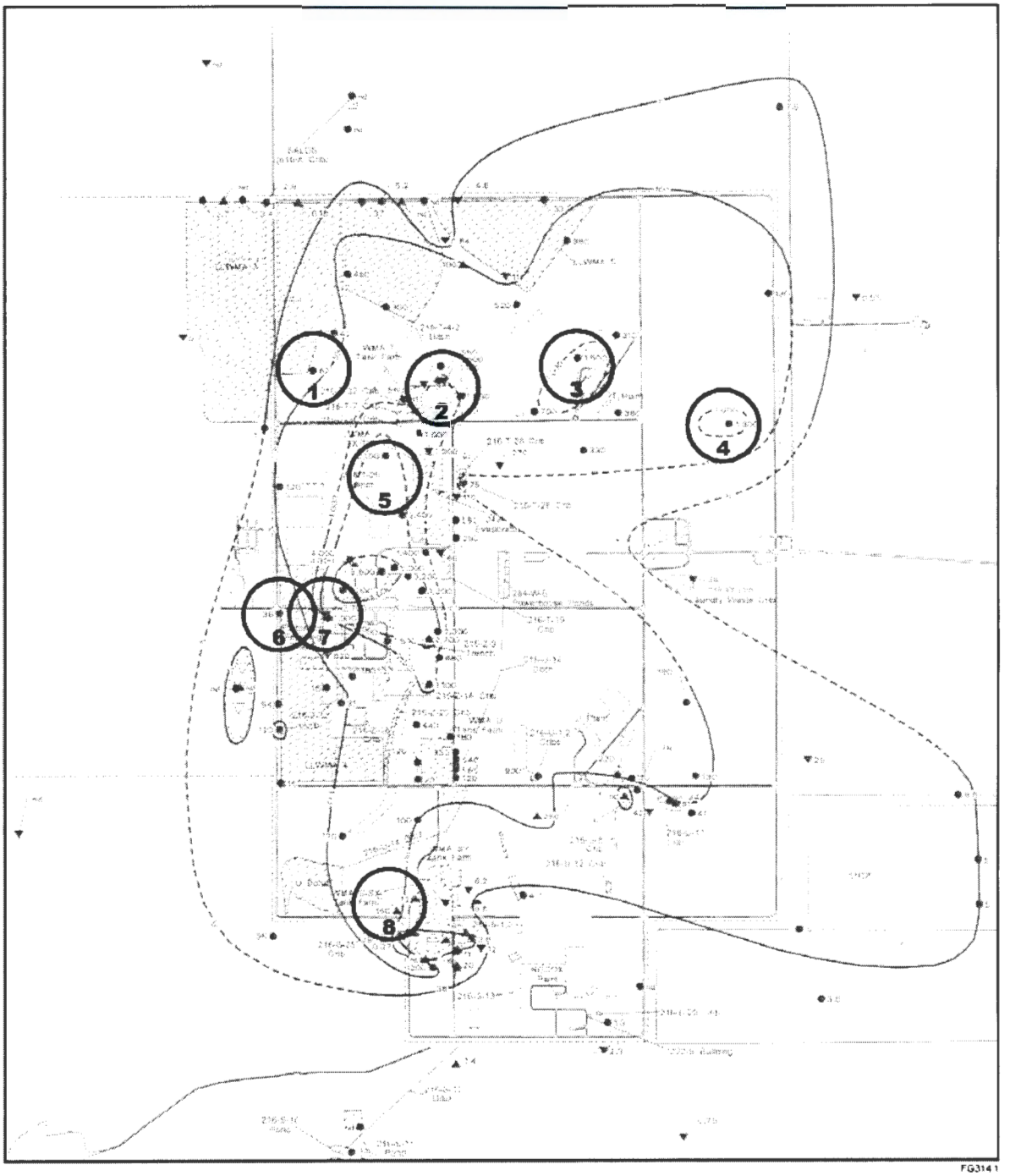
- Use data collected by other projects (e.g., well drilling within the PFP Protected Area, well deepening near the 216-Z-9 Trench, well drilling at the 216-T-26 Crib) to augment the existing 200 Areas carbon tetrachloride database.

- Refine the initial evaluation of the hydraulic flow fields during and after the carbon tetrachloride disposal to known waste sites, to determine if the distribution of carbon tetrachloride in groundwater is reasonable based on hydraulics alone. Results of this evaluation may identify other contributing carbon tetrachloride disposal areas.

- Continue numerical modeling of carbon tetrachloride flow and transport in the vadose zone to help guide field investigations of the dispersed plume.

Results of these non-field investigations are summarized in Section 3.10.

Figure 1-2. Step II Groundwater "Hot Spot" Sampling Areas. (From DOE/RL-2001-01)



2.0 FIELD ACTIVITIES

This chapter describes the characterization activities performed as part of the Step II RI of the 200-PW-1 OU dispersed plume. The primary objective of the field activity was to characterize the nature and extent of the dispersed plume in the vadose zone and to detect carbon tetrachloride accumulations in the vadose zone that are impacting or may impact groundwater in the future. Active soil-vapor samples were collected from the vadose zone using direct-push technologies (e.g., a cone penetrometer [CPT] system for subsurface access). Passive soil-vapor samples were collected using passive, sorbent soil-vapor collectors. In addition, soil-vapor samples and groundwater samples were collected from existing wells in the areas of locally elevated carbon tetrachloride concentrations in the groundwater (groundwater "hot spots").

2.1 INVESTIGATION OF VADOSE-ZONE PLUME LATERAL EXTENT AT THE 216-Z-9 TRENCH, 216-Z-1A TILE FIELD, AND 216-Z-18 CRIB

This investigation was conducted in the vicinities of the primary carbon tetrachloride disposal sites to evaluate lateral migration beyond the waste-site boundaries. As part of airflow modeling of soil-vapor extraction operations at the 216-Z-9 Trench, the applied vacuum in the Hanford formation sand was calculated to extend approximately 80 to 140 m (260 to 460 ft) beyond the trench boundaries for different configurations of on-line wells (BHI-00882, *Airflow Modeling Report for Vapor Extraction Operations at the 200-ZP-2 Operable Unit (Carbon Tetrachloride Expedited Response Action)*). Therefore, sampling at the 216-Z-9 Trench will continue to distances at least 225 m (750 ft) beyond the trench boundaries. The vertical sampling scheme is consistent with the Step I sampling (DOE/RL-2001-01, Appendix C). Sampling at the 216-Z-1A Tile Field and 216-Z-18 Crib used a similar strategy.

The investigation of the lateral extent of the dispersed plume at the 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib (the release sites) included passive soil-vapor surveys around the release sites and adjacent areas using an initial coarse grid-collector spacing of about 50 m (164 ft), followed by a refined grid-collector spacing of about 20 m (66 ft) to verify and refine the initial results.

Based on the results of the passive soil-vapor surveys, subsurface investigations were conducted at locations of elevated carbon tetrachloride soil vapor. The investigations used a CPT (a direct-push technology) to collect active soil-gas and soil samples and to deploy FLUTe[1] liners to investigate the presence of carbon tetrachloride DNAPL.

Based on the results of the CPT sampling, a deeper soil-sampling investigation of the vadose zone down to the top of the Cold Creek unit around the 216-Z-9 Trench was conducted using a hydraulic hammer rig (HHR, a direct-push soil-sampling system). The sampling locations also were selected to investigate the distribution of a silt layer identified from 19.8 to 20.4 m (65 to

[1] FLUTe is a trademark of Flexible Liner Underground Technologies, LLC, Santa Fe, New Mexico.

67 ft) bgs on the south side of the 216-Z-9 Trench during drilling of vertical well 299-W15-46. This silt layer was associated with relatively high carbon tetrachloride concentrations and the presence of DNAPL. As described in Section 2.2, the cross-well seismic data collected at the 216-Z-9 Trench site also were used to evaluate the distribution of the silt layer. This soil-sampling investigation was intended to have been followed by a similar investigation around the 216-Z-1A Tile Field and the 216-Z-18 Crib, but this investigation was not conducted for reasons discussed at the end of this section.

Passive Soil-Vapor Surveys

A summary of passive soil-vapor locations is provided in Table 2-1. Table 2-1 includes the specific areas investigated in each passive soil-vapor survey, the total samples collected, deployment dates, and the barometric pressure range during each survey. As shown, the barometric pressure did not fluctuate significantly during any of the surveys.

Table 2-1. Summary of Passive Soil-Vapor Sampling Around the Release Sites. (2 Pages)

Field Test Location (Grid)	Number of Samples	Quality Control (Trip Blanks + Duplicates)	Soil-Vapor Points	Deployment Dates	Barometric Pressure Range* (inches Mercury)
216-Z-9 Trench (coarse)	86	4	1-88	11-14 August 2003	29.1 - 29.29
216-Z-9 Trench (refined)	165	8	A1-A80	13-16 September 2004	29.010 - 29.236
			A81-A165	14-17 September 2004	28.886 - 29.236
TX-TY Tank Farm (coarse)	53	3	B1-B53	15-18 September 2004	28.884 - 29.161
Within the Plutonium Finishing Plant (coarse)	39	2 + 2	C1-C41	11-15 November 2004	29.241 - 29.624
216-Z-1A Tile Field, 216-Z-12 and 216-Z-18 Cribs (coarse)	66	4 + 3	D1-D21, D23-D28, D30-D50		
			D22, D29, D51-D56	12-16 November 2004	
			D57-D66	15-18 November 2004	29.241 - 29.681
Outside TX Tank Farm (refined)	73	3	E1-E64, E66-E74	5-12 December 2005	29.31 - 29.86
216-Z-1A Tile Field and 216-Z-18 Crib (refined)	80	4	F1-F80	31 January – 4 February 2005	29.077 - 29.743
East of the Plutonium Finishing Plant (refined)	22	1	G1-G22		

Table 2-1. Summary of Passive Soil-Vapor Sampling Around the Release Sites. (2 Pages)

Field Test Location (Grid)	Number of Samples	Quality Control (Trip Blanks + Duplicates)	Soil-Vapor Points	Deployment Dates	Barometric Pressure Range* (inches Mercury)
East and northeast of the 216-Z-9 Trench (refined)	55	3 + 3	B1D853-B1D899, B1D8B0-B1D8B9, B1D8C0-B1D8C3	26 May – 2 June 2005	28.84 - 29.38
TX Tank Farm	17	1	H1-H17	3-7 August 2006	28.93 - 29.23
Total Samples	**656**	**41**			

*Barometric pressure recorded at Hanford Meteorological Station, 200 West Area.

The refined passive soil-vapor survey east and northeast of the 216-Z-9 Trench was conducted by Fluor Hanford from May 26 through June 2, 2005. The sample locations for this survey are shown in Figure 2-1 and provided in Table 2-2. The other passive soil-vapor surveys identified in Table 2-1 were conducted by Vista Engineering. The sampling locations for these other surveys are included in DOE/RL-2006-58, Section 4.1, and DOE/RL-2007-22, Section 2.1.

The refined survey conducted by Fluor Hanford in the area east and northeast of the 216-Z-9 Trench was needed to "fill in" the areas not covered by the Vista Engineering surveys. This approach was presented at Vista Engineering's Project Technical Workshop #2 in January 2005 and was approved in that meeting by the U.S. Environmental Protection Agency.

The passive soil-vapor samples were collected on hydrophobic absorbent cartridges contained in glass vials. Fifty-eight sampling vials, including three duplicate samples, were emplaced in the soil east and northeast of the 216-Z-9 Trench. Three trip blanks also were collected. Following sample retrieval, the vials containing the absorbent cartridges were shipped to the passive soil-vapor vendor's laboratory for analysis of volatile organic compounds using gas chromatography/mass spectrometry instrumentation. The results of the passive soil-vapor survey are provided in Appendix A and discussed in Section 3.1.

The passive soil-vapor vendor was Beacon Environmental Services, Inc., Bel Air, Maryland (Beacon). Beacon's passive soil-vapor sampling technology is the EMFLUX[1] Passive Soil-Gas Sampling System. The passive soil-vapor sampling vials were deployed and retrieved following Beacon's protocols for the EMFLUX system.

[1] EMFLUX is a registered trademark of Beacon Environmental Services, Inc., Bel Air, Maryland.

Figure 2-1. Refined Passive Soil-Vapor Survey Locations East and Northeast of the 216-Z-9 Trench.

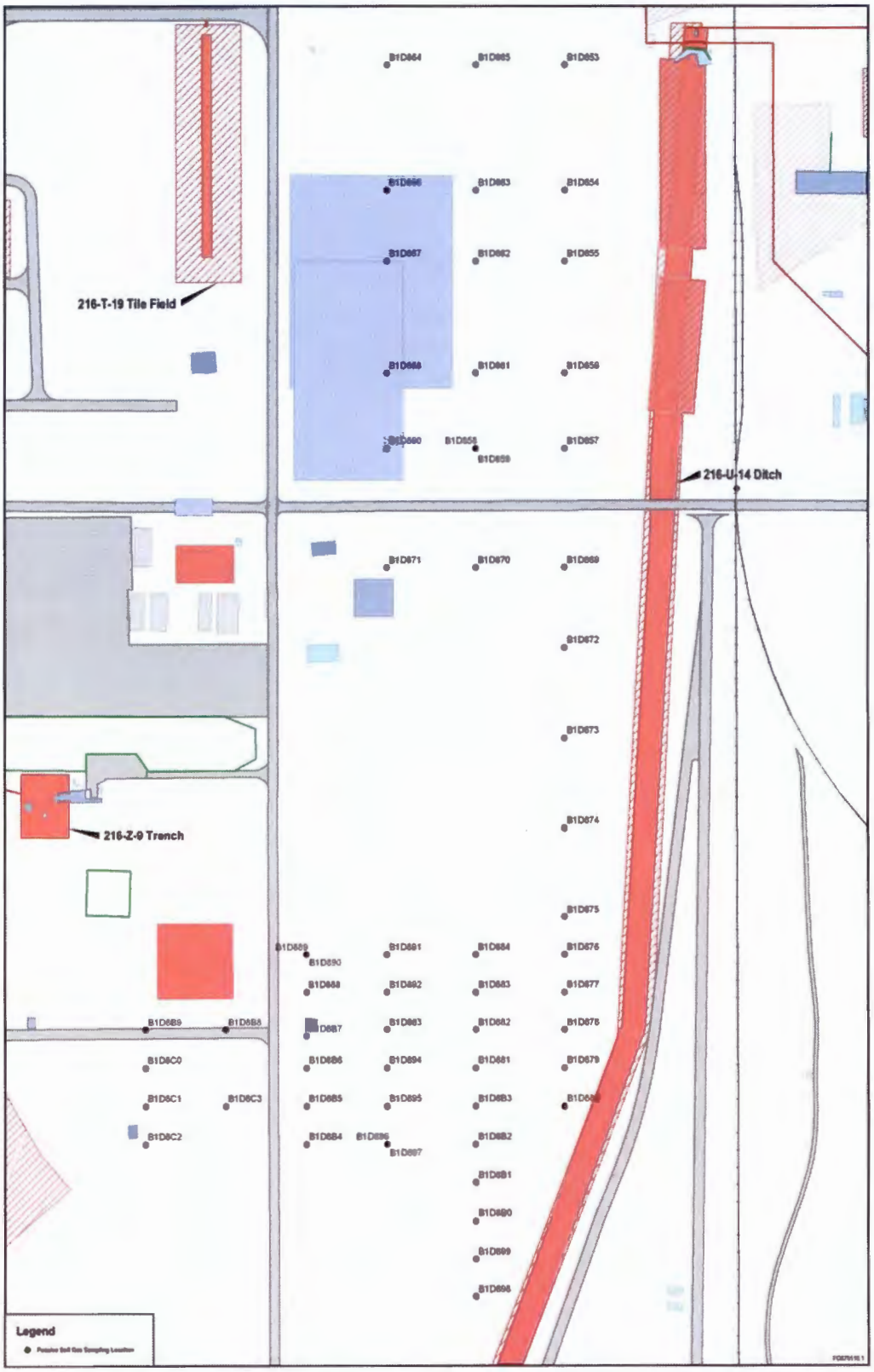


Table 2-2. Refined Passive Soil-Vapor Locations East and Northeast of the 216-Z-9 Trench. (2 Pages)

Temporary Field-Sample Number	Soil-Vapor Sample HEIS Number	Sample Date and Time		Location	
		Emplaced	Extracted	Easting (m)	Northing (m)
1	B1D853	05/26/2005 13:47	06/01/2005 12:58	567048.5	136023.3
4	B1D854	05/26/2005 14:12	06/01/2005 13:01	567048.5	135953.5
7	B1D855	05/26/2005 14:10	06/01/2005 13:02	567048.5	135914.1
10	B1D856	05/26/2005 14:06	06/01/2005 13:04	567048.5	135851.5
13	B1D857	05/26/2005 14:05	06/01/2005 13:06	567048.5	135809.5
14	B1D858	05/26/2005 14:02	06/01/2005 13:07	566998.9	135809.5
14-duplicate	B1D859	05/27/2005 09:27	06/01/2005 13:09	566998.9	135809.5
15	B1D860	05/26/2005 14:00	06/01/2005 13:11	566949.2	135809.5
11	B1D861	05/26/2005 13:57	06/01/2005 13:13	566998.9	135851.5
8	B1D862	05/26/2005 13:55	06/01/2005 13:15	566998.9	135914.1
5	B1D863	05/26/2005 13:53	06/01/2005 13:17	566998.9	135953.5
3	B1D864	05/26/2005 13:51	06/01/2005 13:19	566949.2	136023.3
2	B1D865	05/26/2005 13:50	06/01/2005 13:20	566998.9	136023.3
6	B1D866	05/26/2005 15:46	06/01/2005 13:42	566949.2	135953.5
9	B1D867	05/26/2005 15:52	06/01/2005 14:00	566949.2	135914.1
12	B1D868	05/26/2005 15:45	06/01/2005 14:10	566949.2	135851.5
16	B1D869	05/26/2005 14:19	06/01/2005 14:18	567048.5	135743.3
17	B1D870	05/26/2005 14:20	06/01/2005 14:20	566998.9	135743.3
18	B1D871	05/26/2005 14:22	06/01/2005 14:21	566949.2	135743.3
19	B1D872	05/26/2005 14:27	06/01/2005 14:24	567048.5	135698.9
20	B1D873	05/26/2005 14:28	06/01/2005 14:26	567048.5	135648.4
21	B1D874	05/26/2005 14:29	06/01/2005 14:28	567048.5	135598.4
22	B1D875	05/26/2005 14:31	06/01/2005 14:29	567048.5	135548.1
23	B1D876	05/26/2005 14:32	06/01/2005 14:31	567048.5	135527.1
27	B1D877	05/26/2005 14:34	06/01/2005 14:32	567048.5	135506.1
31	B1D878	05/26/2005 14:35	06/01/2005 14:33	567048.5	135485.1
37	B1D879	05/26/2005 14:36	06/01/2005 14:34	567048.5	135464.1
42	B1D880	05/26/2005 14:38	06/01/2005 14:36	567048.5	135443.2
38	B1D881	05/26/2005 15:04	06/01/2005 14:38	566998.9	135464.1
32	B1D882	05/26/2005 15:06	06/01/2005 14:39	566998.9	135485.1
28	B1D883	05/26/2005 15:26	06/01/2005 14:40	566998.9	135506.1
24	B1D884	05/26/2005 15:27	06/01/2005 14:42	566998.9	135527.1
30	B1D888	05/26/2005 15:21	06/02/2005 08:18	566904.2	135506.1
26	B1D889	05/26/2005 15:22	06/02/2005 08:20	566904.2	135527.1
26-duplicate	B1D890	05/27/2005 09:40	06/02/2005 08:22	566904.2	135527.1

Table 2-2. Refined Passive Soil-Vapor Locations East and Northeast of the 216-Z-9 Trench. (2 Pages)

Temporary Field-Sample Number	Soil-Vapor Sample HEIS Number	Sample Date and Time		Location	
		Emplaced	Extracted	Easting (m)	Northing (m)
25	B1D891	05/26/2005 15:23	06/02/2005 08:26	566949.2	135527.1
29	B1D892	05/26/2005 15:25	06/02/2005 08:28	566949.2	135506.1
33	B1D893	05/26/2005 15:09	06/02/2005 08:30	566949.2	135485.1
39	B1D894	05/26/2005 15:00	06/02/2005 08:33	566949.2	135464.1
44	B1D895	05/26/2005 14:41	06/02/2005 08:35	566949.2	135443.2
49	B1D896	05/26/2005 16:08	06/02/2005 08:36	566949.2	135422.2
49-duplicate	B1D897	05/27/2005 09:45	06/02/2005 08:38	566949.2	135422.2
55	B1D898	05/26/2005 16:14	06/02/2005 08:40	566998.9	135338.2
54	B1D899	05/26/2005 16:13	06/02/2005 08:41	566998.9	135359.2
53	B1D8B0	05/26/2005 16:12	06/02/2005 08:43	566998.9	135380.2
52	B1D8B1	05/26/2005 16:11	06/02/2005 08:44	566998.9	135401.2
48	B1D8B2	05/26/2005 16:10	06/02/2005 08:46	566998.9	135422.2
43	B1D8B3	05/26/2005 14:40	06/02/2005 08:47	566998.9	135443.2
50	B1D8B4	05/26/2005 16:06	06/02/2005 08:51	566904.2	135422.2
45	B1D8B5	05/26/2005 14:43	06/02/2005 08:52	566904.2	135443.2
40	B1D8B6	05/26/2005 14:57	06/02/2005 08:54	566904.2	135464.1
34	B1D8B7	05/26/2005 14:55	06/02/2005 08:55	566904.2	135481.4
35	B1D8B8	05/26/2005 14:53	06/02/2005 08:57	566859.2	135485.1
36	B1D8B9	05/26/2005 14:50	06/02/2005 09:01	566814.2	135485.1
41	B1D8C0	05/26/2005 14:49	06/02/2005 09:02	566814.2	135464.1
47	B1D8C1	05/26/2005 14:47	06/02/2005 09:04	566814.2	135443.2
51	B1D8C2	05/26/2005 16:02	06/02/2005 09:06	566814.2	135422.2
46	B1D8C3	05/26/2005 14:45	06/02/2005 09:08	566859.2	135443.2

HEIS = *Hanford Environmental Information System* database.

Each EMFLUX sampling vial is approximately 6.4 cm (2.5 in.) long, 1.5 cm (0.6 in.) in diameter, and contained two absorbent cartridges. Passive soil-vapor samplers were prepared with two cartridges for subsequent duplicate or confirmatory sample analysis. However, in the refined survey east and northeast of the 216-Z-9 Trench conducted by Fluor Hanford, a second passive soil-gas collector was deployed within 15.2 cm (6 in.) of the primary collector to serve as the duplicate.

The sampling locations were marked with small flags on April 19, 2005, using a Global Positioning System unit with sub-meter accuracy to identify the sampling locations at these coordinates. The Hanford Site coordinates later were converted to coordinates using NAVD88, *North American Vertical Datum of 1988*, and the Washington State plane (south zone) in NAD83, *North American Datum of 1983*, with the 1991 adjustment for horizontal coordinates.

At each sampling location, the sampler created a hole approximately 10.2 cm (4 in.) deep. The vials provided by Beacon initially were sealed with a solid white plastic cap (shipping cap). The sampler then removed the shipping cap from the vial and replaced it with a black plastic cap with a hole covered by screen meshing (sampling cap). The vial was placed in the hole with the sampling cap end facing down. The vial was covered with soil. A wire attached to the vial extended above the soil surface for use during retrieval of the vial. When the sampling vial was retrieved, the sampler removed the wire and replaced the sampling cap with the shipping cap.

All of the sample vials were deployed on May 26, 2005. The duplicate sample vials were deployed on the following day. The duration of exposure for all samples was a minimum of 3 days following the vendor's field procedures. The vials were retrieved on June 1 and June 2, 2005. A sample location number was established and recorded for each sampling location. A unique *Hanford Environmental Information System* (HEIS) database number was assigned to each sampling vial during retrieval (Table 2-2).

Cone Penetrometer Investigations

The initial CPT investigation was conducted from January 7 to January 12, 2005, using a 20-ton CPT truck (DOE/RL-2006-58). A total of 12 penetrometer tests were conducted at 7 locations near the 216-Z-9 Trench. The depth of refusal for these tests ranged from 7.6 to 17.1 m (24.9 to 56.1 ft) with an average push depth of 11.9 m (39 ft).

The next CPT investigation was conducted from April 5 to May 20, 2005, using a 37-ton CPT truck, one of the heaviest CPT trucks available in North America (DOE/RL-2006-58). A total of 75 penetrometer tests were conducted at 18 locations near the 216-Z-9 Trench. The depth of refusal for these tests ranged from 2.1 to 35.4 m (7 to 116.1 ft), with an average push depth of 15.4 m (50.4 ft) (DOE/RL-2006-58).

The last CPT investigation was conducted from July 19 to August 18, 2005, using the same 37-ton CPT truck and test measurements that were used in the April-May 2005 investigation. A total of 73 penetrometer tests were conducted at 23 locations in an area incorporating the 216-Z-1A Tile Field, 216-Z-18 Crib, and 216-Z-12 Crib. The depth of refusal for these tests ranged from 0.35 to 28.2 m (1.1 to 92.5 ft) with an average push depth of 16.1 m (52.8 ft) (DOE/RL-2006-58).

The CPT investigations were conducted by Vista Engineering. Details on the CPT locations, test measurements, and lithologic results for the 216-Z-9 Trench, the 216-Z-1A Tile Field, the 216-Z-12 Crib, and the 216-Z-18 crib are provided in DOE/RL-2006-58, Section 3.2.1.

Hydraulic Hammer Rig Investigations

The HHR was used to conduct the deeper vadose-zone investigation at the 216-Z-9 Trench from June 5 through November 27, 2006. A total of 53 boreholes were pushed at 9 unique locations. The depth of refusal for these pushes ranged from 15.2 to 36.9 m (49.9 to 121.1 ft) with an average push depth of 27 m (89 ft).

Subsequent additional HHR field investigations were not conducted at the 216-Z-1A Tile Field because of budgeting priorities for the DNAPL investigation (DOE/RL-2007-22). The HHR

216-Z-1A Tile Field investigation not only would have supported the DNAPL investigation, but also would have supported and completed this task in the Work Plan (DOE/RL-2001-01). Sampling of the Cold Creek unit silt was the focus during the Work Plan as the most likely location for retention of DNAPL in the soil column. The HHR DNAPL investigation locations at the 216-Z-1A Tile Field and the 216-Z-18 Crib generally were planned to correlate with the locations of the CPT DNAPL investigation. The CPT investigation included the shallower zone at the 216-Z-1A Tile Field and the 216-Z-18 Crib. However, the objective of the HHR DNAPL investigation was to sample to greater depths and target the Cold Creek unit silt. The carbon tetrachloride concentrations detected during the CPT DNAPL investigation sampling were two to three orders of magnitude below the action level identified in the Work Plan as indicating proximity to DNAPL. Only two CPT DNAPL investigation locations had carbon tetrachloride soil-gas concentrations exceeding 100 ppmv, and both were within the boundary of the 216-Z-1A Tile Field (DOE/RL-2006-58). Based on the CPT DNAPL investigation results, it appears unlikely that HHR DNAPL investigation sampling would have found significant concentrations of carbon tetrachloride through the top of the Cold Creek unit. However, sampling would be needed to confirm this. The 216-Z-9 Trench received significantly higher carbon tetrachloride loadings than the 216-Z-1A Tile Field. However, only a limited amount of DNAPL has been identified at the 216-Z-9 Trench, indicating that comparable high concentration regions of carbon tetrachloride at the 216-Z-1A Tile Field would have been less likely (DOE/RL-2007-22).

The HHR investigations were conducted by Vista Engineering. Details on the HHR locations and sample results are provided in DOE/RL-2007-22, Section 2.2.

2.2 INVESTIGATION OF POTENTIAL ACCUMULATION AREAS AT THE 216-Z-9 TRENCH, 216-Z-1A TILE FIELD, AND 216-Z-18 CRIB

This investigation was conducted near the 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib waste sites to evaluate lateral migration beyond the waste-site boundaries. The results were used to identify low points in the fine-grained layers in the vadose zone that could be source or DNAPL accumulation points. The Cold Creek unit is the main fine-grained layer in the vadose zone present beneath the waste sites, which is why it was the primary focus of the investigation. As part of the RI process, a thin silt lens was identified at 19.8 m (65 ft) bgs adjacent to the 216-Z-9 Trench as an additional focus area.

This investigation had the following three main components.

- Develop topographic maps of the Cold Creek unit in the area around the release sites to identify low points that could be accumulation areas for carbon tetrachloride as DNAPL.
- Collect soil-vapor samples above and within the Cold Creek unit at low points to confirm potential DNAPL or source presence.

- Collect soil-vapor samples above and within the Cold Creek unit at the locations northwest and southwest of the 216-Z-9 Trench, where an anomaly that potentially could indicate DNAPL was identified in a 1999 seismic-reflection survey.

The methodologies used to complete these investigations are described below.

High-resolution characterization of the subsurface geometry of the fine-grained vadose-zone layers around the release sites was obtained by using lithologic profiling from electric-cone-penetration test data (e.g., tip and sleeve stress data) from the CPT investigations (see Section 2.1), combined with cross-well seismic-reflection profiling that is typically used in oil field reservoir investigations. The results of these investigations provided resolution of the subsurface-layer geometries of about 0.6 m (2 ft).

The electric-cone-penetration tests were conducted by Vista Engineering from January 7 to August 18, 2005, during the CPT investigations described in Section 2.1. Details on the use of the electric-cone-penetration test data to develop highly detailed lithologic logs that identified fine-grained layers as thin as 15 cm (0.5 ft) are described in DOE/RL-2006-58, Section 3.2.1. The lithologic logs were used to assist in the interpretations of the seismic-reflection profiles.

Twelve cross-well seismic-reflection survey profiles were collected from March 22-30, 2005, using existing wells around the 216-Z-9 Trench (DOE/RL-2006-58, Section 3.2.2). The longest inter-well distance was 81 m (267 ft), and logging depths typically were less than 61 m (200 ft). Eleven cross-well seismic-reflection survey profiles were collected from February 27 to March 8, 2006, using existing wells and one new borehole around the 216-Z-1A Tile Field (DOE/RL-2006-58, Section 3.2.3). The longest inter-well distance was 119 m (390 ft), and logging depths typically were less than 55 m (180 ft).

The final cross-well profiles were interpreted to map the subsurface geometry of specific vadose-zone layers (DOE/RL-2006-58). The key vadose-zone layers for this project are the fine-grained layers within the Hanford formation and the Cold Creek unit, because they are the most likely layers to influence the transport and accumulation of contaminants in the vadose zone. The resulting data were gridded and used to prepare two-dimensional subsurface topographic maps of each layer.

The resulting detailed geometry of the subsurface vadose-zone layers interpreted from the cross-well seismic-reflection profiles was used to identify target depths for intrusive soil sampling as part of the HHR soil-sampling investigations around the release sites (described in Section 2.1). The results of the HHR investigations are summarized in Section 3.2 of this report; details are provided in DOE/RL-2007-22.

As part of the geophysical interpretation of the cross-well profiles, an attempt was made to determine the lateral extent of a thin silt layer that was found from 19.8 to 20.4 m (65 to 67 ft) bgs in well 299-W15-46, adjacent to the south side of the 216-Z-9 Trench (WMP-26264, *Borehole Summary Report for Well 299-W15-46 (C3426) Drilled at the 216-Z-9 Trench*). Although a single 0.6 m (2-ft)-thick silt layer is considered to be below the limit of resolution of the seismic-profile data, after careful review of the profiles, seismic-reflection effects were found that are suggestive of thin-layer pinchouts or lenses in the expected depth range of the silt layer in well 299-W15-46. The interpretation is that two or more thin lenses, possibly overlapping, are

present within portions of the seismic profiles (DOE/RL-2006-58). Although the cross-well data cannot conclusively identify these reflection effects with a silt layer, the characteristic thin-layer reflections were mapped in the 18 to 21 m (60 to 70-ft) depth range for subsequent confirmation of lithology by direct sampling in the HHR investigations.

The cross-well seismic-reflection survey profiles were conducted by Vista Engineering. Details of the data acquisition and interpretation are provided in DOE/RL-2006-58, Sections 3.2.2 (216-Z-9 Trench area) and 3.2.3 (216-Z-1A Tile Field area).

Eleven key existing wells around the release sites were geophysically logged in fiscal year 2006 to support refinement of the configuration of the Cold Creek unit and the interpretation of potential DNAPL accumulation areas (Figure 2-2). The specific wells and types of geophysical logging conducted are provided in Table 2-3. A discussion of the borehole geophysical logging is provided in Section 3.2 of this report. The geophysical logging results are available at http://www.hanford.gov/cp/gpp/data/vzcp/vzcp.cfm .

In 1999, a seismic-reflection survey was conducted along four lines around the 216-Z-9 Trench (Waddell et al., 2003, *Non-Invasive Determination of the Location and Distribution of Free-Phase Dense Nonaqueous Phase Liquids (DNAPL) by Seismic Reflection Techniques, Final Report*). This study suggested that amplitude-versus-offset technology could be used to directly detect the presence of subsurface carbon tetrachloride DNAPL. The study identified several seismic anomalies that could be attributed to possible carbon tetrachloride DNAPL near the top of the Cold Creek unit silt unit and the top of the Cold Creek unit caliche unit. These anomalies were found on line Z-9-2, an east-west line on the north side of the 216-Z-9 Trench that ran just north of well 299-W15-32, and on line Z-9-1, a north-northwest-south-southeast-trending line along the west side of the trench that ran through well 299-W15-217. These locations were investigated by Vista Engineering during the passive soil-vapor sampling, CPT investigations, and HHR investigations at the 216-Z-9 Trench (DOE/RL-2006-58, Sections 4.1.3.1 and 4.2.1; DOE/RL-2007-22, Section 2.2.1). None of these locations had carbon tetrachloride soil-vapor concentrations greater than 5 ppmv or soil concentrations greater than 5 μg/kg. The results of these investigations are discussed in Section 3.2 of this report.

2.3 INVESTIGATION ADJACENT TO THE 216-T-19 CRIB, 216-Z DITCHES, 216-Z-7 CRIB, 216-Z-12 CRIB, 216-Z-16 CRIB, AND 216-Z-17 TRENCH

Data collected at the 216-T-19 Crib, 216-Z Ditches, 216-Z-7 Crib, 216-Z-12 Crib, 216-Z-16 Crib, and 216-Z-17 Trench during Step I did not extend through the upper vadose zone, so the focus of the Step II investigation was to collect samples from the deep vadose zone. The following methods were used for the Step II investigations at these waste sites.

- The investigation adjacent to the 216-Z-16 Crib and the 216-Z-17 Trench was completed using the Enhanced Access Penetration System (EAPS), which is a direct-push technology (CPT) with a drilling capability.

- Sampling could not be conducted at the 216-T-19 Crib using the EAPS. Based on evaluation of existing data, the U.S. Environmental Protection Agency agreed that the Step II sampling need not be conducted at that site (see subsection on 216-T-19 Crib in this section of this report).

Figure 2-2. Location of Wells that were Geophysically Logged as Part of the Step II Investigation.

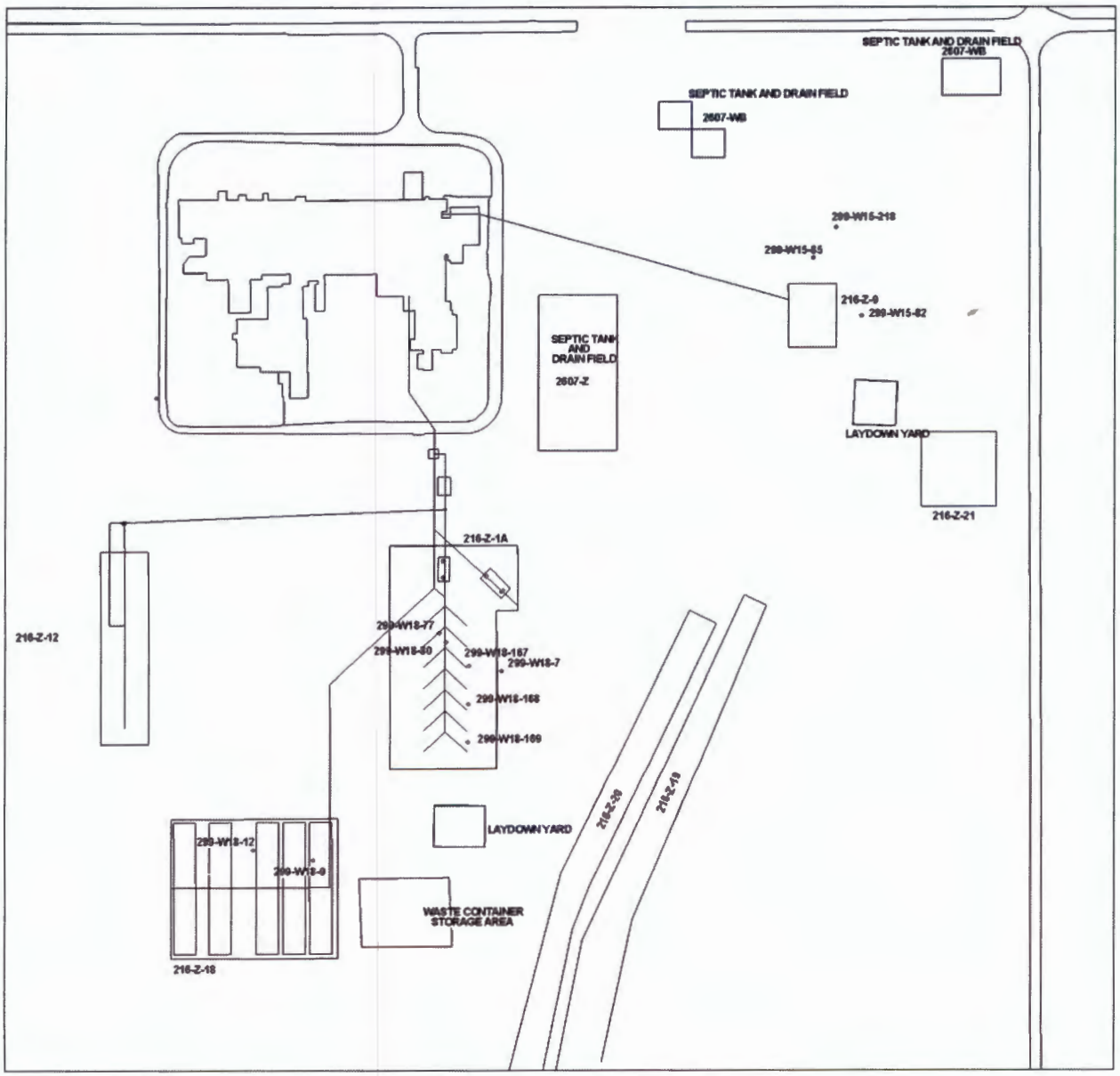


Table 2-3. Geophysical Logging Conducted as Part of the Step II Investigation.

Well	Type of Geophysical Logging Conducted			Date Completed
	Spectral-Gamma Logging System	Passive-Neutron Logging System	Neutron-Moisture Logging System	
W15-82	Y	N	Y	08/10/2006
W15-85	Y	N	Y	02/07/2006
W15-218	Y	N	N	02/01/2006
W18-7	Y	N	N	01/20/2006
W18-9	Y	Y	Y	01/30/2006
W18-12	Y	N	Y	01/19/2006
W18-77	Y	N	N	07/13/2006
W18-80	Y	N	N	07/21/2006
W18-167	Y	Y	N	04/04/2006
W18-168	Y	Y	Y	07/17/2006
W18-169	Y	Y	Y	07/13/2006

Y = yes.
N = no.

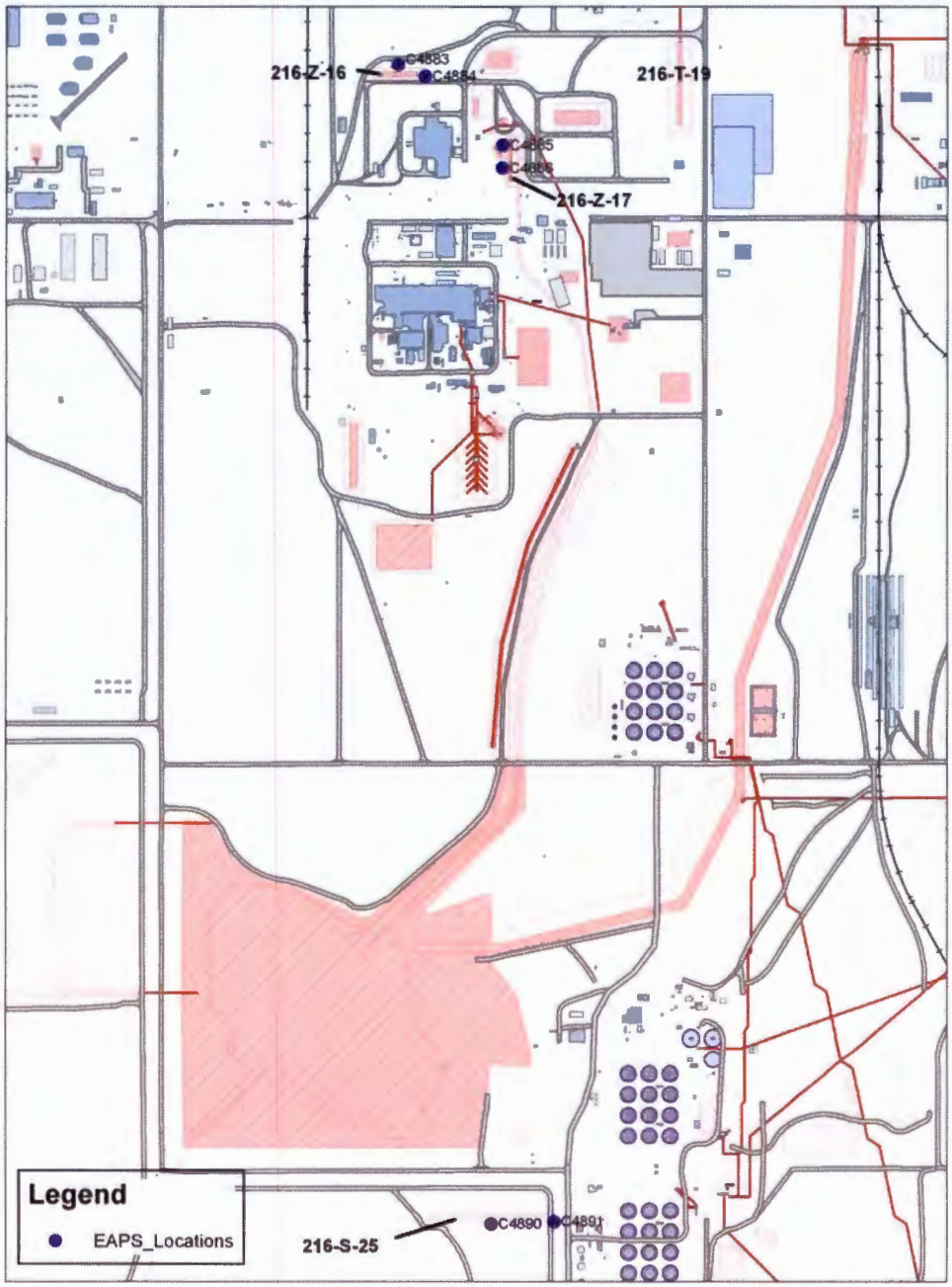
- The investigation adjacent to the 216-Z-Ditches and the 216-Z-12 Crib were completed using a 37-ton CPT.

- Soil-vapor sampling at the 216-Z-7 Crib was completed during the borehole drilling conducted at that site as part of the 200-LW-2 OU RI (DOE/RL-2001-66, *Chemical Laboratory Waste Group Operable Units RI/FS Work Plan, Includes: 200-LW-1 and 200-LW-2 Operable Units*), in accordance with the Step II sampling design (Table 1-1).

The EAPS was used from June through August 2005 to collect soil-vapor samples from the shallow and deep vadose zone in six borings, two adjacent to the 216-Z-16 Crib, two adjacent to the 216-Z-17 Trench, and two adjacent to the 216-S-25 Crib (Figure 2-3). The 216-S-25 Crib borings are discussed in Section 2.6.

The EAPS combines direct-push CPT and air-rotary-drilling methodologies into an integrated system. The principal differentiator in EAPS deployments is the drilling system used. Two drilling systems are available: 7.25 cm (2.875 in.) and 5 cm (2 in.). The 7.25 cm (2.875-in.) drill is the more powerful of the two and is recommended in situations where very hard materials are encountered. A typical scenario for the 7.25 cm (2.875-in.) drill system is to drill through shallow, upper refusing layers to expose softer, deeper layers that can be penetrated further by direct-push CPT. In this scenario, the center rods of the drill string are removed and 4.45 cm (1.75-in.) CPT rods and tools are advanced through the outer drill casing. The 5 cm (2-in.) drill system is an interchangeable direct-push and drilling system that can accomplish a penetration consisting of both direct-push and drilling methods. This system allows the changeover between penetration methods to be made at any point in the penetration and as many times as required.

Figure 2-3. Location of Enhanced Access Penetration System Boreholes for the Dispersed Carbon Tetrachloride Vadose-Zone Plume Step II Investigation.



Soil-vapor samples were collected under two sampling regimes. The first and simplest was collection of soil vapor through a soil-vapor sampling cone that had been advanced to the target depth by direct push. In this case, samples were taken without any delay period, because the formation was regarded as undisturbed. The vapor samples were transported to the surface through Teflon[1] lines pumped by a small bladder pump. Samples were collected in 1 L Tedlar[2] bags.

The second regime was related to soil-vapor conditions after EAPS air-rotary-drilling activities. It is recognized that the natural soil-gas concentration of any analyte will be perturbed because of permeation of air into a formation, which is inevitable during air rotary drilling. For this project, a period of 12 hours was adopted for the formation to recover after drilling, based on modeling performed during EAPS development (Appendix B). After this rebound period, soil-vapor samples were collected through the soil-vapor sampling cone as the EAPS outer drill casing was retracted. The borehole was filled with grouting material just below the desired sampling depth, and then the sample was taken.

Details concerning the drilling, pushing, and sampling of the EAPS boreholes are discussed below and are documented in Appendix B.

The 37-ton CPT truck was used to collect soil-vapor samples at the 216-Z Ditches and the 216-Z-12 Crib during the investigation described in Section 2.1.

A summary of the soil-vapor sampling conducted at each of these waste sites is provided below (Table 2-4). The results for each sample location are discussed in Section 3.3. The Step II sampling design (Table 1-1) included contingency soil sampling at locations with carbon tetrachloride vapor concentrations exceeding 1,200 ppmv to evaluate the presence of a nearby carbon tetrachloride source and at locations with carbon tetrachloride vapor concentrations exceeding 12,000 ppmv to evaluate the presence of DNAPL. Because the soil-vapor concentrations did not meet or approach these action levels, no soil sampling was conducted in response to this aspect of the sampling design. (Soil samples were collected during the drilling of Borehole C4183 at the 216-Z-7 Crib in accordance with the sampling and analysis plan for the 200-LW-2 OU remedial investigation (DOE/RL-2001-66.)

216-Z-16 Crib – Borehole C4884 was located on the east side center of the 216-Z-16 Crib, 1.5 m (5 ft) from the edge. The CPT was pushed and soil-vapor samples were collected at 4.6, 7.6, and 15.2 m (15, 25, and 50 ft) bgs before refusal at 19.8 m (65 ft). The 7.25 cm (2.875-in.) EAPS was used to drill down to the desired depth of 46.1 m (151.3 ft), so that soil-vapor samples could be collected at 45.7 and 38.1 m (150 and 125 ft). At 30.4 m (100 ft), the outer drill casing broke before a soil-vapor sample could be collected, so the borehole was redrilled to that depth, and soil-vapor samples were subsequently collected at 30.4 and 22.9 m (100 and 75 ft) before the borehole was decommissioned.

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[1] Teflon is a trademark of E.I. du Pont de Nemours and Company, Wilmington, Delaware.

[2] Tedlar is a registered trademark of E. I. du Pont de Nemours and Company, Wilmington, Delaware.

Table 2-4. Sampling Conducted Using the Enhanced Access Penetration System.

Well Identification Number	Location	Northing (m)	Easting (m)	Elevation of Brass Survey Marker (m)	Total Depth (ft)
C4883	216-Z-16 Crib	136005.7	566429.9	207.2	151.3
C4884	216-Z-16 Crib	135988.8	566469.7	206.8	150
C4885	216-Z-17 Trench	135886.1	566585.2	Not available	150
C4886	216-Z-17 Trench	135851.8	566584.4	206.3	150
C4890	216-S-25 Crib	134277.9	566569.0	202.9	224
C4891	216-S-25 Crib	134281.2	566662.6	202.3	250

Borehole C4883 was located on the north side center of the 216-Z-16 Crib, 1.5 m (5 ft) from the edge. The vapor-sampling cone was used to take samples at 4.6, 7.6, and 12.5 m (15, 25, and 41 ft) bgs before refusal. The hole then was drilled with the 7.25 cm (2.875-in.) EAPS to 45.7 m (150 ft) and left overnight before the soil-vapor sample was collected at that depth. Subsequent soil-vapor samples then were collected at 38.1, 30.4, 22.9, and 15.2 m (125, 100, 75, and 50 ft) before the borehole was decommissioned.

216-Z-17 Trench – Borehole C4885 was located on the west side center of the 216-Z-17 Trench, 1.5 m (5 ft) from the edge. The 5 cm (2-in.) drill system was used to push to 16.3 m (53.5 ft) and collect soil-vapor samples at 4.6, 7.6, and 15.2 m (15, 25, and 50 ft) bgs. The borehole then was drilled to 20.6 m (67.5 ft) using the 7.25 cm (2.875-in.) EAPS. The 4.45 cm (1.75-in.) CPT cone then was direct pushed to 36.9 m (121 ft). The 4.4 cm (1.75-in.) gas-sampling cone then was deployed but immediately met refusal at 37.5 m (123 ft), so the 7.25 cm (2.875-in.) EAPS was used to drill to the desired depth of 45.7 m (150 ft), and the hole was left overnight. Soil-vapor samples were collected at 45.7, 38.1, 30.4, and 22.9 m (150, 125, 100, and 75 ft) bgs before the borehole was decommissioned.

Borehole C4886 was located on the west side south of the 216-Z-17 Trench. The CPT vapor-sampling cone was used to collect soil-vapor samples at 4.6, 7.6, 15.2, and 22.9 m (15, 25, 50, and 75 ft) bgs before refusal at 30.4 m (100 ft). The 7.25 cm (2.875-in.) EAPS was used to drill to the desired depth of 45.7 m (150 ft), and the hole was left overnight. Soil-vapor samples were collected at 45.7, 38.1, and 30.4 m (150, 125, and 100 ft) bgs before the borehole was decommissioned.

216-T-19 Crib – Three EAPS boreholes were planned to be located adjacent to the 216-T-19 Crib. However, because significant radioactive contamination was expected at this location within 18.3 m (60 ft) of the ground surface, the EAPS air-rotary-drilling system had the potential to bring contaminated cuttings to the surface. The EAPS air-rotary-drilling system was not configured to work in a radiological environment. The air-rotary-drilling system had the potential to contaminate the drilling equipment and the interior of the support truck. The practical experience gained with the EAPS system indicated that the direct-push system was unlikely to reach the desired depths by itself. In addition, the maximum shallow soil-vapor carbon tetrachloride concentration during Step I sampling at the 216-T-19 Crib was 1.5 ppmv,

and the passive soil-vapor survey indicated relatively low carbon tetrachloride results. The U.S. Environmental Protection Agency concurred that the Step II investigation at the 216-T-19 Crib was not required, so no further investigation was conducted at this site (FH-0503537, "Meeting Minutes, Unit Managers' Meeting, 200 Area Groundwater and Source Operable Units," Attachment 7, "Agreements and Issue Resolution List").

216-Z Ditches – The 216-Z Ditches were investigated during the CPT investigation that was described in Section 2.1 of this report. Two pushes at the midpoint of the original 216-Z Ditches system (the head end of the later replacement 216-Z Ditches) (at location P41 in Figure 2-4) met refusal at 13.25 and 13.65 m (43.5 and 44.8 ft). The sampling was conducted by Vista Engineering and is described in DOE/RL-2006-58, Sections 3.2.1 and 4.2.2.

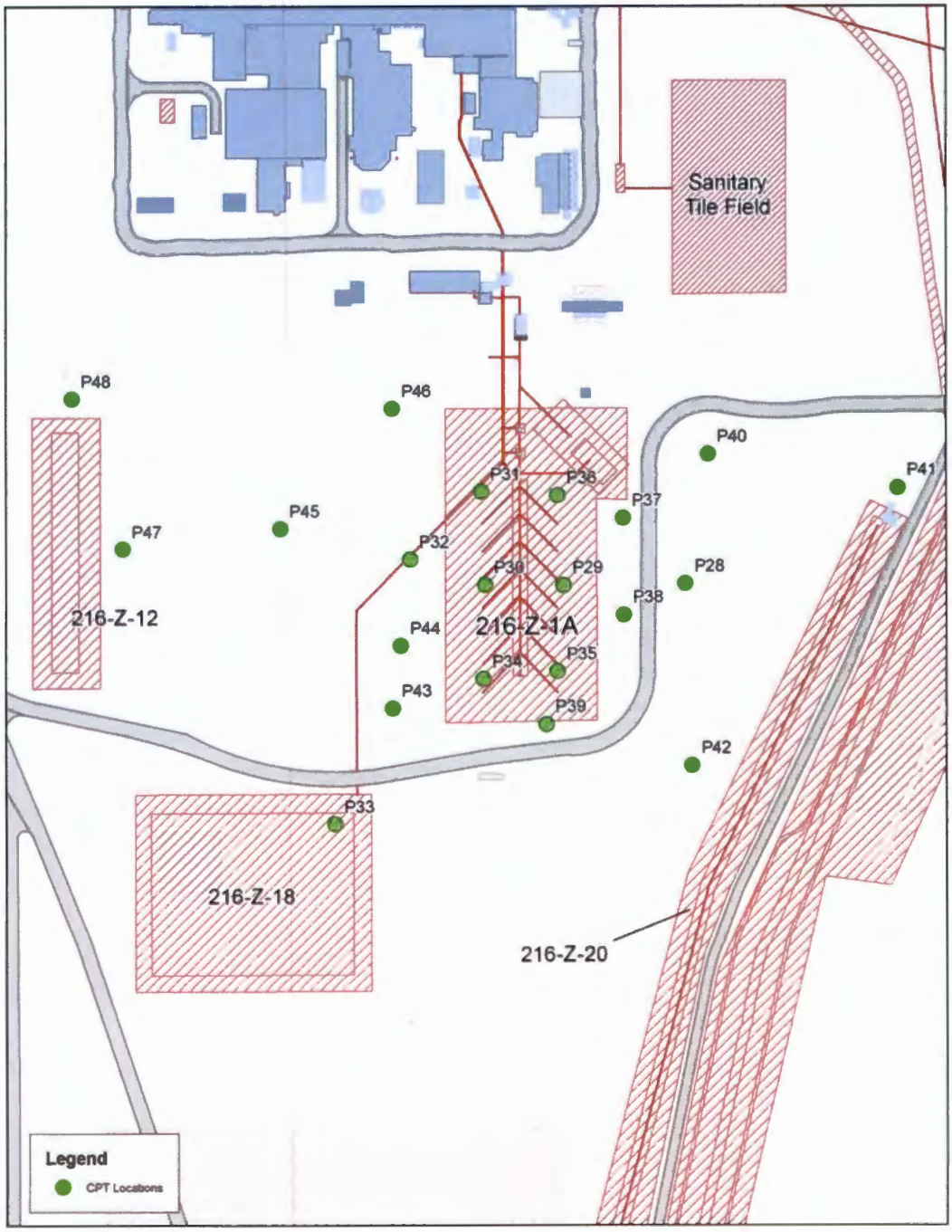
216-Z-12 Crib – The 216-Z-12 Crib was investigated during the CPT investigation that was described in Section 2.1 of this report. One push on the east side of the 216-Z-12 Crib (at location P47 in Figure 2-4) met refusal at 0.35 m (1.1 ft), and two pushes at the north end of the crib met refusal at 22.87 and 23.2 m (75.03 and 76.1 ft) (at location P48 in Figure 2-4). The sampling was conducted by Vista Engineering and is described in DOE/RL-2006-58, Sections 3.2.1 and 4.2.2. (Because no samples were collected at location P-47, P-47 is not included in Appendix D of DOE/RL-2006-58.)

216-Z-7 Crib – Borehole C4183 was drilled and sampled through the 216-Z-7 Crib from the ground surface to the water table at 68 m (225 ft) as part of the investigation of this crib as a representative waste site of the 200-LW-2 OU (D&D-25461, *200-LW-1 and 200-LW-2 Operable Units - Borehole Summary for Boreholes in the 216-S-20, 216-T-28, and 216-Z-7 Cribs*, and DOE/RL-2005-61, *Remedial Investigation Report for the 200-LW-1 (300 Area Chemical Laboratory Waste Group) and 200-LW-2 (200 Area Chemical Laboratory Waste Group) Operable Units*).

During the drilling, in situ soil-vapor samples were collected and analyzed in support of the 200-PW-1 OU Step II investigation. The soil-vapor samples were collected with a displacement pump from intervals isolated by an inflatable packer. The vapor samples were purged through Teflon-lined TYGON[1] tubing into Tedlar sampling bags. The soil-vapor samples were screened for volatile organics using hand-held organic-vapor analyzers. The soil-vapor samples then were analyzed for carbon tetrachloride using field-screening instruments. The in situ soil-vapor samples were collected at seven discrete borehole depths, described in Section 3.3 of this report.

[1] TYGON is a registered trademark of Norton Performance Plastics Corporation, a Saint-Gobain Company, Akron, Ohio.

Figure 2-4. Location of Cone Penetrometer Push Locations Around the 216-Z-1A Tile Field. (From DOE/RL-2006-58)



2.4 ACTIVITIES AT TRENCH T-04 IN THE 218-W-4C BURIAL GROUND

Soil-vapor data collected in the vicinity of Trench T-04 in the 218-W-4C Burial Ground during the Step I investigation in 2002 did not extend through the upper vadose zone. Therefore, the focus of the Step II investigation at this location was to collect samples from deeper in the vadose zone (Table 1-1). However, RL and the U.S. Environmental Protection Agency concurred that the existing carbon tetrachloride vadose-zone data at Trench T-04 were sufficient and that no additional investigations need to be conducted at this location as part of the 200-PW-1 RI, so no soil-vapor or soil sampling was conducted at this site during the Step II investigation (FH-0602151, "Meeting Minutes, Unit Managers' Meeting, 200 Area Groundwater and Source Operable Units, August 23, 2006," Attachment 12, "200 Area Unit Managers' Meeting Source Operable Units and Facilities Status").

After the Step I investigation at the 218-W-4C Burial Ground was completed in 2002, two activities were conducted at this waste site in support of *Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989) (Tri-Party Agreement) Milestone M-91-40 for retrieval of retrievably stored waste.

- Vent-riser sampling was initiated on October 15, 2003. Eighty-nine vapor samples were collected in Tedlar bags or SUMMA[1] canisters between October 15 and October 22, 2003. The last two samples (one Tedlar bag and one SUMMA canister) were collected between December 8 and December 10, 2003. The vapor samples in Tedlar bags were analyzed for carbon tetrachloride using field-screening instruments. The samples in SUMMA canisters were analyzed for volatile organic compounds in a laboratory. In accordance with Tri-Party Agreement Milestone M-91-40, these results were reported in quarterly letter reports to the Washington State Department of Ecology. The two reports, one for October to December 2003 and one for January to March 2004, are provided as Appendix C1 and Appendix C2, respectively, for completeness. Results are summarized in Section 3.4.

- A soil-vapor extraction system was operated at Trench T-04 from November 2003 through April 2004. The soil-vapor extraction system was operated to remove carbon tetrachloride from the burial ground trench to minimize release to the environment. Approximately 11 kg of carbon tetrachloride were removed from trench T-04 in the 218-W-4C Burial Ground during fiscal year 2004. The soil-vapor extraction system then was permanently removed, to allow retrieval operations to remove the bulk of the soil overburden covering the drums at the east end of Trench T-04 (WMP-26178, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Carbon Tetrachloride Site, Fiscal Year 2004*).

[1] SUMMA is a trademark of Moletrics, Inc., Cleveland, Ohio.

2.5 INVESTIGATION IN THE PLUTONIUM FINISHING PLANT PROTECTED AREA

The Plutonium Finishing Plant Protected Area was characterized using both active and passive soil-vapor surveys to investigate potential sources of carbon tetrachloride. Active soil-vapor sampling within the Plutonium Finishing Plant Protected Area was identified as part of the sampling design for the Step I investigation (DOE/RL-2001-01, Appendix C). This task was conducted in August 2003, after completion of the report on Step I investigation results (CP-13514). The Plutonium Finishing Plant Protected Area active soil-vapor sampling results are provided in this report on Step II investigation results.

The sampling design in the Step I sampling and analysis plan (DOE/RL-2001-01, Appendix C) specified shallow soil-vapor sampling (to a depth of 1.5 m [5 ft]) within the Plutonium Finishing Plant Protected Area. A systematic grid was to be used to identify the sampling locations, in accordance with the requirements of the sampling and analysis plan. The results of the shallow, grid-based sampling were to be used to guide selection of locations for deeper soil-vapor sampling using a direct-push technology. However, during the subsequent detailed planning, safety concerns were raised that necessitated using a different sampling strategy. A supplement to the sampling and analysis plan was prepared to formally communicate the revised strategy for the vadose-zone sampling within the Plutonium Finishing Plant Protected Area and to obtain the concurrence of the U.S. Department of Energy, Richland Operations Office, and the U.S. Environmental Protection Agency. The supplement to the sampling and analysis plan was approved by the 200-PW-1 OU managers in December 2002 and is included in Appendix C of the Work Plan (DOE/RL-2001-01).

As part of the revised sampling design, professional judgment was used, rather than shallow sampling on a grid spacing, to focus the deeper sampling. The Guzzler Vacuum Extraction System[1] (Guzzler) was used through the upper zone (to a minimum depth of 0.9 m [3 ft]) to clear the subsurface for the use of a direct-push technology for sampling. At a minimum, all of the locations selected in the revised strategy were investigated as described in the initial sampling design for focused, deeper sampling using a direct-push technology.

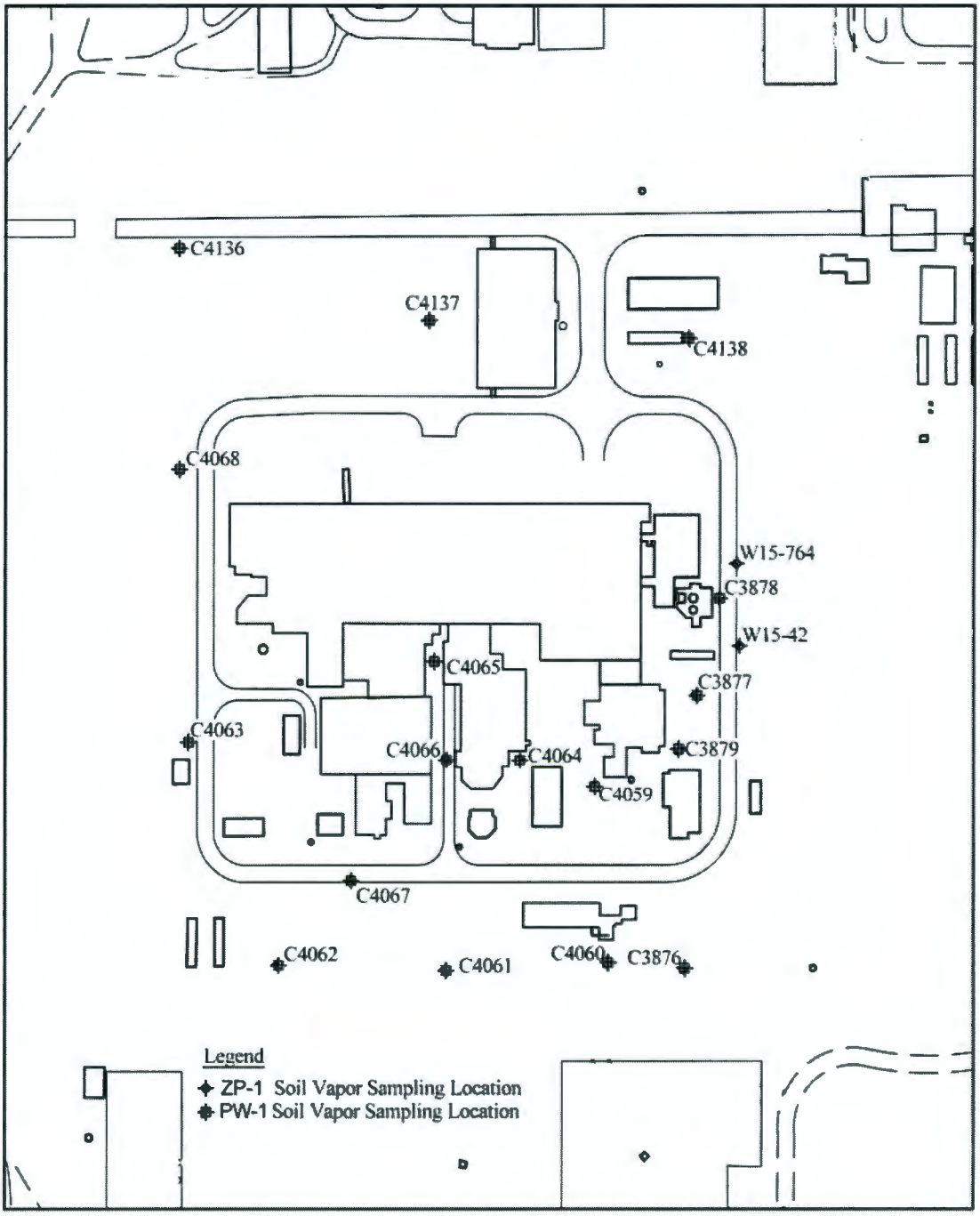
Active soil-vapor samples were collected at 18 subsurface locations within the Plutonium Finishing Plant Protected Area (Figure 2-5). The rationale for selection of these locations, in order of priority, is provided in Table 2-5. Two locations (Boreholes C4059 and C4060) are listed twice in Table 2-5 because each had two sampling objectives.

The primary objective of the Step I sampling was to characterize the dispersed plume in the upper 38.1 m (125 ft) of the vadose zone (i.e., above the Cold Creek unit) in the immediate vicinity of the Plutonium Finishing Plant. The sampling design for focused, deeper sampling using a direct-push technology specified sampling vapors at 4.6 and 7.6 m (15 and 25 ft) bgs, if possible, to indicate the vertical trend. At each location, vapor samples were collected at 7.6 m

[1] Guzzler is a trademark of Guzzler Manufacturing, Inc. (a subsidiary of Federal Signal Corporation), Streator, Illinois.

(25-ft) increments below the 7.6 m (25-ft) depth and at the final depth when the GeoProbe[1] was unable to advance deeper (i.e., refusal).

Figure 2-5. Soil-Vapor Sampling Locations Within the Plutonium Finishing Plant Protected Area.



[1] GeoProbe is a registered trademark of Kejr, Inc., Salina, Kansas.

Table 2-5. Sampling Location Rationale in the Plutonium Finishing Plant Protected Area.

Well Identification Number	Temporary Sampling Location Number*	Rationale
C4064	Z13	Investigation of the three french drains that received heating, ventilation, and air conditioning condensate discharges
C4066	Z14	
C4065	Z15	
C3879	17	Investigation of the drum storage area. NOTE: Two locations will be investigated according to Table 3-3 in the sampling and analysis plan (DOE/RL-2001-01, Appendix C), because no shallow soil-vapor sampling will be conducted.
C3877	24	
C4060	6	Investigation of the liquid-waste discharge pipeline to the 216-Z-1A Tile Field liquid-waste discharge site
C4059	15	
C3494 (W15-764)	25	Investigation of the liquid-waste discharge pipeline to the 216-Z-9 Trench liquid-waste discharge site. NOTE: The soil-vapor sampling was conducted during drilling of well 299-W15-764 (Borehole C3494).
C4059	15	Investigation of liquid-waste discharges to unplanned release site UPR-200-W-103
C4061	4	Investigation of liquid-waste discharge pipeline to the 216-Z Ditches system
C4060	6	Investigation of liquid-waste discharges to the 241-Z-361 Settling Tank
C3876	7	
C4068	28	Investigation near location of groundwater well 299-W15-16
C4062	2	Investigation of southwest portion of Plutonium Finishing Plant Protected Area
C4067	11	
C4063	20	
C4136	55	Investigation of northern portion of Plutonium Finishing Plant Protected Area
C4137	46	
C4138	48	
C3878	26	Investigation of carbon tetrachloride tank storage area

*Based on Figure 1 in the second supplement to the Step I sampling and analysis plan in DOE/RL-2001-01, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit RI/FS Work Plan: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*, Appendix C.

The 18 sample locations were identified in the Plutonium Finishing Plant Protected Area and marked in the field in 2002. The excavation permit process was initiated, location surveys were performed, and ground-penetrating radar was performed at each site to determine any underground hazards. Based on concerns about potentially encountering subsurface hazards not identified by the ground-penetrating radar, a regulated Guzzler was used to remove approximately 2.4 m (8 ft) of soil at each sampling location. The soil then was returned to the ground, and the GeoProbe was used for subsurface access for sampling.

Guzzler operations began on July 23, 2003, and were completed on July 28, 2003. The Guzzler, which is basically a large vacuum machine, was able to remove soil using a hose with a rigid

attachment. The outside diameter of the hose attachment was about 20.3 cm (8 in.), but a hole several times larger in diameter usually would result, because soil/aggregate at the top of the hole typically slid to the bottom. At sites with asphalt at the ground surface, the GeoProbe unit was used to break-up the asphalt to allow the Guzzler to be used. All sites were backfilled with the material removed from the holes.

Well identification numbers were assigned as guzzling operations progressed (Table 2-6). An industrial hygiene technician was present at the first two locations (Boreholes C3876 and C3877) to conduct health and safety monitoring for carbon tetrachloride. The industrial hygiene technician used an organic-vapor monitor portable ionization detector with an 11.7 eV ionization-potential lamp that was calibrated to carbon tetrachloride. No carbon tetrachloride was detected. A radiological control technician provided continuous monitoring with field instruments for worker protection. No radiological contamination was detected above background levels on soil retrieved from the subsurface. However, when the probe of the field instrument was lowered into Boreholes C3876 and C3877, readings up to twice background were obtained.

Table 2-6. Guzzler/GeoProbe Boreholes within the Plutonium Finishing Plant Facility Area. (2 Pages)

Well Identification Number	Temporary Number*	Guzzler Total Depth (ft bgs)	Ground Surface	Guzzler Operation Date	GeoProbe Total Depth (ft)	Northing (m)	Easting (m)	Elevation (m)
C3876	7	5	Gravel	07/23/03	34.2	135512.9	566561.9	206.7
C3877	24	7.6	Gravel	07/23/03	46.7	135609.7	566566.4	206.9
C3878	26	7.5	Asphalt	07/24/03	45.4	135643.7	566574.6	206.5
C3879	17	8	Asphalt	07/24/03	41.3	135591.0	566559.6	206.9
C4059	15	8.1	Gravel	07/24/03	42.9	135577.3	566529.0	206.7
C4060	6	8	Gravel	07/24/03	36	135514.9	566534.0	206.6
C4061	4	8	Gravel	07/24/03	36.5	135512.1	566475.1	207.1
C4062	2	8	Gravel	07/24/03	31	135513.9	566413.8	207.7
C4063	20	8	Gravel	07/24/03	42.2	135593.4	566380.9	206.7
C4064	Z13	6.9	Gravel	07/25/03	28.5	135587.0	566501.8	206.7
C4065	Z15	7.3	Asphalt	07/25/03	44	135621.6	566470.6	206.9
C4066	Z14	8	Asphalt	07/25/03	40	135587.1	566475.1	206.4
C4067	11	8	Gravel	07/25/03	39	135544.0	566440.3	206.0
C4068	28	8	Gravel	07/25/03	32	135689.0	566377.6	207.1
C4136	55	7.7	Gravel	07/28/03	36	135766.6	566377.4	208.3

Table 2-6. Guzzler/GeoProbe Boreholes within the Plutonium Finishing Plant Facility Area. (2 Pages)

Well Identification Number	Temporary Number*	Guzzler Total Depth (ft bgs)	Ground Surface	Guzzler Operation Date	GeoProbe Total Depth (ft)	Northing (m)	Easting (m)	Elevation (m)
C4137	46	7.9	Gravel	07/28/03	38.5	135741.1	566468.6	207.1
C4138	48	8	Asphalt	07/28/03	47.5	135734.8	566563.2	206.4

*Based on Figure 1 in the second supplement to the Step I sampling and analysis plan in DOE/RL-2001-01, *200-PW-1 Plutonium-Rich/Organic-Rich Process Waste Group Operable Unit RI/FS Work Plan*, Appendix C.
bgs = below ground surface.
GeoProbe is a registered trademark of GeoProbe Systems, Salina, Kansas.
Guzzler is a trademark of Guzzler Manufacturing, Inc. (a subsidiary of Federal Signal Corporation), Streator, Illinois.

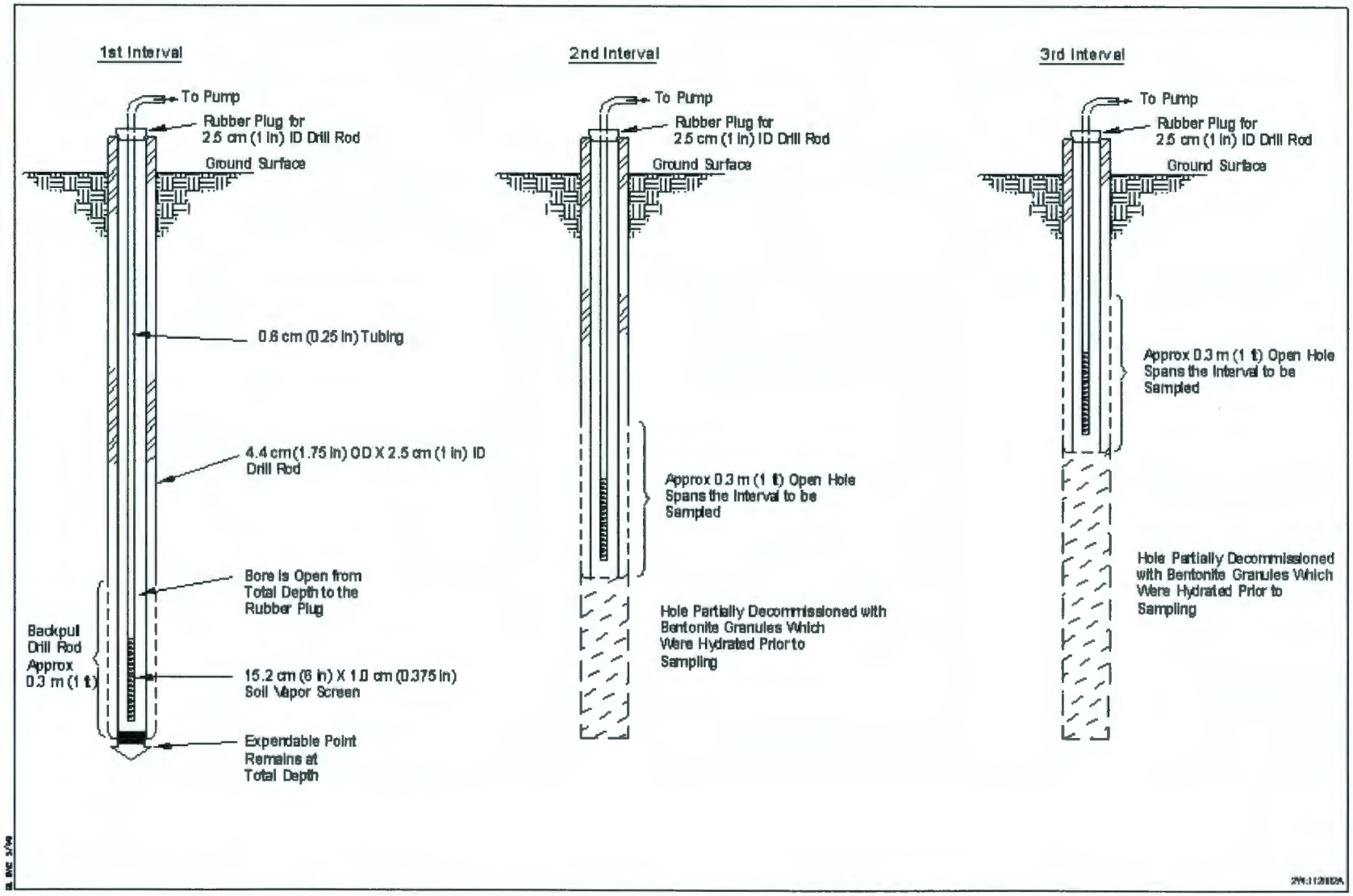
GeoProbe operations began on August 18, 2003, and were completed on August 28, 2003. The total depth and sampling intervals of each borehole are provided in Table 2-6. The GeoProbe system uses 4.45 cm (1.75-in.) outside-diameter and 2.5 cm (1.0-in.) inside-diameter carbon steel probe rods to provide access to the subsurface to obtain soil-vapor samples. This direct-push system provided a method to obtain soil-vapor samples at various depths without the radiological exposure to workers or the generation of waste associated with normal borehole drilling.

Soil-vapor samples were scheduled to be taken at 4.6 and 7.6 m (15 and 25 ft) bgs, if possible, to indicate vertical trends. Additional sampling would occur in 7.6 m (25 ft) increments until refusal or a final depth of 38.1 m (125 ft) bgs was reached. In general, the GeoProbe system was used to collect soil-vapor samples from three intervals at each location (Figure 2-6). Soil-probe rods were pushed as deep as possible (i.e., to refusal) to obtain vapor samples. The maximum target depth of 38.1 m (125 ft) was not reached by any of the pushes. The maximum depth penetrated below ground surface was 14.5 m (47.5 ft), and the minimum depth was 8.7 m (28.5 ft).

After reaching the refusal depth, the rods were pulled back approximately 0.3 m (1 ft) to allow an expendable probe point to fall out and create an uncased borehole for soil-vapor sampling. The depth to the bottom of the borehole was verified using a measuring tape. A 15.2 cm (6-in.)-long stainless steel screen attached to Teflon-lined TYGON tubing was lowered to the bottom of the borehole to obtain the soil-vapor sample. The probe-rod annulus typically was sealed with a fitted rubber stopper to ensure that the sample was being collected from the bottom of the borehole. The photoionization detector was used as a pump to purge atmospheric air from within the tubing and the GeoProbe rod. After purging, the soil vapor was collected in a 1 L Tedlar bag for analysis. The samples then were analyzed within the 6-hour holding time using an Innova 1312 multi-gas analyzer[1] (Section 3.5).

[1] Innova and the 1312 multi-gas analyzer are trademarks of Innova AirTech Instruments A/S, Ballerup, Denmark.

Figure 2-6. Downhole Configuration for Sampling Using the GeoProbe.



After the soil-vapor sample was collected, the screen and tubing were removed from the borehole. Granular bentonite was added to the borehole to decommission the lower portion while the probe rods were being retrieved. Bentonite was placed to approximately 7.6 m (25 ft) bgs. A soil-vapor sample was collected above this bentonite plug in the same manner that the first soil-vapor sample was collected. The borehole again was partially decommissioned with granular bentonite to the next sample interval, approximately 4.6 m (15 ft) bgs. After the final sample was collected, the borehole was decommissioned by filling it with granular bentonite to the ground surface. Figure 2-6 depicts the general downhole configurations for obtaining subsurface soil-vapor samples with the GeoProbe system.

The passive soil-vapor survey, consisting of 35 sampling points, was conducted by Vista Engineering in November 2004. The sampling methodology and locations are presented in DOE/RL-2006-58, Section 4.1.2 and Figure 4-5.

2.6 INVESTIGATION ADJACENT TO THE 216-S-25 CRIB

This potential release site was not investigated during Step I, because it is located outside of the Step I study area. The Step II sampling design included collection of soil vapor from the shallow and deep vadose zone adjacent to the 216-S-25 Crib.

The EAPS was used in June and July 2005 to collect soil-vapor samples from the shallow and deep vadose zone and one groundwater sample in two borings adjacent to the 216-S-25 Crib (Figure 2-3). The EAPS operation and sampling methodology were discussed in Section 2.3. Details concerning the drilling, pushing, and sampling of the two EAPS boreholes used to investigate this site are discussed below and are documented in Appendix B.

Borehole C4890 was located on the south side center of the 216-S-25 Crib, 0.9 m (3 ft) from the edge of the crib. A CPT probe with a gas-sampling port initially was pushed to 17.3 m (56.8 ft), and soil-vapor samples were collected at 4.6, 7.6, and 15.2 m (15, 25, and 50 ft). The 7.25 cm (2.875-in.) EAPS was used to drill to the desired depth of 68.3 m (224 ft) on July 7, 2005. On July 11, 2005, the water level in the boring was measured at 65.8 m (216 ft). A bladder pump was lowered through the drill casing into the groundwater, and the groundwater was pumped to the surface and collected in sample containers. This groundwater sample (HEIS number B1DFF8) subsequently was analyzed for volatile organic compounds.

On July 12, 2005, a soil-vapor sample was collected at 65.5 m (215 ft), 0.3 m (1 ft) above the water table. Six samples were taken at 7.6 m (25-ft) intervals from 61 m (200 ft) up to 22.8 m (75 ft). As each sampling depth was completed, the boring was filled with bentonite to the elevation of the next sample. Upon completion of the soil-vapor sampling, the hole was decommissioned.

Borehole C4891 was located on the east side center of the 216-S-25 Crib, 1.2 m (4 ft) from the edge of the crib. The vapor sampler was advanced to 10.2 m (33.5 ft) by direct push, and soil-vapor samples were collected at 4.6 and 7.6 m (15 and 25 ft). The 5 cm (2-in.) EAPS drill then was used to 15.2 m (50 ft), where a soil-vapor sample was collected. This sample was

collected before the prescribed 12-hour rebound time had elapsed. Drilling then resumed to 17.7 m (58 ft) before mechanical issues with the EAPS forced the work to stop. The cone subsequently was re-pushed to refusal at 17.7 m (58 ft). The 5 cm (2-in.) EAPS drill was used to drill from 17.7 to 21.6 m (58 to 71 ft). Investigation of mechanical problems during a direct push to the 22.8 m (75-ft) sampling interval found that the outer drill bit had detached and plugged the boring. Subsequent drill bit and mechanical problems resulted in two more borings, located 1.5 m (5 ft) away from the original boring, which were decommissioned after they reached 3.2 and 21.3 m (10.7 and 70 ft), respectively.

On July 20, 2005, the rig was moved another 1.5 m (5 ft) from the original location, and the 4.44 cm (1.75-in.) vapor-sampling probe was pushed to 22.8 m (75 ft) to collect the first soil-vapor sample, before encountering refusal at 27 m (88.5 ft). The 7.25 cm (2.875-in.) EAPS drill was used to drill the boring to 32.6 m (107 ft). The boring then was continued in direct-push mode with a 4.45 cm (1.75-in.) cone to the target depth of 45.7 m (150 ft) and was left overnight before soil-vapor sampling began. Soil-vapor samples were collected at depths of 45.7, 38.1, and 30.5 m (150, 125, and 100 ft) before the borehole was decommissioned.

2.7 INVESTIGATION AT THE 218-W-3A BURIAL GROUND

The Step II investigation of the 218-W-3A Burial Ground included a passive soil-vapor survey of two trenches and vapor sampling of all existing vent risers in engineered trenches within the burial ground.

Passive soil-vapor collectors were placed approximately every 15 m along the centerline of trench T-9S and trench T-06 (Figure 2-7). Trench T-9S was selected for sampling because the east end of this trench is near well 299-W10-20 in groundwater hot spot location #1 (Figure 1-2). The objective of sampling Trench T-9S was to evaluate whether the burial ground trench contents were providing a continuing source of carbon tetrachloride groundwater contamination. Trench T-06 was selected because it received 2,275 drums of primarily Plutonium Finishing Plant waste, which potentially could generate volatile organic compound vapors.

The carbon tetrachloride groundwater plume, as defined by the 5 μg/L contour, does not extend underneath the northwestern portion of the 218-W-3A Burial Ground. Groundwater concentrations exceeding 100 μg/L are indicated only underneath the southeastern portion of the burial ground. Because of the lack of elevated carbon tetrachloride groundwater concentrations underlying most of the burial ground, no additional trenches were selected for passive soil-vapor surveys. This approach was presented at Vista Engineering's Project Technical Workshop #2 in January 2005 and was approved in that meeting by the U.S. Environmental Protection Agency.

The passive soil-vapor survey deployed passive soil-vapor collectors using the methodology described in Section 2.1. Collectors were placed at 12 locations along trench T-06 and at 10 locations along trench T-9S from June 30 to July 5, 2005 (Table 2-7). A second passive soil-vapor collector was placed at one location in each trench to collect a duplicate sample. One trip blank also was collected.

Figure 2-7. Sampling Locations in the 218-W-3A Burial Ground.

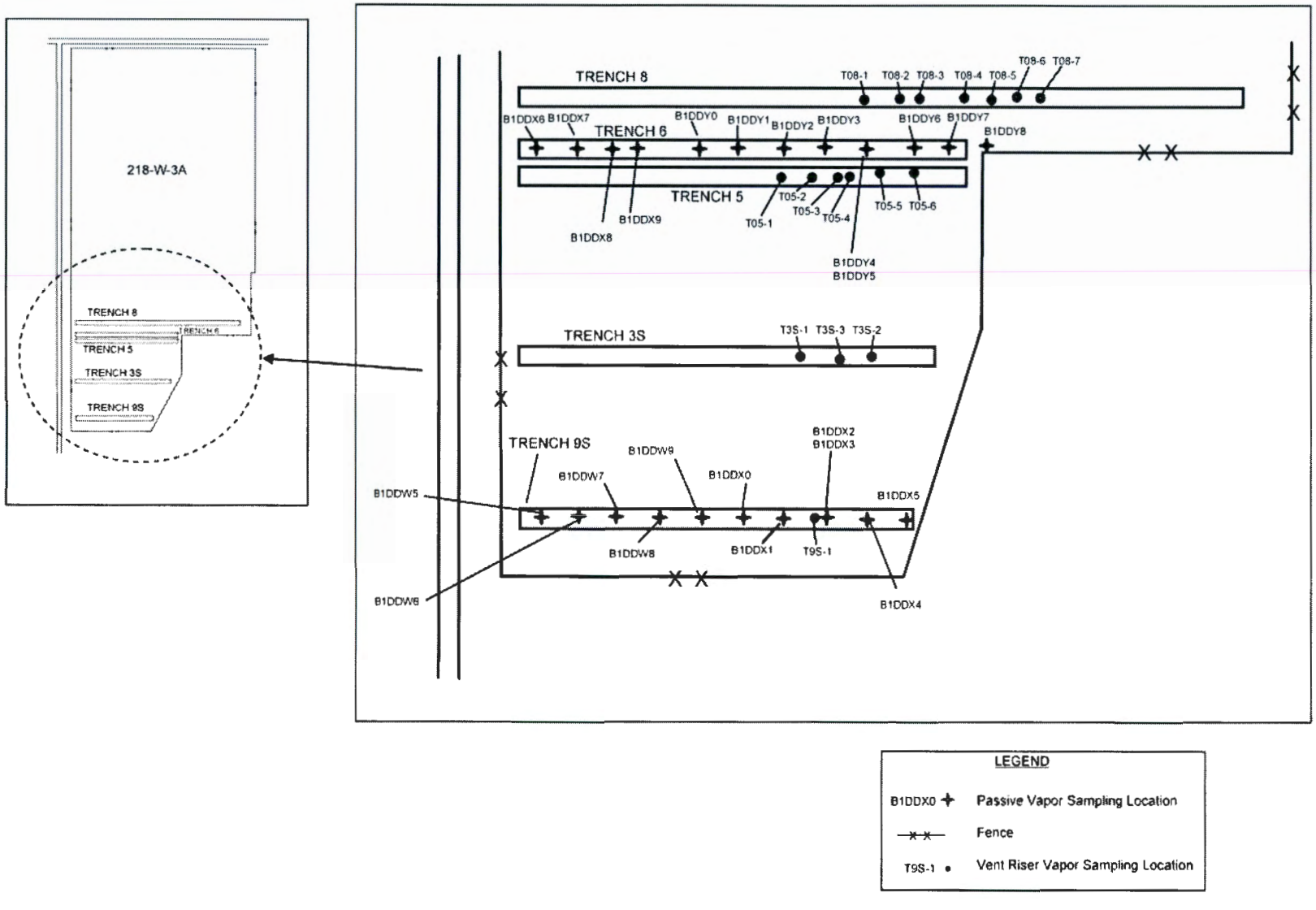


Table 2-7. Passive Soil-Vapor Survey at the 218-W-3A Burial Ground.

Temporary Field Sample Number	Soil-Vapor Sample HEIS Number	Sample Date and Time		Location	
		Emplaced	Extracted	Easting (m)	Northing (m)
T9S-1	B1DDX4	06/30/2005 09:25	07/05/2005 09:20	566221.0	136876.6
T9S-2	B1DDW5	06/30/2005 09:06	07/05/2005 08:55	566099.3	136876.4
T9S-3	B1DDW6	06/30/2005 09:08	07/05/2005 08:57	566114.5	136876.4
T9S-4	B1DDW7	06/30/2005 09:11	07/05/2005 09:01	566129.7	136876.4
T9S-5	B1DDW8	06/30/2005 09:13	07/05/2005 09:04	566144.9	136876.4
T9S-6	B1DDW9	06/30/2005 09:15	07/05/2005 09:07	566160.1	136876.5
T9S-7	B1DDX0	06/30/2005 09:17	07/05/2005 09:10	566175.3	136876.5
T9S-8	B1DDX1	06/30/2005 09:19	07/05/2005 09:12	566190.6	136876.5
T9S-9	B1DDX2	06/30/2005 09:21	07/05/2005 09:15	566205.8	136876.5
T9S-9 duplicate	B1DDX3	06/30/2005 09:21	07/05/2005 09:17	566205.8	136876.5
T9S-10	B1DDX5	06/30/2005 09:27	07/05/2005 09:25	566236.2	136876.6
T06-1	B1DDY8	06/30/2005 09:59	07/05/2005 10:03	566266.4	137047.6
T06-2	B1DDX6	06/30/2005 09:38	07/05/2005 09:36	566099.0	137046.4
T06-3	B1DDX7	06/30/2005 09:39	07/05/2005 09:40	566114.2	137046.5
T06-4	B1DDX8	06/30/2005 09:41	07/05/2005 09:42	566129.4	137046.5
T06-5	B1DDX9	06/30/2005 09:43	07/05/2005 09:44	566137.1	137046.5
T06-6	B1DDY0	06/30/2005 09:44	07/05/2005 09:47	566159.9	137046.5
T06-7	B1DDY1	06/30/2005 09:46	07/05/2005 09:49	566175.1	137046.6
T06-8	B1DDY2	06/30/2005 09:47	07/05/2005 09:52	566190.3	137046.6
T06-9	B1DDY3	06/30/2005 09:49	07/05/2005 09:53	566205.5	137046.6
T06-10	B1DDY4	06/30/2005 09:50	07/05/2005 09:56	566220.7	137046.6
T06-10 duplicate	B1DDY5	06/30/2005 09:51	07/05/2005 09:58	566220.7	137046.6
T06-11	B1DDY6	06/30/2005 09:53	07/05/2005 09:59	566235.9	137046.7
T06-12	B1DDY7	06/30/2005 09:55	07/05/2005 10:01	566251.1	137046.7

HEIS = *Hanford Environmental Information System* database.

When the sampler returned to retrieve the collectors on July 5, he discovered that sample B1DDX5, the easternmost sample in Trench T-9S, had been displaced from its original location. Based on his observation of numerous coyote tracks in the vicinity, he inferred that a coyote inadvertently had caught the collector retrieval wire, pulled the collector out of the ground, and dropped the collector at the location approximately 3 m to the southeast where the sampler found it. It is unknown when the collector was disturbed after emplacement. The collector was retrieved from its as-found location and sent to the vendor's laboratory with the other collectors for analysis of volatile organic compounds.

Vapor samples from the 17 vent risers present in portions of trenches T-9S, T-3S, T-05, and T-08 were collected and analyzed using field-screening instruments (Figure 2-7). All of the vent risers in trenches T-9S (1 riser), T-3S (3 risers), and T-05 (6 risers) were sampled on August 25, 2005, and all of the vent risers in trench T-08 (7 risers) were sampled on September 6, 2005. A sample location number (trench and riser) was established and recorded for each vent riser. The vent risers in each trench were numbered sequentially from west to east.

After the vent-riser cap was removed, a 15.2 m (50-ft)-long piece of Teflon-lined TYGON tubing was lowered to the bottom of the riser or until refusal (Figure 2-8). The tubing measured 0.64 cm (0.25-in.) inside diameter and 0.95 cm (0.375-in.) outside diameter, with a metal filter on the lower end. The tubing was marked at 0.3 m (1-ft) intervals so that depth from the top of the riser to the bottom could be measured. The depth-to-bottom from the top of the riser typically was 5.8 to 6.4 m (19 to 21 ft) (Table 2-8). The tubing then was pulled back approximately 0.08 m (0.25-ft) to lift the filter off the bottom of the trench. The top of the riser was sealed to prevent intrusion of ambient air during purging and sampling.

Figure 2-8. Schematic View of the 218-W-3A Burial Ground Trench and the Vent-Riser Sampling Method.

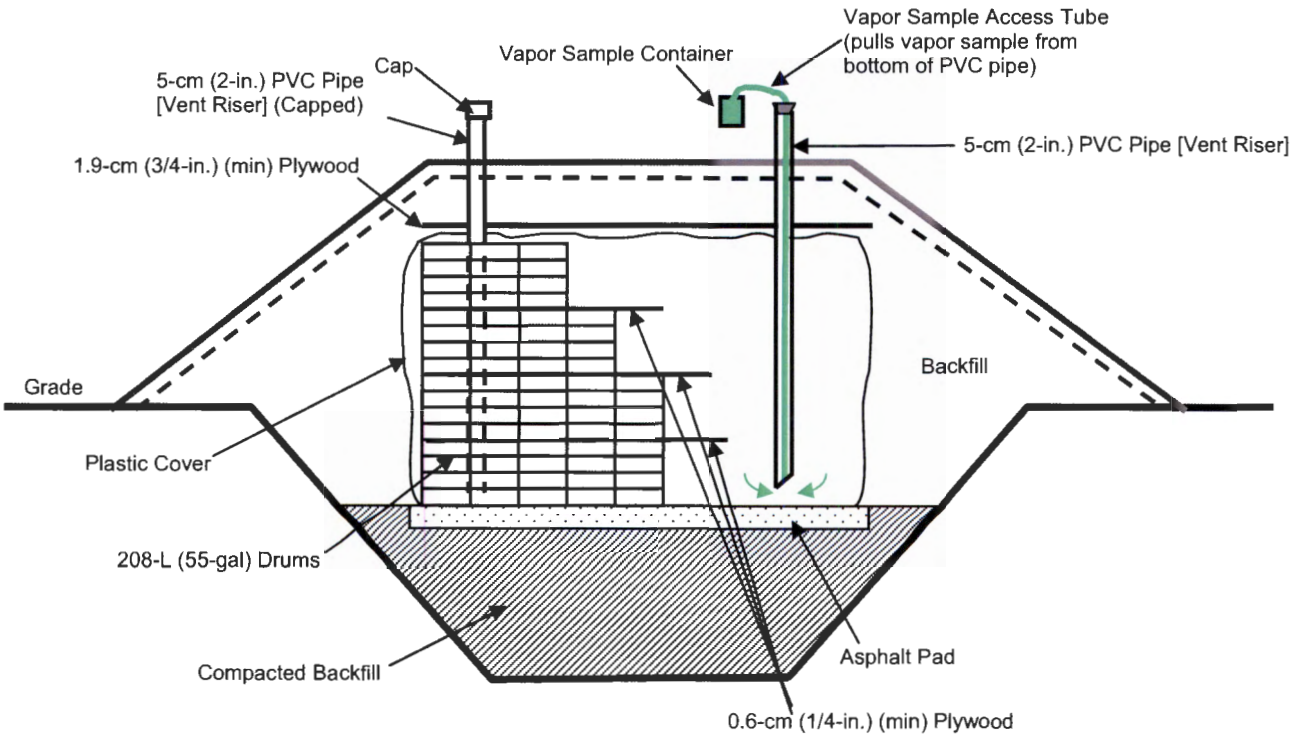


Table 2-8. Field Measurements for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches.

Sample Identifier	Sample Depth*		HEIS Number	Sample and Analysis Date and Time	Location	
	Below Top of Riser (m)	Below Surface (m)			Easting (m)	Northing (m)
T-9S-1	6.4	5.3	B1DVM5	08/25/2005 1440	566121.1	136876.4
T-3S-1	5.8	3.3	B1DVM2	08/25/2005 1330	566114.6	136950.7
T-3S-2	6.1	5.1	B1DVM3	08/25/2005 1353	566148.4	136950.2
T-3S-3	0.9	-0.1	B1DVM4	08/25/2005 1425	566133.2	136949.5
T-05-1	3.0	1.7	B1DVL6	08/25/2005 0950	566105.6	137035.0
T-05-2	5.8	5.0	B1DVL7	08/25/2005 1042	566120.5	137034.2
T-05-2 duplicate	5.8	5.0	B1DVN5	08/25/2005 1048	566120.5	137034.2
T-05-3	5.8	5.0	B1DVL8	08/25/2005 1115	566133.0	137035.7
T-05-4	5.8	4.4	B1DVL9	08/25/2005 1143	566137.6	137034.5
T-05-5	1.4	0.4	B1DVM0	08/25/2005 1208	566150.7	137037.3
T-05-6	6.1	4.9	B1DVM1	08/25/2005 1238	566167.4	137037.0
T-05-6 duplicate	6.1	4.9	B1DVN3	08/25/2005 1245	566167.4	137037.0
T-08-1	6.1	5.3	B1DVM6	09/06/2005 1005	566143.9	137071.1
T-08-1 duplicate	6.1	5.3	B1DVN4	09/06/2005 1012	566143.9	137071.1
T-08-2	6.1	5.4	B1DVM7	09/06/2005 1050	566160.3	137070.8
T-08-3	6.4	5.1	B1DVM8	09/06/2005 1120	566169.8	137071.8
T-08-4	1.1	0.0	B1DVM9	09/06/2005 1220	566190.5	137072.2
T-08-5	5.4	4.8	B1DVN0	09/06/2005 1320	566203.6	137070.9
T-08-6	6.4	5.2	B1DVN1	09/06/2005 1345	566215.8	137071.9
T-08-7	6.4	3.7	B1DVN2	09/06/2005 1415	566225.8	137071.9

*Depths are approximate; all risers are assumed to be vertical.

HEIS = *Hanford Environmental Information System* database.

The sample tubing was connected to a sampling pump, which was used to pump vapor from the bottom of the vent riser. The sampling pump was operated for 1 to 2 minutes to purge atmospheric air from within the tubing (purging time was dependent on the sampling-pump flow rate). When the sampling pump was operating, the volatile organic compound concentrations at the outlet of the pump were monitored using an organic-vapor analyzer. When the volatile organic compound concentration readings on the organic-vapor analyzer stabilized after purging, or at the discretion of the industrial hygienist and field sampler, the vapor was introduced directly to a MIRAN SapphIRe Ambient Air Analyzer[1] for field-screening analysis of volatile

[1] MIRAN and the SapphIRe Ambient Air Analyzer are registered trademarks of Thermo Scientific, a part of Thermo Fisher Scientific, Inc., Waltham, Massachusetts.

organic compounds. Following sample analysis, the sample tubing was removed from the riser and the cap was replaced.

The results of these investigations are discussed in Section 3.7. Because none of the sample locations had significant soil-vapor concentrations of carbon tetrachloride that would warrant a vadose-zone investigation, no further investigations were conducted at the 218-W-3A Burial Ground for the RI.

Sampling of the vent risers in portions of the 218-W-3A Burial Ground trenches containing retrievably stored waste was required by DOE/RL-2004-71, *218-W-3A Burial Ground Sampling and Analysis Plan*. Nine of the 17 vent risers (2 in Trench T-05 and 7 in Trench T-08) also were sampled for the 218-W-3A Burial Ground environmental release investigation. DOE/RL-2004-71 required field screening plus additional analysis of vapor samples in the laboratory. All of the vent risers were sampled once for field screening. For the risers covered by DOE/RL-2004-71, additional sampling was conducted for laboratory analysis. The quarterly letter report for October to December 2005 to the Washington State Department of Ecology describes the additional sampling and is included in Appendix D. The laboratory results are included in Section 3.7 for completeness.

2.8 INVESTIGATION OF GROUNDWATER "HOT SPOTS"

Eight carbon tetrachloride groundwater "hot spots" that have locally elevated carbon tetrachloride concentrations were investigated in the Step II investigation. If one of these "hot spots" were found to be persistent, it might be indicative of a continuing source at that location. By "looking up" from the groundwater hot spots, the source of the contamination in the vadose zone may be identified. The investigation included sampling soil vapor and groundwater in existing wells at each of the eight "hot spots" and a geostatistical evaluation of the potential persistence of these "hot spots."

2.8.1 Sampling at Existing Wells

The investigation of the eight groundwater "hot spot" areas shown on Figure 1-2 was conducted by collecting both soil-vapor and groundwater samples from existing wells in the vicinity of these "hot spots" and then comparing the sample results using Henry's law for the equilibrium partitioning of carbon tetrachloride between the vapor and aqueous phases (DOE/RL-2001-01, Appendix D, p. D-21). The list of wells in Table D-10 of the Work Plan (DOE/RL-2001-01) was revised during the pre-job planning for the Step II field work, and the wells that were sampled and their rationale for selection are listed in Table 2-9. The well locations are shown in Figure 2-9.

The results and evaluation of these investigations at existing wells are discussed in Section 3.8. Because the evaluation indicated that there were no locations of apparent continuing sources, no soil-vapor sampling was conducted in the vadose zone using direct-push technology in these eight areas for the RI. No soil sampling was conducted because vapor concentrations did not exceed 1,200 ppmv (Section 3.8).

Table 2-9. Wells Identified for Soil-Vapor and Groundwater Sampling at the Groundwater "Hot Spot" Areas. (2 Pages)

Groundwater "Hot Spot" Location [a]	Associated Potential Release Site	Well	Depth to Groundwater (ft Below Top of Casing)		Depth to Bottom (ft Below Top of Casing)	Screen Interval (ft)	Length of Screen Above Water Table (ft)	Length of Screen Below Water Table (ft)
1. 299-W10-20	218-W-3A Burial Ground	299-W10-19	N/A[b]	09/06/2005	238.3	214.4 – 234.5	20.1	0
		299-W10-20	240.1	09/19/2005	245.2	221.7 – 241.6	18.4	1.5
		299-W10-21	229.7	09/19/2005	232.2	209.3 – 229.3	20	0
2. T Tank Farm	T Tank Farm	299-W10-1	234.5	08/29/2005	302.8	190 – 270	44.5	35.5
		299-W10-4	228.6	09/26/2005	238.8	190 – 245	38.6	16.4
		299-W10-8	238.7	08/25/2005	250.7	211 – 251	27.7	12.3
		299-W10-23	260.0	09/19/2005	261.2	225.8 – 260.9	34.2	0.9
		299-W10-24	243.8	09/20/2005	268.4	232.9 – 268.0	11	24.1
		299-W11-28	N/A[b]	08/25/2005	247.4	224.0 – 244.9	20.9	0
		299-W11-40	243.5	11/23/2005	272.2	238.1 – 273.1	5.4	29.6
		299-W11-41	245.9	09/26/2005	273.7	236.7 – 271.7	9.2	25.8
		299-W11-42	247	09/30/2005	273.8	236.8 – 271.8	10.2	24.8
3. T Plant	218-W-8 Burial Ground; T Plant	299-W11-3	279.9	10/11/2005	287.8	254 – 267	13	0
						277 – 287.8	0	10.8
		299-W11-7	268.4	09/27/2005	274.5	245 – 290	23.4	21.6
		299-W11-14	277.0	06/21/2006	276.9	250 – 313	27	36
		299-W11-37	285.6	09/27/2005	294.3	260.2 – 291.3	25.4	5.7
4. 299-W11-10	T Plant	299-W11-10	293.8	08/30/2005	300.3	256 – 304	37.8	10.2
5. 216-T-25 Trench	216-T-25 Trench, 218-W-1 and 218-W-2 Burial Grounds, TX-TY Tank Farm	299-W10-5	229.1	08/30/2005	241.1	175 – 220	45	0
		299-W15-40	226	06/22/2005	256.4	218.0 – 253.1	8	27.1
		299-W15-43	229	06/23/2005	266.2	226.4 – 261.4	2.6	32.4
		299-W15-765	224	06/22/2005	259.2	220 – 255	4	31

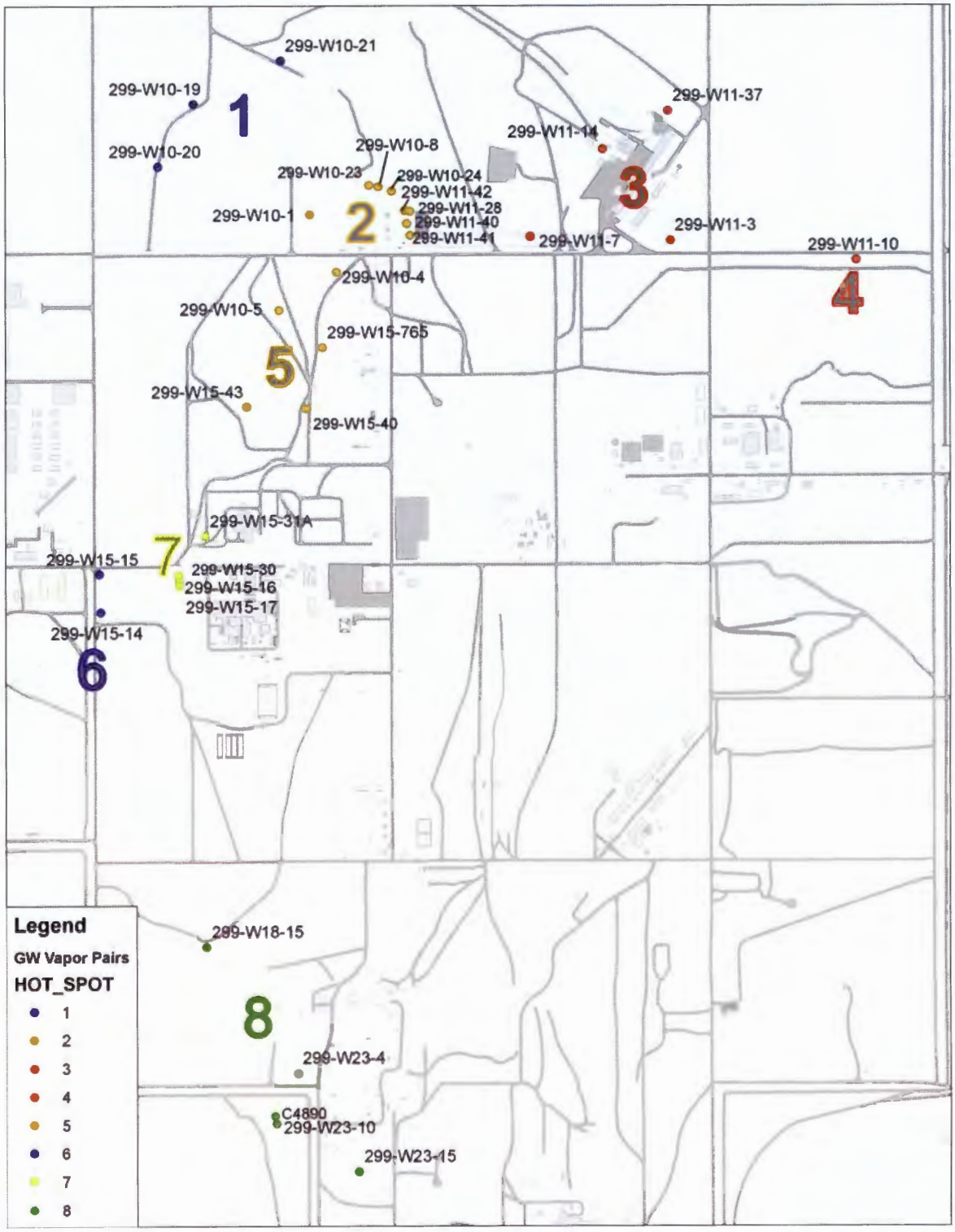
Table 2-9. Wells Identified for Soil-Vapor and Groundwater Sampling at the Groundwater "Hot Spot" Areas. (2 Pages)

Groundwater "Hot Spot" Location [a]	Associated Potential Release Site	Well	Depth to Groundwater (ft Below Top of Casing)		Depth to Bottom (ft Below Top of Casing)	Screen Interval (ft)	Length of Screen Above Water Table (ft)	Length of Screen Below Water Table (ft)
6. 299-W15-15	218-W-4B and 218-W-4C Burial Grounds	299-W15-14	205.3	08/30/2005	219.9	unknown	unknown	unknown
		299-W15-15	250.6	09/26/2005	252.8	223 – 255	27.6	4.4
7. 299-W15-16	218-W-4C Burial Grounds	299-W15-16	N/A[b]	09/29/2005	243.5	208 – 238	30	0
		299-W15-17	239.5	09/29/2005	432.3	422.5 – 432.5	0	10
		299-W15-30	240.7	09/29/2005	263.5	218.1 – 258	22.6	17.3
		299-W15-31A	236.1	09/22/2005	255.6	212.5 – 252.4	27	12.9
8. West of S-SX Tank Farm	216-S-25 Crib, S-SX Tank Farm	299-W18-15	217	09/22/2005	239.4	170 – 243	47	26
		299-W23-4	218.2	06/21/2006	249.7	180 – 300	38.2	81.8
		299-W23-10	221.3	09/22/2005	223.4	165 – 178	13	0
						186 – 230	35.3	8.7
		299-W23-15	213	09/22/2005	unknown	185.7 – 222.4	27.3	9.4

[a] See Figure 2-9 for general locations.
[b] Well is dry.

N/A = not applicable.

Figure 2-9. Location of Wells Sampled at the Eight Groundwater "Hot Spots."



The groundwater samples were collected from 31 wells between June 22, 2005, and June 21, 2006, using microsampler bailers. Samples were collected from approximately the upper 5 cm (2 in.) of the aquifer below the static water surface. The use of the microsampler surface bailer limits the amount of agitation at the air-water interface. Therefore, the collected samples are expected to provide a better representation of carbon tetrachloride concentrations at the top of the aquifer. Sampling using the microsampler, which fills from the top, required at least 58 cm (23 in.) of water in the well. When a well provided insufficient water for sampling (i.e., less than 58 cm (23 in.) of water in the well), the well was sampled using an alternate sampling method. The only wells that did not yield sufficient water for sample collection with the microsampler bailers were wells 299-W11-14 and 299-W15-16. The groundwater sample from well 299-W11-14 was collected using a wide-mouth 250 mL bottle secured to the end of an electronic tape (e-tape). No water was measured in well 299-W15-16 as part of this investigation.

The microsampling device consisted of a 58 cm (23-in.) length of TYGON tubing attached to the bottom of an e-tape. The length of the tubing was designed to provide 50 mL of groundwater, a volume sufficient for a 40 mL sample for analysis of volatile organic compounds. The e-tape was used to provide an electronic signal to indicate when the water column in the well was encountered. The closed end (bottom) of the tubing was positioned next to the sensor of the e-tape, and the top of the tubing was open to allow water to flow into the tubing. The device was lowered into the well until the e-tape indicated contact with the water surface. The depth to static water level was recorded based on the e-tape response.

The microsampling device then was lowered and filled with water. The groundwater samples subsequently were transferred from the microsampling bailer to appropriate sample containers using a syringe or other method to minimize agitation and volatilization. If the groundwater in a well was recently disturbed (e.g., by groundwater sampling or maintenance), the groundwater system within the well was allowed at least seven days to return to equilibrium following the disturbance before it was sampled with the microsampler.

All of the groundwater samples were laboratory analyzed for volatile organic compounds using EPA Method 8260 (SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update III-B*, as amended), because the field gas chromatograph stopped functioning.

The soil-vapor samples were collected from 30 wells between June 22 and November 23, 2005, using a Teflon-lined TYGON tube attached to the e-tape approximately 10 cm (4 in.) above the top of the microsampling TYGON tubing. Each vapor sample was collected at the same time as the associated groundwater sample was collected (i.e., as the microsampler was filling, the vapor sample was being collected). A pump was used to draw the vapor to the surface, where it was collected in Tedlar bags. The vapor samples were collected immediately above the water table or above the bottom of the well if the well was dry. Because no water was measured in well 299-W15-16, a vapor sample was collected from the lowermost 0.6 m (2 ft) of the screened or perforated interval in the vadose zone.

Soil-vapor samples were collected during soil venting periods (e.g., when the barometric pressure was falling), to collect representative results. If necessary, the borehole was sealed to

prevent inflow of atmospheric air until falling atmospheric and venting conditions existed before sampling began. Sealing of the wells was accomplished by using a large plastic bag placed over the top of the casing and then taping it closed. During times with rising barometric pressure, the bag would be drawn tight against the well casing, and during times of falling barometric pressure, the bag would be inflated.

Vapor samples were collected in Tedlar bags through probes and/or Teflon-lined TYGON tubing from the surface to just above the water surface. The tubing was purged from the line by using a portable diaphragm pump. The purging time was based on the length of the tubing and the pumping rate. After one volume of air had been purged, the line was attached to the Tedlar bags and a sample was collected. Analysis of the soil vapor was performed using a B&K[1] 1302 photoacoustic gas analyzer or other field-screening instrument that could differentiate carbon tetrachloride from chloroform at the target-required quantitation limits (DOE/RL-2001-01, Table D-5).

To establish the carbon tetrachloride concentration gradient in the upper 3 m (10 ft) of the unconfined aquifer, depth-discrete groundwater samples were planned to be collected from one well in each groundwater hot spot area (DOE/RL-2004-78, Appendix A). However, the key wells in hot spot areas 1, 3, and 6 could not be sampled because of insufficient water in these wells. The wells and sampling depths for the depth-discrete sampling are listed in Table 2-10. The depth-discrete groundwater samples were collected from all wells using the same equipment, except for well 299-W11-25B, where the water samples were collected by pumping after the borehole was drilled to 6, 12, 18, 24, 30, and 36 m (20, 40, 60, 80, 100, and 120 ft) below the water table (PNNL-15776, *Borehole Data Package for Two RCRA Wells 299-W11-25B and 299-W11-46 at Single-Shell Tank Waste Management Area T, Hanford Site, Washington*). A straddle packer system was used to isolate the well screen or perforated casing intervals (0.6 m [2-ft] interval in 10 and 15 cm [4 and 6-in.] wells and 0.9 m [3-ft] interval in 20 cm [8-in.] wells). Low-flow purging and sampling methods using a bladder pump were used to collect each groundwater sample. Purge rates typically ranged from 150 to 500 mL/min until field parameters were stable, and then the sample was collected. The depth-discrete groundwater samples were collected from the top to the bottom of the well to minimize disturbance of the water column. The groundwater samples then were laboratory analyzed for volatile organic compounds, using EPA Method 8260 (SW-846).

2.8.2 Geostatistical Evaluation

Pacific Northwest National Laboratory conducted a geostatistical analysis of the persistence of carbon tetrachloride groundwater concentration for eight areas of elevated carbon tetrachloride groundwater concentrations in the 200 West Area that were identified by Fluor Hanford (PNNL-16509, *Geostatistical Analyses of the Persistence and Inventory of Carbon Tetrachloride in the 200 West Area of the Hanford Site*). The purpose of this analysis was to help evaluate the potential for vadose-zone sources at these areas to support the field investigations of the eight groundwater "hot spots" discussed in Section 2.8.1. The eight areas evaluated in PNNL-16509

[1] B&K is a trademark of Brüel & Kjær, S&V, Nærum, Denmark.

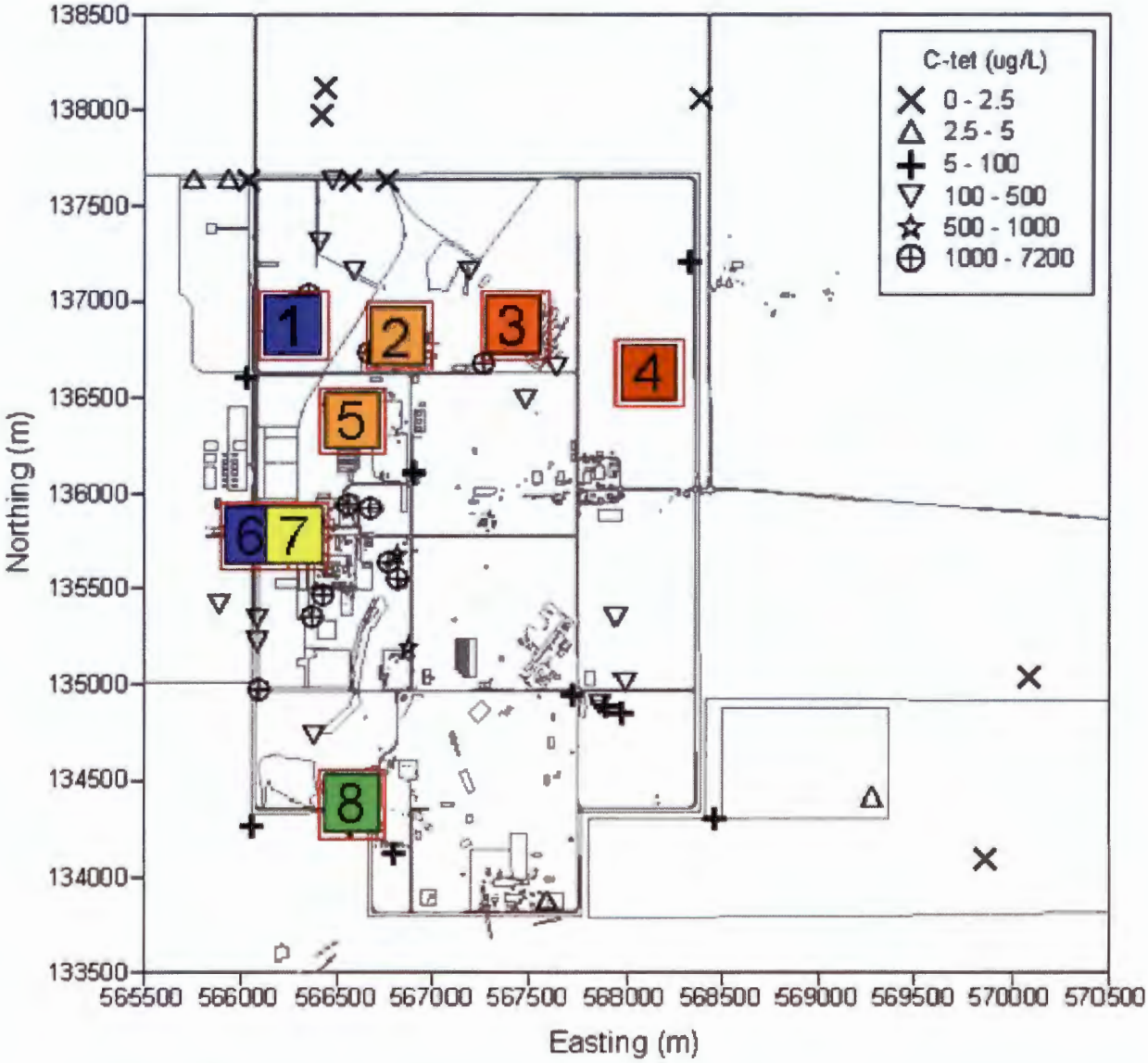
are the same as the eight areas discussed in Section 2.8.1 and shown in Figure 2-9. The results of PNNL-16509 are summarized below, and the eight areas are shown in Figure 2-10.

Table 2-10. Wells for Depth-Discrete Groundwater Sampling.

Groundwater "Hot Spot" Area	Well Selected for Depth-Discrete Groundwater Sampling
1	The key well, 299-W10-20, does not have sufficient water for depth-discrete sampling.
2	Sample well 299-W11-42. The water table was estimated to be at 74.7 m (245 ft) in this well in July 2005, and the well was estimated to have 10.7 m (35 ft) of water. Sample at 1.5 and 3.0 m (5 and 10 ft) below the static water level. Well 299-W11-25B, which was drilled adjacent to well 299-W11-39, was sampled at depth-discrete intervals every 6.1 m (20 ft) below the water table to the Ringold Formation lower mud unit during drilling in February 2005.
3	The key well, 299-W11-14, does not have sufficient water for depth-discrete sampling.
4	Sample well 299-W11-10. The water table was estimated to be at 88.9 m (291.8 ft) in this well in July 2005, and the well was estimated to have 2.6 m (8.5 ft) of water. Sample at 1.2 and 2.4 m (4 and 8 ft) below the static water level.
5	Three key wells, 299-W15-40, 299-W15-43, and 299-W15-765, were sampled at depth-discrete intervals by Vista Engineering in January 2005.
6	The key well, 299-W15-15, does not have sufficient water for depth-discrete sampling.
7	One key well, 299-W15-30, was sampled at depth-discrete intervals by Vista Engineering in February 2005.
8	Sample well 299-W23-4. The water table was estimated to be at 66.9 m (219.6 ft) in this well in July 2005, and the well was estimated to have 9.1 m (30 ft) of water. Sample at 1.5, 4.6, and 7.6 m (5, 15, and 25 ft) below the static water level.

The available carbon tetrachloride data for the period of 1994 to 2004 were reviewed to identify a set of wells that were sampled regularly through the 10-year period. Data sets initially were selected from 53 wells for which carbon tetrachloride data were consistently available from 1996, 1998, 2000, and 2002. Consistent well locations were selected for each time period, so variations in concentration in a given area would not be caused by changes in well configurations. A fifth data set was added to represent conditions in 37 wells during 2004 and 11 wells during 2003; 5 wells from the initial four data sets could not be used in the fifth data set, because they were not sampled in 2003 or 2004. Although the results for 2004 generally agreed with results for earlier time periods, the missing five well locations increased the degree of uncertainty. No significant differences were seen in the overall distribution of carbon tetrachloride concentrations over the 10-year time period. A slight decrease in concentrations was observed during the last two time periods.

Figure 2-10. Summary Map of Classification of Subareas, Based on Their Likelihood of Containing Persistent Carbon Tetrachloride Sources. (From PNNL-16509)



Color scale ranges from red for high probability to blue for the lowest probability.

The carbon tetrachloride concentration data were highly skewed, so concentration mapping was performed on normal-score data transforms. Experimental variograms were fit with isotropic models that showed a slight decrease in range from 1,200 m (3,937 ft) in 1996 and 1998 to 1,000 m (3,280.8 ft) in 2000 and 2002. The variogram range in 2004 was further reduced, but that may be an artifact of the missing well locations for the last time period. The decrease in range also might be caused by a slight decrease in the size of the plume.

PNNL generated 1,000 simulations of carbon tetrachloride concentration for each time period and found that 500 simulations were sufficient to characterize the spatial variability. The modeling summarized carbon tetrachloride spatial distribution in several ways, including calculation of median simulated values, the probability of exceeding several cut-off values, and calculation of percentiles of local distributions. Maps were prepared from the statistics to identify areas of high and low concentration for each time period and to provide measures of the uncertainty in carbon tetrachloride concentrations. Figure 2-10 is a summary map of the subareas that were identified by Fluor Hanford. The subareas are ranked in terms of the likelihood for containing persistent carbon tetrachloride sources.

The simulations of the individual subareas identified important differences. The differences suggested that some of the subareas might contain ongoing carbon tetrachloride sources. The simulations included the following notable results.

- Several of the northern subareas had relatively high median concentrations with low variability and little variation with time. The subareas with the highest median concentrations and lowest variability were subareas 3 and 4. Subareas 2 and 5 also are candidates for ongoing carbon tetrachloride sources, but they display greater variability over time. If the concentration reported for well 299-W10-1 in 1998 is not representative, then the median concentrations for subareas 2 and 5 are higher and less variable. Concentrations for subareas 2 and 5 then would resemble subareas 3 and 4.

- Subarea 7 exhibited a significant decrease in median concentration during the last two time periods. The substantial concentration decrease could result from nearby pump-and-treat operations.

- Subareas 1 and 6 exhibited significant decreases in median concentration and are unlikely to contain ongoing sources for carbon tetrachloride release.

- Subarea 8 showed an increasing median carbon tetrachloride concentration at a level that is significantly lower than all of the other subareas; it is unlikely to contain a significant continuing carbon tetrachloride source.

As discussed in Section 2.8.1, each subarea was investigated by sampling existing wells for carbon tetrachloride concentrations in soil vapor and groundwater. Evaluation of the data indicates that the vadose-zone soil-vapor concentrations are not significant sources of carbon tetrachloride contamination in the groundwater at these locations (Section 3.8).

2.9 INVESTIGATION OF POSSIBLE RELEASE SITES/SOURCES

In addition to the specific Step II investigation tasks described in Table 1-1, three investigations were conducted within the Step II study area as part of the Step II RI that provide useful information on the nature and extent of the dispersed carbon tetrachloride vadose-zone contamination and possible release sites/sources.

2.9.1 T Plant Soil-Vapor Survey

A passive soil-vapor survey around T Plant was conducted using the passive soil-gas collectors and the methodology described in Section 2.1. The T Plant area was selected for investigation because it overlies groundwater hot spot location #3 (Figure 2-9). The collectors were placed at 30 locations, spaced 50 m apart to be consistent with the coarse grid-collector spacing, around the plant from May 26 to June 1, 2005, as summarized in Table 2-11 and shown in Figure 2-11. A second passive soil-vapor collector was placed at two locations to serve as a duplicate sample. The two duplicate collectors were emplaced on May 27, 2005. Two trip blanks also were collected. After they had been retrieved, all of the collectors were sent to the vendor's laboratory for analysis of volatile organic compounds.

Table 2-11. Passive Soil-Vapor Survey at T Plant. (2 Pages)

Temporary Field Sample Number	Soil-Vapor Sample HEIS Number	Sample Date and Time		Location	
		Emplaced	Extracted	Easting (m)	Northing (m)
25	B1D817	05/26/2005 13:16	06/01/2005 09:43	567524.5	136941.0
24	B1D818	05/26/2005 12:54	06/01/2005 09:51	567524.5	136880.1
21	B1D819	05/26/2005 12:34	06/01/2005 10:30	567477.0	136831.2
20	B1D820	05/26/2005 12:39	06/01/2005 10:35	567478.2	136780.5
17	B1D821	05/26/2005 12:05	06/01/2005 10:40	567426.4	136828.6
11	B1D822	05/26/2005 12:13	06/01/2005 10:47	567376.4	136826.8
18	B1D823	05/26/2005 12:16	06/01/2005 10:51	567424.4	136882.6
19	B1D824	05/26/2005 12:18	06/01/2005 10:54	567422.7	136928.6
23	B1D825	05/26/2005 12:20	06/01/2005 10:57	567471.9	136931.1
22	B1D826	05/26/2005 12:25	06/01/2005 11:00	567474.5	136881.1
7	B1D827	05/26/2005 10:10	06/01/2005 11:50	567326.6	136821.1
6	B1D828	05/26/2005 10:15	06/01/2005 11:52	567328.3	136775.0
5	B1D829	05/26/2005 10:20	06/01/2005 11:54	567330.6	136713.1
4	B1D830	05/26/2005 10:22	06/01/2005 11:57	567332.9	136651.4
1	B1D831	05/26/2005 10:25	06/01/2005 11:58	567283.0	136649.5
2	B1D832	05/26/2005 10:30	06/01/2005 12:01	567280.7	136711.2
2-duplicate	B1D833	05/27/2005 09:15	06/01/2005 12:02	567280.7	136711.2
3	B1D834	05/26/2005 10:33	06/01/2005 12:06	567278.3	136773.2

Table 2-11. Passive Soil-Vapor Survey at T Plant. (2 Pages)

Temporary Field Sample Number	Soil-Vapor Sample HEIS Number	Sample Date and Time		Location	
		Emplaced	Extracted	Easting (m)	Northing (m)
12	B1D835	05/26/2005 10:39	06/01/2005 12:09	567374.6	136876.7
13	B1D836	05/26/2005 10:41	06/01/2005 12:12	567372.7	136926.7
10	B1D837	05/26/2005 10:50	06/01/2005 12:17	567378.3	136776.8
16	B1D838	05/26/2005 10:54	06/01/2005 12:19	567428.2	136778.7
15	B1D839	05/26/2005 10:57	06/01/2005 12:22	567430.5	136716.9
14	B1D840	05/26/2005 10:59	06/01/2005 12:24	567432.8	136655.2
8	B1D841	05/26/2005 11:01	06/01/2005 12:26	567382.9	136653.3
9	B1D842	05/26/2005 11:04	06/01/2005 12:28	567380.6	136715.0
26	B1D843	05/26/2005 13:28	06/01/2005 12:33	567592.7	136684.5
27	B1D844	05/26/2005 13:30	06/01/2005 12:36	567621.8	136725.1
28	B1D845	05/26/2005 13:33	06/01/2005 12:38	567651.0	136765.8
28-duplicate	B1D846	05/27/2005 09:07	06/01/2005 12:40	567651.0	136765.8
29	B1D847	05/26/2005 13:35	06/01/2005 12:42	567680.1	136806.4
30	B1D848	05/26/2005 13:37	06/01/2005 12:43	567709.2	136847.1

HEIS = *Hanford Environmental Information System* database.

This approach for sampling in the vicinity of T Plant was presented at Vista Engineering's Project Technical Workshop #2 in January 2005 and approved in that meeting by the U.S. Environmental Protection Agency. It also was agreed at that meeting that passive soil-vapor sampling was not needed in the vicinity of well 299-W13-1, where relatively high carbon tetrachloride concentrations were detected at the base of the unconfined aquifer, for the following two reasons: (1) there is no reason to suspect a near-surface source in that area; and (2) the deep carbon tetrachloride groundwater data indicate a distant source.

2.9.2 Fiscal Year 2001 to 2006 Well Drilling for Other Operable Units

Soil-vapor samples have been collected and analyzed for carbon tetrachloride in support of the 200-PW-1 OU RI in 19 wells that were drilled for the investigation of other OUs or in support of other activities in the 200 West Area from fiscal year 2001 through fiscal year 2006. These soil-vapor samples are summarized in Table 2-12 and discussed in Section 3.8. The locations of the wells are shown in Figure 2-12.

Figure 2-11. Passive Soil-Vapor Survey Locations at the T Plant.

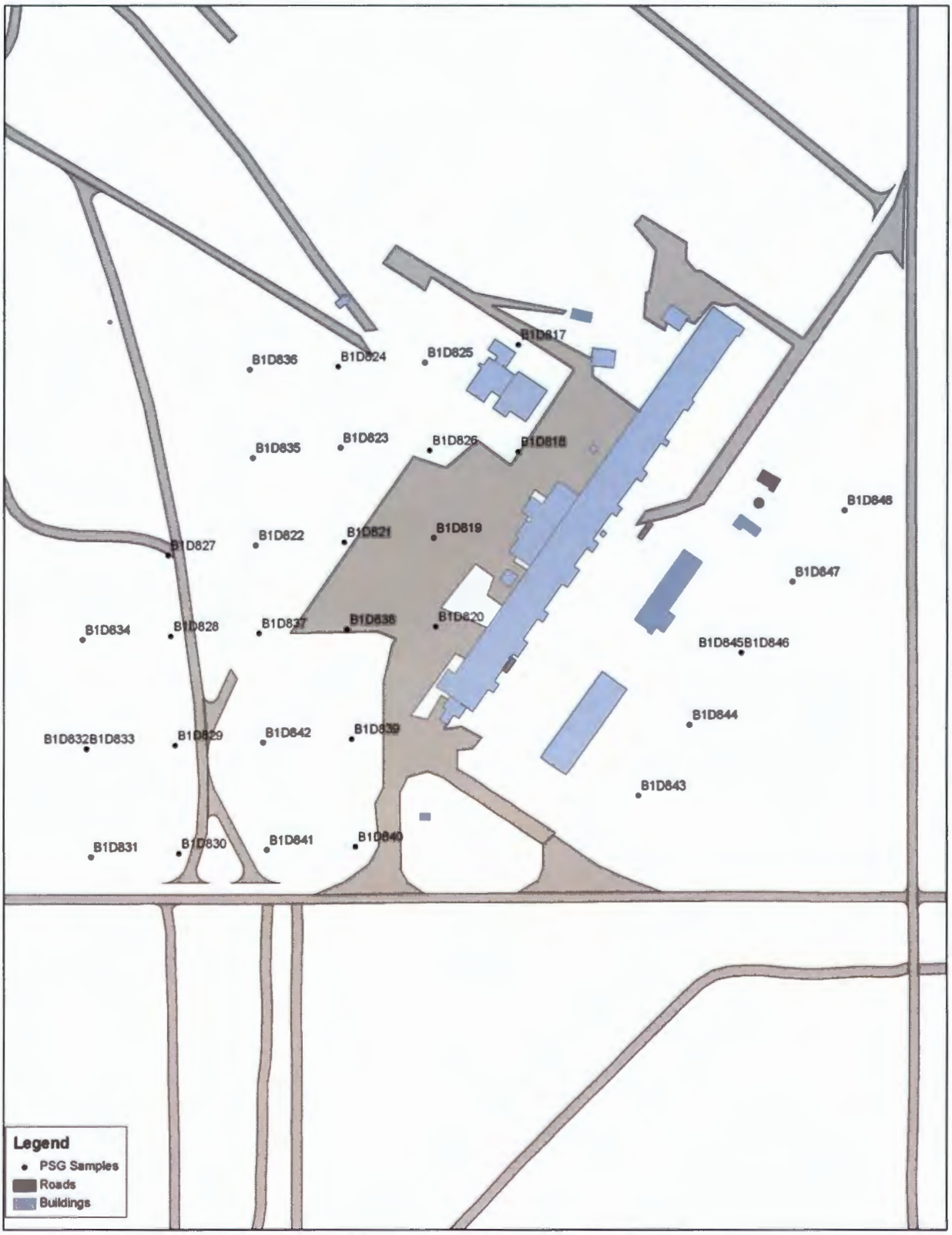


Table 2-12. Soil-Vapor Samples Collected During Fiscal Year 2001 to Fiscal Year 2006 Well Drilling. (2 Pages)

Well Name	Well Identification Number	SAF	Reference	Location	Date Sampled	Comment
299-W15-95	A7394	B01-088	BHI-01631	216-Z-9 Trench	May - June 2001	Existing well deepened
299-W15-84	A7384	B01-088	BHI-01631	216-Z-9 Trench	June 2001	Existing well deepened
C3102	C3102	B01-097	BHI-01606	216-T-26 Crib	July 2001	--
299-W15-764	C3494	B01-115	BHI-01631	East of PFP by 216-Z-9 Trench effluent lines	October 2001	--
299-W15-42	C3803	B01-115	BHI-01631	East of PFP	November 2001 – January 2002	--
C3808	C3808	B02-053	CP-12134	216-Z-11 Ditch	May 2002	--
299-W18-16	C4303	F03-022	See Table 3-22	East of 216-Z-1A Tile Field	November 2004	--
299-W15-49	C4301	F03-022	See Table 3-22	Northeast of 218-W-4B Burial Ground	November 2004	--
299-W15-50	C4302	F03-022	See Table 3-22	North of 216-Z-9 Trench, south of 216-T-19 Crib and Tile Field	January 2005	--
C4738	C4738	F03-022	See Table 3-22	216-T-33 Crib	February 2005	--
299-W15-43	C3955	F05-003	See Table 3-22	West of TX Tank Farm	June 2005	--
299-W15-94	C4684	F05-003	See Table 3-22	East of 218-W-4C Burial Ground	September 2005	--
299-W11-47	C4990	F05-003	See Table 3-22	East of T Tank Farm	January-February 2006	--
299-W15-224	C4986	F05-003	See Table 3-22	East of 218-W-4B Burial Grounds	February 2006	--
C4183	C4183	F05-003	D&D-25461	216-Z-7 Crib	March 2005	--
299-W10-25	C4987	F05-003	See Table 3-22	East of 218-W-3A Burial Ground	April 2006	Casing deviated; replaced by well 299-W10-31 (C5194) during drilling

Table 2-12. Soil-Vapor Samples Collected During Fiscal Year 2001 to Fiscal Year 2006 Well Drilling. (2 Pages)

Well Name	Well Identification Number	SAF	Reference	Location	Date Sampled	Comment
299-W10-31	C5194	F05-003	See Table 3-22	East of 218-W-3A Burial Ground	April 2006	Replacement for well 299-W10-25 (C4987)
299-W11-86	C5101	F05-003	See Table 3-22	East of T Plant	June 2006	Well damaged during completion; replaced by well 299-W11-87 (C5407)
299-W14-71	C5102	F05-003	See Table 3-22	North of U Plant	August-September 2006	--
299-W14-72	C5103	F05-003	See Table 3-22	East of 200 West Powerhouse Ponds	September 2006	--

BHI-01606, *Borehole Summary Report for Borehole C3102 in the 216-T-26 Crib, 200-TW-1 Scavenged Waste Group Operable Unit.*

BHI-01631, *Carbon Tetrachloride Field Investigation Report for Drilling in the Vicinity of the PFP and the 216-Z-9 Trench.*

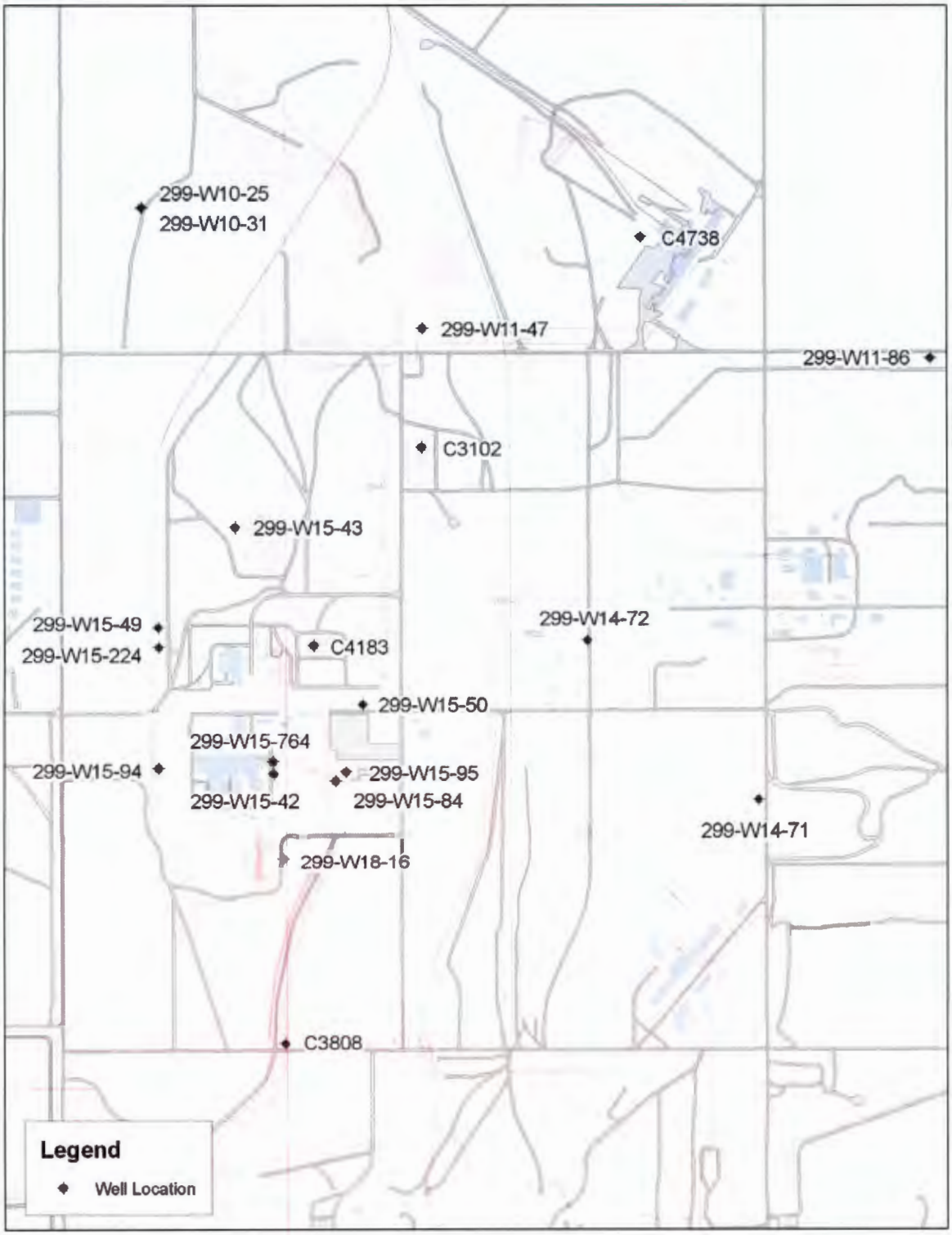
CP-12134, *Borehole Summary Report for Borehole C3808 in the 216-Z-11 Ditch, 200-CW-5 U-Pond/Z-Ditches Cooling Water Group Operable Unit.*

D&D-25461, *200-LW-1 and 200-LW-2 Operable Units - Borehole Summary for Boreholes in the 216-S-20, 216-T-28, and 216-Z-7 Cribs.*

PFP = Plutonium Finishing Plant.
SAF = Sampling Authorization Form.

Of these 19 wells, soil-vapor samples were collected during the drilling of six selected groundwater wells in fiscal year 2006 in locations of some of the groundwater "hot spot" areas shown in Figure 2-9 or in areas where the groundwater has not been sampled previously. At each drilling location, soil-vapor samples were collected approximately 1.5 m (5 ft) above the Cold Creek unit, 1.5 m (5 ft) below the Cold Creek unit, and just above the water table. One well (299-W10-25/299-W10-31) is in groundwater "hot spot" area 1, one well (299-W11-47) is in area 2, one well (299-W11-86) is in area 4, one well (299-W15-224) is in area 7, and two wells are in areas where the groundwater has not been previously sampled (299-W14-71, 299-W14-72) (Figure 2-9).

Figure 2-12. Location of Wells Drilled in the 200 West Area During Fiscal Years 2001 to 2006 and Sampled in Support of the 200-PW-1 Operable Unit Remedial Investigation.



Six soil samples were collected during the drilling of Borehole C3102 in the 216-T-26 Crib and were analyzed for carbon tetrachloride in support of the 200-PW-1 OU RI (DOE/RL-2002-42, *Remedial Investigation Report for the 200-TW-1 and 200-TW-2 Operable Units (Includes the 200-PW-5 Operable Unit)*). The 216-T-26 Crib is located east of the TY Tank Farm in the 200 West Area. Borehole C3102 was drilled from June 24 through July 26, 2001, in support of the RI for the 200-TW-1 OU. The soil samples were collected from the following intervals: 6.7 to 7.5 m (22 to 24.5 ft) bgs, 20.5 to 21.3 m (67.3 to 69.8 ft) bgs; 28.0 to 28.8 m (92 to 94.5 ft) bgs, 45.0 to 45.3 m (147.5 to 148.5 ft) bgs, 60.2 to 60.6 m (197.5 to 198.8 ft) bgs, and 68.9 to 69.2 m (226 to 227 ft) bgs.

2.9.3 Monitoring of Step I Temporary Probes

During the Step I dispersed carbon tetrachloride investigation, eight temporary probes were installed for additional soil-vapor monitoring to confirm the initial Step I sampling results (CP-13514). The GeoProbe was used to install three soil-vapor probes at the 218-W-4C Burial Ground in November 2002. The CPT system was used to install five soil-vapor probes adjacent to liquid-waste disposal sites in September 2002. Details of the installations using the two drilling systems are described in the report on Step I sampling and analysis (CP-13514).

The temporary probes were monitored from October 2002 through November 2004. Monitoring was discontinued after November 2004 with concurrence from the U.S. Environmental Protection Agency, as documented in the Unit Managers' Meeting minutes for November 18, 2004 (FH-0403949, "Meeting Minutes, Unit Managers' Meeting, 200 Area Groundwater and Source Operable Units").

2.10 SOIL-VAPOR BOREHOLE DECOMMISSIONING

Push-rod installation and extraction using the GeoProbe and EAPS systems was performed in accordance with WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells." The boreholes were decommissioned by extraction of the rods and simultaneous installation of granular bentonite. The granular bentonite was installed as the rods were removed to prevent water from entering the vadose zone at the push location. A brass marker with the well name was set in cement grout at the ground surface of each direct-push location.

2.11 CIVIL SURVEY

The locations of decommissioned GeoProbe and EAPS push locations and passive soil-vapor extraction samplers were surveyed in accordance with applicable procedures. Coordinates were recorded using NAVD88 and NAD83 with the 1991 adjustment for horizontal coordinates.

2.12 WASTE MANAGEMENT

Minimal waste was generated during the Step II GeoProbe and EAPS operations and soil-vapor sampling, passive soil-vapor sampling, and sampling of existing wells. Investigation-derived waste generated by characterization activities was managed in accordance with WMP-20501, *Waste Control Plan for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units.*

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3.0 ANALYTICAL RESULTS

This chapter provides the analytical results of the Step II field investigation of the dispersed carbon tetrachloride vadose-zone plume. The focus is on the results for carbon tetrachloride, which was the only contaminant of concern for the Step II investigation. However, analytical results for other contaminants also are provided.

3.1 RESULTS OF VADOSE-ZONE PLUME LATERAL EXTENT AT THE 216-Z-9 TRENCH, 216-Z-1A TILE FIELD, AND 216-Z-18 CRIB

The lateral extent of the dispersed carbon tetrachloride vadose-zone plume was investigated using passive soil-vapor surveys initially deployed on a coarse grid spacing followed by refined grid spacing. The locations and dates of the surveys are summarized in Table 2-1. The results of the passive soil-vapor survey conducted by Fluor Hanford east and northeast of the 216-Z-9 Trench are provided in Table 3-1. The locations of these samples are shown in Figure 2-1. The results of the other passive soil-vapor surveys, which were conducted by Vista Engineering, are provided in DOE/RL-2006-58, Section 4.1, and DOE/RL-2007-22, Section 2.1.

Table 3-1. Passive Soil-Vapor Sampling Results East and Northeast of the 216-Z-9 Trench (Refined). (3 Pages)

Sample Identifier	HEIS Number	Carbon Tetrachloride (CAS 56-23-5) (ng/trap)	Q	Chloroform (CAS 67-66-3) (ng/trap)	Q	Methylene Chloride (CAS 75-09-2) (ng/trap)	Q	Chloromethane (CAS 74-87-3) (ng/trap)	Q
1	B1D853	25	U	25	U	25	U	25	U
4	B1D854	25	U	25	U	25	U	25	U
7	B1D855	25	U	25	U	25	U	25	U
10	B1D856	25	U	25	U	25	U	25	U
13	B1D857	25	U	25	U	25	U	25	U
14	B1D858	104.66		25	U	25	U	25	U
14-duplicate	B1D859	34.89		25	U	25	U	25	U
15	B1D860	97.32		25	U	25	U	25	U
11	B1D861	25	U	25	U	25	U	25	U
8	B1D862	25	U	25	U	25	U	25	U
5	B1D863	25	U	25	U	25	U	25	U
3	B1D864	25	U	25	U	25	U	25	U
2	B1D865	25	U	25	U	25	U	25	U
6	B1D866	25	U	25	U	25	U	25	U
9	B1D867	25	U	25	U	25	U	25	U
12	B1D868	25	U	25	U	25	U	25	U

Table 3-1. Passive Soil-Vapor Sampling Results East and Northeast of the 216-Z-9 Trench (Refined). (3 Pages)

Sample Identifier	HEIS Number	Carbon Tetrachloride (CAS 56-23-5) (ng/trap)	Q	Chloroform (CAS 67-66-3) (ng/trap)	Q	Methylene Chloride (CAS 75-09-2) (ng/trap)	Q	Chloromethane (CAS 74-87-3) (ng/trap)	Q
16	B1D869	25	U	25	U	25	U	25	U
17	B1D870	31.53		25	U	25	U	25	U
18	B1D871	68.94		25	U	25	U	25	U
19	B1D872	25	U	25	U	25	U	25	U
20	B1D873	45.45		25	U	25	U	100.54	
21	B1D874	25	U	25	U	25	U	25	U
22	B1D875	59.83		25	U	25	U	25	U
23	B1D876	25	U	25	U	25	U	25	U
27	B1D877	25	U	25	U	25	U	25	U
31	B1D878	25	U	25	U	25	U	25	U
37	B1D879	32.18		25	U	25	U	25	U
42	B1D880	25	U	25	U	25	U	25	U
38	B1D881	105.95		25	U	25	U	25	U
32	B1D882	25	U	25	U	25	U	25	U
28	B1D883	68.11		25	U	25	U	25	U
24	B1D884	25	U	25	U	25	U	25	U
30	B1D888	70.26		25	U	25	U	25	U
26	B1D889	25	U	25	U	25	U	25	U
26-duplicate	B1D890	67.06		25	U	25	U	25	U
25	B1D891	25	U	25	U	25	U	25	U
29	B1D892	25	U	25	U	25	U	25	U
33	B1D893	25	U	25	U	25	U	25	U
39	B1D894	25	U	25	U	25	U	25	U
44	B1D895	25	U	25	U	25	U	25	U
49	B1D896	154.86		25	U	25	U	25	U
49-duplicate	B1D897	62.37		25	U	25	U	25	U
55	B1D898	25	U	25	U	25	U	25	U
54	B1D899	25	U	25	U	25	U	25	U
53	B1D8B0	38.96		25	U	25	U	25	U
52	B1D8B1	69.98		25	U	25	U	25	U
48	B1D8B2	67.13		25	U	25	U	25	U
43	B1D8B3	25	U	25	U	25	U	25	U
50	B1D8B4	25	U	25	U	25	U	25	U

Table 3-1. Passive Soil-Vapor Sampling Results East and Northeast of the 216-Z-9 Trench (Refined). (3 Pages)

Sample Identifier	HEIS Number	Carbon Tetrachloride (CAS 56-23-5) (ng/trap)	Q	Chloroform (CAS 67-66-3) (ng/trap)	Q	Methylene Chloride (CAS 75-09-2) (ng/trap)	Q	Chloromethane (CAS 74-87-3) (ng/trap)	Q
45	B1D8B5	25	U	25	U	25	U	25	U
40	B1D8B6	25	U	25	U	25	U	25	U
34	B1D8B7	140.48		25	U	25	U	25	U
35	B1D8B8	40.55		25	U	25	U	25	U
36	B1D8B9	161.75		25	U	25	U	25	U
41	B1D8C0	74.97		25	U	25	U	25	U
47	B1D8C1	25	U	25	U	25	U	25	U
51	B1D8C2	25	U	25	U	25	U	25	U
46	B1D8C3	25	U	25	U	25	U	25	U

CAS = Chemical Abstracts Service.
HEIS = *Hanford Environmental Information System* database.
Q = laboratory data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

The samples collected by Fluor Hanford were analyzed for the following compounds:

Chemical Abstracts Service Number	Compound	Chemical Abstracts Service Number	Compound
75-00-3	Chloroethane	107-06-2	1,2-Dichloroethane
74-87-3	Chloromethane	71-55-6	1,1,1-Trichloroethane
75-35-4	1,1-Dichloroethene	56-23-5	Carbon Tetrachloride
75-09-2	Methylene Chloride	78-87-5	1,2-Dichloropropane
156-60-5	trans-1,2-Dichloroethene	79-01-6	Trichloroethene
75-34-3	1,1-Dichloroethane	79-00-5	1,1,2-Trichloroethane
156-59-2	cis-1,2-Dichloroethene	124-48-1	Dibromochloromethane
67-66-3	Chloroform	127-18-4	Tetrachloroethene

One hydrophobic absorbent cartridge was analyzed from each sampling vial. Analysis began on June 8, 2005, and was completed on June 9, 2005. Each absorbent cartridge was thermally desorbed and then analyzed using gas chromatography/mass spectrometry equipment in accordance with the U.S. Environmental Protection Agency Method 8260B (SW-846). Each cartridge was analyzed for the list of volatile organic compounds in the above table.

The analytical results are provided in nanograms per cartridge (nanograms per trap). The practical quantitation levels represent values above which Beacon believes that quantitative laboratory results can be achieved within specified limits of precision and with a high degree of

confidence. The practical quantitation level for all analytes is 25 ng. All of the results are in the HEIS database.

Carbon tetrachloride was detected at 19 of the 55 locations sampled (Table 3-1). The highest concentration detected was 161.75 ng/trap in sample B1D8B9, located approximately 120 m (390 ft) southeast of the trench (Figure 2-1). Chloroform was not detected at any of the sampling locations. Chloromethane was detected at one sample location, B1D873, approximately 300 m (1000 ft) east of the 216-Z-9 Trench, at a concentration of 100.54 ng/trap. No other volatile organic compounds were detected in any of the samples (Appendix A).

Field quality control consisted of field-duplicate samples and trip-blank samples. Three duplicate samples were collected (Table 3-1), meeting the requirement in the sampling and analysis plan to duplicate at least 5 percent of the total collected samples (i.e., one duplicate sample was analyzed for every 20 samples) (DOE/RL-2001-01, Appendix D). The duplicate samples were collected to evaluate variability of the sample-collection and analytical methodology by comparing two analyses of sample-collection media exposed to equivalent conditions. Of the three sample-duplicate pairs, one pair had no detectable volatile organic compounds in the sample. In the other two sample-duplicate pairs, only one detection of carbon tetrachloride was greater than five times the method-detection limit (25 ng/trap). The required precision of +/- 25 percent applies only to volatile organic compound detections that are greater than five times the method-detection limit (DOE/RL-96-68, *Hanford Analytical Services Quality Assurance Requirements Documents*, Section 7.5.1.3).

For sample-duplicate pairs with detections of at least one volatile organic compound in the sample and duplicate, the relative percent difference can be calculated to evaluate whether the data meet the required precision of 25 percent. However, because no sample-duplicate pair in this study had detections of carbon tetrachloride at a concentration greater than five times the method-detection limit in both the sample and the duplicate, the relative percent difference was not calculated.

The purpose of collecting trip blanks was to check for possible contamination originating from container preparation methods, shipment, handling, storage, or site conditions. No compounds above the practical quantitation level were identified on any of the three trip blanks.

The results of the passive soil-gas surveys were used to select locations for subsurface investigations using direct-push technologies (a CPT and an HHR). The direct-push investigations were conducted by Vista Engineering as part of the carbon tetrachloride DNAPL source-term location project. These direct-push investigations are described in Section 2.1 of this report.

The CPT was used to collect depth-discrete information on soil lithology, soil vapor, and soil concentrations of carbon tetrachloride; DNAPL field screening; and gross-gamma activities using geophysical logging. The highest concentration of carbon tetrachloride detected in soil-vapor samples from the 216-Z-9 Trench area was 184 ppmv at a depth of 18.1 m (59.3 ft) near the east side of the 216-Z-9 Trench. The highest concentration of carbon tetrachloride detected in soil-vapor samples from the 216-Z-1A Tile Field area was 512 ppmv at a depth of 18.7 m (61.3 ft) near the center of the 216-Z-1A Tile Field. Carbon tetrachloride was not

detected in any of the soil samples above the analytical reporting limits. The results of the CPT soil-vapor and soil sampling in the vicinities of the 216-Z-9 Trench, the 216-Z-1A Tile Field, the 216-Z-18 Crib, and the 216-Z-12 Crib are summarized in DOE/RL-2006-58, Section 4.2.1.

The HHR was used to collect depth-discrete information on soil-vapor and soil concentrations of carbon tetrachloride; DNAPL field screening; and spectral-gamma activities and neutron-moisture profiles using geophysical logging. The objective of the HHR investigation was to identify the lateral extent of the carbon tetrachloride DNAPL source-term regions through the top of the Cold Creek unit. The initial investigation using HHR was conducted in the vicinity of the 216-Z-9 Trench. As field work progressed, the investigation focused on refining the distribution of DNAPL in the fine-grained silts encountered during drilling of well 299-W15-46 south of the 216-Z-9 Trench. The results of the CPT investigations and the sediment sample results from characterization at wells 299-W15-46 and 299-W15-48 were used, in addition to the passive soil-gas results, to select specific sampling locations for use of the HHR in the vicinity of the 216-Z-9 Trench.

The highest concentration of carbon tetrachloride detected in soil samples from the 216-Z-9 Trench area was 390,000 µg/kg at a depth of 19.5 to 20.1 m (64 to 66 ft) bgs on the south side of the 216-Z-9 Trench. This sample, which was collected 6.1 m (20 ft) east of well 299-W15-46, confirmed the high concentration of carbon tetrachloride (380,000 µg/kg) in a sample collected from a similar depth during drilling of the well. Carbon tetrachloride was not detected in soil samples from similar depths at locations 6.1 m (20 ft) south, 6.1 m (20 ft) west, and 15.2 m (50 ft) east of well 299-W15-46. Only one soil-vapor sample was collected using HHR. The sample was collected 7 m (23 ft) west of well 299-W15-46 at a depth of 20 m (66 ft) bgs and had a carbon tetrachloride concentration of 105 ppmv. The results of the HHR soil-vapor and soil sampling in the vicinity of the 216-Z-9 Trench are summarized in DOE/RL-2007-22, Sections 2.2.1 and 2.2.3.

3.2 RESULTS FROM POTENTIAL ACCUMULATION AREAS AT THE 216-Z-9 TRENCH, 216-Z-1A TILE FIELD, AND 216-Z-18 CRIB

The results of the cross-well seismic surveys at the 216-Z-9 Trench and the 216-Z-1A Tile Field were interpreted to prepare subsurface topographic contour maps of key vadose-zone layers at each of these sites. The subsurface topographic contour maps for the 216-Z-9 Trench area are shown in DOE/RL-2006-58, Figures 3.11 to 3.14, and those for the 216-Z-1A Tile Field are shown in DOE/RL-2006-58, Figures 3.20 to 3.23. The resulting detailed geometry of these subsurface vadose-zone layers was used to identify target depths for intrusive soil-vapor and soil sampling around the release sites using direct-push technologies. The cross-well seismic surveys and direct-push investigations were conducted by Vista Engineering as part of the carbon tetrachloride DNAPL source-term location project.

The results of the investigations at the 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib using the CPT and HHR direct-push technologies are summarized in Section 3.1. Detailed information is provided in DOE/RL-2007-22, Section 2.2.

The anomalies identified during a 1999 seismic-reflection survey that could be attributed to possible carbon tetrachloride DNAPL near the top of the Cold Creek unit adjacent to the 216-Z-9 Trench (Waddell et al., 2003) were investigated by passive soil-vapor locations 56, 59, 87, and 88 (Figure 4.3 in DOE/RL-2006-58), CPT locations P17, P20, and P24 (Figure 4.10 in DOE/RL-2006-58), and HHR locations P55, P56, and P51 (Figure 2.4 in DOE/RL-2007-22). The highest carbon tetrachloride concentrations measured at these locations were 64 ng/trap at passive soil-vapor location 87, 5 ppmv at CPT location P20 at a depth of 0.2 m (0.58 ft), and <5 µg/kg at the HHR locations (Bratton et al., 2004, *Integrated Approach for Carbon Tetrachloride Source Term Location, 200 West Area Hanford Site, Washington, Final Report*; DOE/RL-2006-58; DOE/RL-2007-22, respectively). These results are significantly less than concentrations expected from a DNAPL source; however, the vapor concentrations in the shallow depths of these investigations may have been affected by the soil-vapor extraction operations.

Geophysical logging was conducted at 11 wells in the vicinities of the 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib as part of the Step II investigation (Table 2-3). The spectral-gamma logging system was used at each well to identify specific gamma-emitting radionuclides. Passive-neutron logging was performed at selected wells. This logging method has been shown to be effective in qualitatively detecting zones of alpha-emitting nuclides, including transuranic radionuclides, even where no gamma emissions are available for detection. The passive-neutron signal depends on the concentration of alpha sources, and also on the concentrations of lighter elements such as nitrogen, oxygen, fluorine, magnesium, aluminum, and silicon that emit neutrons after alpha capture. The neutron-moisture logging system was used at selected wells to measure the volumetric moisture content in percent. Variations in concentrations of naturally occurring, gamma-emitting radionuclides (K-40, U-238, Th-232) and moisture content observed throughout a borehole may aid in interpreting lithology changes. In the sampling plan (DOE/RL-2001-01, Appendix D), the geophysical logging was planned to aid in interpretation of the configuration of the Cold Creek unit to support sampling in potential DNAPL accumulation areas (Table 1-1). However, as discussed in the first paragraph of this section, the comprehensive cross-well seismic surveys conducted by Vista Engineering were used to prepare the contour maps of the Cold Creek unit and other lithologic units at the 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib. The geophysical logging results will be used in the RI Report to support the conceptual site models for these waste sites.

A summary of the results, taken from the log data reports provided by S. M. Stoller,[1] available at http://www.hanford.gov/cp/gpp/data/vzcp/vzcp.cfm, is as follows.

- Well 299-W15-82, east of the 216-Z-9 Trench: The only manmade radionuclide detected was Cs-137 near the ground surface at less than 1 pCi/g.

  The moisture data indicated some variability.

[1] Stoller is a trademark of S. M. Stoller Corporation, Lafayette, Colorado.

- Well 299-W15-85, north of the 216-Z-9 Trench: No manmade radionuclides were detected in this borehole.

  The moisture log indicated considerable variability; the maximum volume percent moisture was approximately 15 percent.

- Well 299-W15-218, north of the 216-Z-9 Trench: No evidence of manmade radionuclides was detected in this borehole.

- Well 299-W18-7, east of the 216-Z-1A Tile Field: Am-241 was interpreted to be present from 41.9 to 48.0 m (137.5 to 157.5 ft) bgs at levels less than 100 nCi/g.

  The vertical profiles of naturally occurring potassium, uranium, and thorium isotopes suggest that the top of the Cold Creek unit exists at 41.9 m (137.5 ft) bgs. A low concentration of K-40 and elevated U-238 exhibited at this depth is characteristic of this unit, suggesting "caliche." The Am-241 contamination appears to be associated with the unit.

  Elevated radon was observed between 28.5 and 57.5 m (93.5 and 188.5 ft) bgs. Elevated U-238 detected at 52.6 m (172.5 ft) bgs is believed to be naturally occurring and likely indicative of a thin silty zone.

- Well 299-W18-9, within the 216-Z-18 Crib: Am-241 was detected between 6.4 and 17.7 m (21 and 58 ft) bgs and between 19.8 and 20.7 m (65 and 68 ft) bgs. The maximum concentration was approximately 400,000 pCi/g at 7.3 m (24 ft) bgs. A minor amount of Cs-137 (approximately 0.1 pCi/g) also appears to be present.

  Plutonium-239 was detected between 6.7 and 15.2 m (22 and 50 ft) bgs and between 16.8 and 17.7 m (55 and 58 ft) bgs. The maximum concentration was measured at approximately 400,000 pCi/g at 7.5 m (24.5 ft) bgs. The maximum concentration of Pu-241 was estimated as 16 pCi/g.

  Neptunium-237 was detected using the spectral-gamma logging system by measuring a daughter product (Pa-233) that emits a prominent gamma ray. Protactinium-233 was detected between 6.7 and 18.0 m (22 and 59 ft) bgs and between 19.7 and 20.9 m (64.5 and 68.5 ft) bgs. The maximum concentration was approximately 19 pCi/g at 7.3 m (24 ft) bgs.

  A slightly elevated Th-232 concentration is indicated between 6.7 and 7.3 m (22 and 24 ft) bgs; other less prominent indications are at approximately 9.1 m (30 ft) bgs and from 12.2 to 13.1 m (40 to 43 ft) bgs.

  Uranium-232 is present at a maximum concentration of approximately 1 pCi/g. It is inferred, on the basis of the U-232 concentration, that less than 300 pCi/g of U-233 may be present in this waste stream.

  Passive-neutron logging was performed in the borehole from the ground surface to 22.9 m (75 ft). The passive-neutron log indicated a maximum count rate of 8 counts per second (c/s) at 7.3 m (24 ft) bgs.

The moisture data indicated some variability.

- Well 299-W18-12, within the 216-Z-18 Crib: No evidence of manmade radionuclides was detected in this borehole. The increase in natural uranium at 57.3 to 58.5 m (188 to 192 ft) bgs and the associated decrease in natural potassium and thorium are indicative of a caliche layer.

  The moisture data indicated some variability.

- Well 299-W18-77, within the 216-Z-1A Tile Field: No evidence of manmade radionuclides was detected in this borehole.

- Well 299-W18-80, within the 216-Z-1A Tile Field: No evidence of manmade contamination was detected in this borehole from spectra collected using routine (i.e., 200-seconds-long) count times. However, spectra were collected at 1.9 and 5.9 m (6.3 and 19.5 ft) bgs, using 1,000-seconds-long count times. The spectra collected at 5.9 m (19.5 ft) bgs represent a measurement at the bottom of the borehole, where the driller's log indicated contamination at 20,000 d/min. Examination of spectra shows evidence of Am-241 at about 11,400 pCi/g and of Np-237 at about 0.88 pCi/g. These levels are below the minimum detectable activity for the 200-seconds-long measurements. From this it can be inferred that some degree of contamination is present near the bottom of the borehole.

- Well 299-W18-167, within the 216-Z-1A Tile Field: Am-241 was detected from 16.6 to 17.8 m (54.5 to 58.5 ft) bgs. The maximum concentration was approximately 250,000 pCi/g at 17.8 m (54.5 ft) bgs.

  Plutonium-239 was detected at 17.8 m (54.5 ft) bgs. The maximum concentration was approximately 40,000 pCi/g.

  Neptunium-237 was detected using the spectral-gamma logging system by measuring a daughter product (Pa-233) that emits a prominent gamma ray. Protactinium-233 was detected between 14.8 and 15.1 m (48.5 and 49.5 ft) bgs and from 16.3 to 16.9 m (53.5 to 55.5 ft) bgs. The maximum concentration was approximately 19 pCi/g at 17.8 m (54.5 ft) bgs.

  Passive-neutron logging was performed in the borehole from 14.5 to 19.4 m (47.5 to 63.5 ft) bgs. The passive-neutron log indicated a maximum count rate of 3 c/s at 17.8 m (54.5 ft) bgs.

- Well 299-W18-168, within the 216-Z-1A Tile Field: Am-241 was detected from 14.6 to 14.9 m (48 to 49 ft) bgs and from 16.2 to 18.6 m (53 to 61 ft) bgs. The maximum concentration was approximately 145,000 pCi/g at 14.9 m (49 ft) bgs.

  Plutonium-239 was not detected in this borehole above a method-detection limit of approximately 25,000 pCi/g.

Neptunium-237 was detected using the spectral-gamma logging system by measuring a daughter product (Pa-233) that emits a prominent gamma ray. Protactinium-233 was detected between 14.0 and 19.2 m (46 and 63 ft) bgs. The maximum concentration was approximately 16 pCi/g at 14.9 m (49 ft) bgs.

Passive-neutron logging was performed in the borehole from 11.6 to 25.3 m (38 to 83 ft) bgs. The passive-neutron log indicated a maximum count rate of 3 c/s at 14.9 m (49 ft) bgs.

Moisture data indicated some variability.

- Well 299-W18-169, within the 216-Z-1A Tile Field: Cs-137 was detected at 0.5 m (1.6 ft) bgs at 0.2 pCi/g.

  Neptunium-237 was detected using the spectral-gamma logging system by measuring a daughter product (Pa-233) that emits a prominent gamma ray. Protactinium-233 was detected between 9.9 and 12.1 m (32.6 and 39.6 ft) bgs. The maximum concentration was approximately 2 pCi/g at 10.9 m (35.6 ft) bgs.

  Americium-241 was inferred to be present at relatively low concentrations between 9.9 and 11.8 m (32.6 and 38.6 ft) bgs. This is consistent with the low concentrations observed for Pa-233 (and Np-237, which is a decay product of Am-241).

  Plutonium-239 was not detected in this borehole above a method-detection limit of approximately 15,000 pCi/g.

  Passive-neutron logging was performed in the borehole from 8.4 to 13.0 m (27.6 to 42.6 ft) bgs. The passive-neutron log indicated a maximum count rate of 0.8 c/s at 10.2 m (33.6 ft) bgs.

  Moisture data indicated some variability.

3.3 RESULTS ADJACENT TO THE 216-T-19 CRIB, 216-Z- DITCHES, 216-Z-7 CRIB, 216-Z-12 CRIB, 216-Z-16 CRIB, AND 216-Z-17 TRENCH

As discussed in Section 2.3, because of radiological concerns with using the EAPS to investigate the 216-T-19 Crib and the relatively low carbon tetrachloride concentrations observed at this waste site during the Step I investigation, the U.S. Environmental Protection Agency concurred that a Step II investigation at this site was not required (FH-0503537).

The EAPS was used to collect soil-vapor samples from the shallow and deep vadose zone in four borings adjacent to the 216-Z-16 Crib and the 216-Z-17 Trench. The field-screening results for soil-vapor samples collected using the EAPS are summarized in Table 3-2. The only carbon tetrachloride soil-vapor concentration detected in the EAPS samples from these locations was 9.06 to 9.14 ppmv from Borehole C4884 at a depth of 45.7 m (150 ft). This boring was located adjacent to the center of the 216-Z-16 Crib (Figure 2-2). The Step II results are consistent with

the Step I results, in which no carbon tetrachloride was detected down to refusal depth of 20.4 m (67 ft) bgs at the 216-Z-16 Crib site (CP-13514).

Table 3-2. Field-Screening Results for Soil-Vapor Samples Collected at Liquid-Waste Disposal Sites Using the Enhanced Access Penetration System. (5 Pages)

Sample Location	HEIS Number	Sample and Analysis			Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
		Date	Sample Time	Analysis Time							
216-Z-16 Crib											
C4883	B1F5W7	08/10/2005	9:30	13:20	15	1.00	U	1.66		3.29	
C4883	B1F5W8 (duplicate)	08/10/2005	9:30	13:22	15	1.00	U	1.89		2.90	
C4883	B1F5W9	08/10/2005	9:45	13:24	25	1.00	U	1.13		1.80	
C4883	B1F5X0 (duplicate)	08/10/2005	9:45	13:26	25	1.00	U	1.25		1.64	
C4883	B1F5X1	08/10/2005	11:00	13:30	41	1.00	U	1.16		1.00	U
C4883	B1F5X2 (duplicate)	08/10/2005	11:00	13:38	41	1.00	U	1.13		1.00	U
C4883	B1F5Y1	08/15/2005	14:50	17:11	50	1.00	U	1.80		1.00	U
C4883	B1F5Y2 (duplicate)	08/15/2005	14:50	17:13	50	1.00	U	1.46		1.46	
C4883	B1F5X9	08/15/2005	14:40	17:07	75	1.00	U	1.76		1.12	
C4883	B1F5Y0 (duplicate)	08/15/2005	14:40	17:09	75	1.00	U	1.59		1.34	
C4883	B1F5X7	08/15/2005	14:30	17:03	100	1.00	U	1.83		1.28	
C4883	B1F5X8 (duplicate)	08/15/2005	14:30	17:05	100	1.00	U	2.10		1.30	
C4883	B1F5X5	08/15/2005	14:10	16:59	125	1.00	U	3.03		1.78	
C4883	B1F5X6 (duplicate)	08/15/2005	14:10	17:01	125	1.00	U	2.81		1.78	
C4883	B1F5X3	08/12/2005	7:30	13:05	150	1.00	U	1.00	U	1.00	U
C4883	B1F5X4 (duplicate)	08/12/2005	7:30	13:07	150	1.00	U	1.00	U	1.00	U
C4884	B1F5Y3	08/04/2005	8:30	13:40	15	1.00	U	3.24		3.17	
C4884	B1F5Y4 (duplicate)	08/04/2005	8:30	13:42	15	1.00	U	3.22		3.26	
C4884	B1F5Y5	08/04/2005	9:00	13:44	25	1.00	U	2.06		3.05	
C4884	B1F5Y6 (duplicate)	08/04/2005	9:00	13:48	25	1.00	U	2.02		2.82	

Table 3-2. Field-Screening Results for Soil-Vapor Samples Collected at Liquid-Waste Disposal Sites Using the Enhanced Access Penetration System. (5 Pages)

Sample Location	HEIS Number	Sample and Analysis			Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
		Date	Sample Time	Analysis Time							
C4884	B1F5Y7	08/04/2005	10:00	13:48	50	1.00	U	1.95		3.14	
C4884	B1F5Y8 (duplicate)	08/04/2005	10:00	13:50	50	1.00	U	2.25		2.80	
C4884	B1F605	08/10/2005	7:30	13:18	75	1.00	U	1.65		1.00	U
C4884	B1F606	08/10/2005	7:30	13:18	75	1.00	U	1.42		1.00	U
C4884	B1F603	08/10/2005	7:15	13:11	100	1.00	U	1.30		1.00	U
C4884	B1F604 (duplicate)	08/10/2005	7:15	13:13	100	1.00	U	1.22		1.00	U
C4884	B1F601	08/08/2005	8:20	14:12	125	1.00	U	1.26		5.34	
C4884	B1F602 (duplicate)	08/08/2005	8:20	14:14	125	1.00	U	1.73		4.46	
C4884	B1F5Y9	08/08/2005	7:45	14:08	150	9.14		1.93		5.17	
C4884	B1F600 (duplicate)	08/08/2005	7:45	14:10	150	9.06		1.79		6.16	
216-Z-17 Trench											
C4885	B1F607	07/26/2005	10:02	14:01	15	1.00	U	3.91		13.0	
C4885	B1F608 (duplicate)	07/26/2005	10:02	14:03	15	1.00	U	3.99		13.6	
C4885	B1F609	07/26/2005	10:15	14:06	25	1.00	U	2.80		10.7	
C4885	B1F610	07/26/2005	10:15	14:08	25	1.00	U	3.06		10.8	
C4885	B1F611	07/26/2005	11:40	14:10	50	1.00	U	1.64		3.87	
C4885	B1F612 (duplicate)	07/26/2005	11:40	14:12	50	1.00	U	1.40		3.89	
C4885	B1F613	08/03/2005	12:45	13:39	75	1.00	U	1.55		1.00	U
C4885	B1F614 (duplicate)	08/03/2005	12:45	13:41	75	1.00	U	1.49		1.00	U
C4885	B1F615	08/03/2005	12:15	13:31	100	1.00	U	1.00	U	1.00	U
C4885	B1F616 (duplicate)	08/03/2005	12:15	13:33	100	1.00	U	1.00	U	1.00	U
C4885	B1F617	08/03/2005	12:15	13:35	100	1.00	U	1.00	U	1.00	U

Table 3-2. Field-Screening Results for Soil-Vapor Samples Collected at Liquid-Waste Disposal Sites Using the Enhanced Access Penetration System. (5 Pages)

Sample Location	HEIS Number	Sample and Analysis			Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
		Date	Sample Time	Analysis Time							
C4885	B1F618 (duplicate)	08/03/2005	12:15	13:37	100	1.00	U	1.00	U	1.00	U
C4885	B1F619	08/03/2005	11:00	13:23	125	1.00	U	1.00	U	1.00	U
C4885	B1F620 (duplicate)	08/03/2005	11:00	13:25	125	1.00	U	1.00	U	1.00	U
C4885	B1F621	08/03/2005	11:00	13:27	125	1.00	U	1.00	U	1.00	U
C4885	B1F622 (duplicate)	08/03/2005	11:00	13:29	125	1.00	U	1.00	U	1.06	
C4885	B1F623	08/03/2005	8:45	13:14	150	1.00	U	1.00	U	1.00	U
C4885	B1F624 (duplicate)	08/03/2005	8:45	13:17	150	1.00	U	1.00	U	1.00	U
C4885	B1F625	08/03/2005	8:45	13:19	150	1.00	U	1.07		1.00	U
C4885	B1F626 (duplicate)	08/03/2005	8:45	13:21	150	1.00	U	1.07		1.00	U
C4886	B1F627	08/16/2005	7:20	14:08	15	1.00	U	2.95		4.94	
C4886	B1F628 (duplicate)	08/16/2005	7:20	14:10	15	1.00	U	2.78		5.47	
C4886	B1F629	08/16/2005	7:32	14:12	25	1.00	U	3.18		4.43	
C4886	B1F630 (duplicate)	08/16/2005	7:32	14:14	25	1.00	U	3.20		4.36	
C4886	B1F631	08/16/2005	8:24	14:16	50	1.00	U	3.32		3.54	
C4886	B1F632 (duplicate)	08/16/2005	8:24	14:18	50	1.00	U	3.01		3.71	
C4886	B1F633	08/16/2005	10:35	14:20	75	7.34		2.49		8.32	
C4886	B1F634	08/16/2005	10:35	14:22	75	7.31		2.78		8.35	
C4886	B1F639	08/19/2005	9:20	12:54	100	1.00	U	1.00	U	1.49	
C4886	B1F640 (duplicate)	08/19/2005	9:20	12:58	100	1.00	U	1.00	U	1.52	
C4886	B1F637	08/19/2005	8:50	12:50	125	1.00	U	1.00	U	1.00	U
C4886	B1F638 (duplicate)	08/19/2005	8:50	12:52	125	1.00	U	1.00	U	1.19	
C4886	B1F635	08/19/2005	7:25	12:46	150	1.00	U	1.00	U	1.00	U

Table 3-2. Field-Screening Results for Soil-Vapor Samples Collected at Liquid-Waste Disposal Sites Using the Enhanced Access Penetration System. (5 Pages)

Sample Location	HEIS Number	Sample and Analysis			Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
		Date	Sample Time	Analysis Time							
C4886	B1F636 (duplicate)	08/19/ 2005	7:25	12:48	150	1.00	U	1.00	U	1.51	
216-S-25 Crib											
C4890	B1F641	06/27/ 2005	un-known	17:52	15	1.00	U	1.63		1.43	
C4890	B1F642 (duplicate)	06/27/ 2005	un-known	17:54	15	1.00	U	1.71		1.52	
C4890	B1F643	06/27/ 2005	un-known	17:56	25	1.00	U	1.65		2.03	
C4890	B1F644 (duplicate)	06/27/ 2005	un-known	17:58	25	1.00	U	1.73		2.03	
C4890	B1F645	06/27/ 2005	un-known	18:00	50	1.00	U	3.11		5.52	
C4890	B1F646 (duplicate)	06/27/ 2005	un-known	18:02	50	1.00	U	2.97		5.50	
C4890	B1F653	07/12/ 2005	14:50	15:35	75	1.00	U	1.87		3.12	
C4890	B1F652	07/12/ 2005	13:37	14:52	100	1.00	U	1.06		1.72	
C4890	B1F651	07/12/ 2005	13:15	14:50	125	1.00	U	1.33		1.64	
C4890	B1F650	07/12/ 2005	12:30	14:47	150	1.00	U	1.00	U	1.26	
C4890	B1F649	07/12/ 2005	11:52	14:45	175	1.00	U	1.92		1.00	U
C4890	B1F648	07/12/ 2005	9:53	11:06	200	1.00	U	1.69		1.00	U
C4890	B1F647	07/12/ 2005	8:51	11:05	215	1.89		2.74		3.67	
C4891	B1F654	07/13/ 2005	15:00	16:55	15	1.00	U	3.93		1.00	U
C4891	B1F655	07/13/ 2005	15:13	16:57	25	1.00	U	3.93		1.00	U
C4891	B1F656	07/14/ 2005	10:45	14:07	50	1.00	U	6.45		0.66	
C4891	B1F657	07/20/ 2005	14:07	16:34	75	1.00	U	2.98		3.67	
C4891	B1F658 (duplicate)	07/20/ 2005	14:07	16:36	75	1.00	U	2.94		3.76	
C4891	B1F659	07/25/ 2005	11:25	11:55	100	1.00	U	1.49		1.83	
C4891	B1F660 (duplicate)	07/25/ 2005	11:25	11:57	100	1.00	U	1.31		2.14	

Table 3-2. Field-Screening Results for Soil-Vapor Samples Collected at Liquid-Waste Disposal Sites Using the Enhanced Access Penetration System. (5 Pages)

Sample Location	HEIS Number	Sample and Analysis			Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
		Date	Sample Time	Analysis Time							
C4891	B1F661	07/25/2005	8:50	11:59	125	1.00	U	4.39		4.72	
C4891	B1F662 (duplicate)	07/25/2005	8:50	12:01	125	1.00	U	4.39		4.91	
C4891	B1F663	07/25/2005	8:20	12:03	150	1.00	U	6.16		3.86	
C4891	B1F664 (duplicate)	07/25/2005	8:20	12:05	150	1.00	U	6.17		3.91	

CAS = Chemical Abstracts Service.
HEIS = *Hanford Environmental Information System* database.
ppmv = parts per million by volume.
Q = laboratory data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

The second highest carbon tetrachloride soil-vapor concentration measured in the EAPS samples was 7.31 to 7.34 ppmv from Borehole C4886 at a depth of 22.8 m (75 ft), which is located adjacent to the west side of the 216-Z-17 Trench (Figure 2-2). This was the only detection of carbon tetrachloride at the 216-Z-17 Crib during the Step II investigation. The Step II results are consistent with the Step I results, in which no carbon tetrachloride was detected down to refusal depth of 12.2 (40 ft) bgs at the 216-Z-17 Trench site (CP-13514).

A gas-calibration check standard of known carbon tetrachloride concentration (25.37 ppmv) was analyzed at the beginning and end of analysis each day (Table 3-3). The pairs of standard and measured carbon tetrachloride concentrations were used to evaluate the accuracy of the carbon tetrachloride analyses. The percent recovery (%R) was calculated according to the formula:

$$\%R = 100x(C_m / C_s)$$

where

C_m = the measured concentration of carbon tetrachloride
C_s = is the standard.

Table 3-3. Field-Screening Results for Carbon Tetrachloride Concentration Standards during Enhanced Access Penetration System Analyses. (3 Pages)

Carbon Tetrachloride Concentration Standard (ppmv)	Carbon Tetrachloride Concentration Analyzed (ppmv)	Date Analyzed	Time Analyzed
25.37	22.6	06/27/05	17:50
25.37	22.6	06/27/05	18:04
25.37	22.0	07/12/05	11:04
25.37	22.3	07/12/05	11:12

Table 3-3. Field-Screening Results for Carbon Tetrachloride Concentration Standards during Enhanced Access Penetration System Analyses. (3 Pages)

Carbon Tetrachloride Concentration Standard (ppmv)	Carbon Tetrachloride Concentration Analyzed (ppmv)	Date Analyzed	Time Analyzed
25.37	22.4	07/12/05	14:43
25.37	22.6	07/12/05	15:33
25.37	22.3	07/12/05	15:37
25.37	23.2	07/13/05	16:53
25.37	22.4	07/13/05	16:59
25.37	22.6	07/13/05	17:17
25.37	22.2	07/14/05	14:06
25.37	22.4	07/14/05	14:08
25.37	22.3	07/14/05	14:22
25.37	22.5	07/20/05	16:32
25.37	22.7	07/20/05	16:45
25.37	22.9	07/25/05	11:52
25.37	22.9	07/25/05	12:37
25.37	23.2	07/26/05	14:00
25.37	23.2	07/26/05	14:40
25.37	22.2	08/03/05	13:12
25.37	22.6	08/03/05	13:45
25.37	23.1	08/04/05	13:38
25.37	23.0	08/04/05	14:22
25.37	22.7	08/08/05	14:06
25.37	22.6	08/08/05	14:16
25.37	19.6	08/10/05	13:09
25.37	20.7	08/10/05	13:32
25.37	20.7	08/10/05	14:14
25.37	21.4	08/12/05	13:03
25.37	21.4	08/12/05	13:09
25.37*	15.3	08/15/05	16:57
25.37*	15.3	08/15/05	17:15
25.37	22.3	08/15/05	17:23
25.37	22.3	08/15/05	17:26
25.37	22.2	08/15/05	17:28
25.37	22.1	08/15/05	17:31
25.37	20.4	08/16/05	14:04
25.37	20.6	08/16/05	14:24
25.37	20.6	08/16/05	15:08

Table 3-3. Field-Screening Results for Carbon Tetrachloride Concentration Standards during Enhanced Access Penetration System Analyses. (3 Pages)

Carbon Tetrachloride Concentration Standard (ppmv)	Carbon Tetrachloride Concentration Analyzed (ppmv)	Date Analyzed	Time Analyzed
25.37	22.3	08/19/05	12:44
25.37	21.9	08/19/05	12:58
25.37	22.0	08/19/05	13:25

*Tedlar bag with 25.37 ppmv carbon tetrachloride standard emptied and filled with fresh carbon tetrachloride from compressed gas cylinder for 17:23 and subsequent analyses.
ppmv = parts per million by volume.

The maximum %R was 91 percent, the minimum was 77 percent, and the average was 87 percent. These calculations indicate that the B&K 1302 analyses of the carbon tetrachloride concentrations were accurate within 23 percent at a maximum and within 13 percent on average. These results indicate good recovery. NOTE: The first two analyses of the carbon tetrachloride standard on August 15, 2005, were anomalously low. The analyst then replaced this standard gas sample. Carbon tetrachloride concentrations measured in the fresh standard were acceptable. The two anomalous results were not used in this calculation of percent recovery.

A blank sample was analyzed at the beginning and end of each analytical session. The analytical results for the blank samples were all nondetect for carbon tetrachloride (Table 3-4).

Table 3-4. Field-Screening Results for Blank Samples during Enhanced Access Penetration System Analyses. (2 Pages)

Sample Location	Analysis Date	Analysis Time	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q	Methyl Ethyl Ketone (CAS 78-93-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
Blank	06/27/05	17:48	1.00	U	1.00	U	1.00	U	1.00	U	10,900
Blank	06/27/05	18:06	1.00	U	1.00	U	1.00	U	1.00	U	11,200
Blank	07/12/05	11:02	1.00	U	1.00	U	1.00	U	1.00	U	10,400
Blank	07/12/05	11:14	1.00	U	1.00	U	1.00	U	1.00	U	10,700
Blank	07/12/05	14:40	1.00	U	1.00	U	1.00	U	1.00	U	10,800
Blank	07/12/05	15:32	1.00	U	1.00	U	1.00	U	1.00	U	10,700
Blank	07/12/05	15:39	1.00	U	1.00	U	1.00	U	1.00	U	10,800
Blank	07/13/05	16:50	1.00	U	1.00	U	1.00	U	1.00	U	5,010
Blank	07/13/05	17:01	1.00	U	1.00	U	1.00	U	1.00	U	5,600
Blank	07/13/05	17:19	1.00	U	1.00	U	1.00	U	1.00	U	5,750
Blank	07/14/05	14:04	1.00	U	1.00	U	1.00	U	1.00	U	9,380
Blank	07/14/05	14:09	1.00	U	1.00	U	1.00	U	1.00	U	10,100
Blank	07/14/05	14:24	1.00	U	1.00	U	1.00	U	1.00	U	9,960
Blank	07/20/05	16:30	1.00	U	1.00	U	1.00	U	1.00	U	8,860
Blank	07/20/05	16:47	1.00	U	1.00	U	1.00	U	1.00	U	8,620

Table 3-4. Field-Screening Results for Blank Samples during Enhanced Access Penetration System Analyses. (2 Pages)

Sample Location	Analysis Date	Analysis Time	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q	Methyl Ethyl Ketone (CAS 78-93-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
Blank	07/25/05	11:51	1.00	U	1.00	U	1.00	U	1.00	U	8,410
Blank	07/25/05	12:39	1.00	U	1.00	U	1.00	U	1.00	U	8,010
Blank	07/26/05	13:59	1.00	U	1.00	U	1.00	U	1.00	U	5,610
Blank	07/26/05	14:42	1.00	U	1.00	U	1.00	U	1.00	U	5,400
Blank	08/03/05	13:10	1.00	U	1.00	U	1.00	U	1.00	U	7,440
Blank	08/03/05	13:43	1.00	U	1.00	U	1.00	U	1.00	U	7,420
Blank	08/04/05	13:38	1.00	U	1.00	U	1.00	U	1.00	U	4,780
Blank	08/04/05	14:24	1.00	U	1.00	U	1.00	U	1.00	U	5,000
Blank	08/08/05	13:38	1.00	U	1.00	U	1.00	U	1.00	U	9,030
Blank	08/08/05	14:18	1.00	U	1.00	U	1.00	U	1.03		3,460
Blank	08/10/05	13:07	1.00	U	1.00	U	1.00	U	1.00	U	10,400
Blank	08/10/05	13:34	1.00	U	1.00	U	1.00	U	1.03		10,400
Blank	08/10/05	14:18	1.00	U	1.00	U	1.00	U	1.03		9,690
Blank	08/12/05	13:01	1.00	U	1.00	U	1.00	U	1.00	U	10,300
Blank	08/12/05	13:11	1.00	U	1.00	U	1.00	U	1.00	U	11,600
Blank	08/15/05	16:55	1.00	U	1.00	U	1.00	U	1.00	U	9,550
Blank	08/15/05	17:18	1.00	U	1.00	U	1.00	U	1.00	U	9,830
Blank	08/15/05	17:33	1.00	U	1.00	U	1.00	U	1.00	U	8,450
Blank	08/16/05	14:00	1.00	U	1.00	U	1.00	U	1.00	U	8,880
Blank	08/16/05	14:26	1.00	U	1.00	U	1.00	U	1.00	U	7,630
Blank	08/16/05	15:10	1.00	U	1.00	U	1.00	U	1.00	U	8,160
Blank	08/19/05	12:42	1.00	U	1.00	U	1.00	U	1.00	U	8,900
Blank	08/19/05	12:42	1.00	U	1.00	U	1.00	U	1.00	U	8,700
Blank	08/19/05	13:27	1.00	U	1.00	U	1.00	U	1.00	U	8,840

CAS = Chemical Abstracts Service.
ppmv = parts per million by volume.
Q = laboratory data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

The 216-Z Ditches and 216-Z-12 Crib were investigated by Vista Engineering during the CPT investigation in the vicinity of the 216-Z-1A Tile Field and 216-Z-18 Crib waste sites (described in Section 2.1). The CPT was used to collect soil-vapor samples at the mid-point of the original 216-Z Ditches system (currently the head end of the 216-Z-20 Crib) (location P41 in Figure 2-3) and next to the 216-Z-12 Crib (locations P47 and P48 in Figure 2-3). Samples could not be collected at P47, because the CPT met refusal at 0.35 m (1.15 ft) bgs (DOE/RL-2006-58, Section 4.2.2). The results of the active soil-vapor sampling are summarized in DOE/RL-2006-58, Appendix D; the results for P41 and P48 are presented in Table 3-5.

Table 3-5. Field-Screening Results for Soil-Vapor Samples Collected at Liquid-Waste Disposal Sites Using the Cone Penetrometer. (2 Pages)

Sample Station	Well ID	Sample Number	Sample Depth (ft bgs)	Sample Date	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q
Z Ditches								
P41A	C4908	P41A-2	2.89	07/28/2005	4		8	
P41A	C4908	P41A-5	5.02	07/28/2005	2	U	3	
P41A	C4908	P41A-6A	6.01	07/28/2005	2	U	2	
P41A	C4908	P41A-6B	6.17	07/28/2005	2	U	2	
P41A	C4908	P41A-9	9.45	07/28/2005	2	U	2	U
P41A	C4908	P41A-12	12.57	07/28/2005	2	U	3	
P41A	C4908	P41A-15	15.68	07/28/2005	2		2	
P41A	C4908	P41A-18	18.97	07/28/2005	2		2	U
P41A	C4908	P41A-22	22.41	07/28/2005	3		2	
P41A	C4908	P41A-25	25.53	07/28/2005	3		2	U
P41A	C4908	P41A-28A	28.81	07/28/2005	3		2	U
P41A	C4908	P41A-28B	28.81	07/28/2005	3		2	U
P41A	C4908	P41A-32	32.09	07/28/2005	3		2	U
P41A	C4908	P41A-35	35.21	07/28/2005	3		2	U
P41A	C4908	P41A-38	38.65	07/28/2005	3		3	
P41A	C4908	P41A-39A	39.47	07/28/2005	4		2	
P41A	C4908	P41A-39B	39.47	07/28/2005	4		2	
P41A	C4908	P41A-40	40.78	07/28/2005	4		5	
P41B	C4909	P41B-40	40.78	07/28/2005	4		5	
216-Z-12 Crib								
P48A	C4902	P48A-3	3.87	07/26/2005	2	U	4	
P48A	C4902	P48A-5	5.02	07/26/2005	2	U	3	
P48A	C4902	P48A-6	6.01	07/26/2005	2	U	2	
P48A	C4902	P48A-7	7.15	07/26/2005	2	U	2	
P48A	C4902	P48A-10	10.44	07/26/2005	2	U	2	
P48A	C4902	P48A-13	13.72	07/26/2005	2	U	2	
P48A	C4902	P48A-17	17	07/26/2005	2	U	3	
P48A	C4902	P48A-20	20.28	07/26/2005	2	U	2	
P48A	C4902	P48A-23	23.56	07/26/2005	2		2	
P48A	C4902	P48A-26	26.84	07/26/2005	4		2	
P48A	C4902	P48A-30A	30.28	07/26/2005	8		3	
P48A	C4902	P48A-30B	30.28	07/26/2005	8		3	
P48A	C4902	P48A-33	33.73	07/26/2005	8		2	
P48A	C4902	P48A-37	37.01	07/26/2005	9		3	
P48A	C4902	P48A-40	40.29	07/26/2005	7		3	
P48A	C4902	P48A-43	43.74	07/26/2005	6		2	

Table 3-5. Field-Screening Results for Soil-Vapor Samples Collected at Liquid-Waste Disposal Sites Using the Cone Penetrometer. (2 Pages)

Sample Station	Well ID	Sample Number	Sample Depth (ft bgs)	Sample Date	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q
P48A	C4902	P48A-47	47.18	07/26/2005	8		3	
P48A	C4902	P48A-50	50.3	07/26/2005	9		4	
P48A	C4902	P48A-53	53.42	07/26/2005	11		4	
P48A	C4902	P48A-56	56.86	07/26/2005	10		4	
P48A	C4902	P48A-59	59.98	07/26/2005	12		6	
P48A	C4902	P48A-63	63.26	07/26/2005	14		4	
P48A	C4902	P48A-66	66.54	07/26/2005	10		4	
P48A	C4902	P48A-69	69.82	07/26/2005	16		6	
P48A	C4902	P48A-72	72.11	07/26/2005	18		5	
P49B	C4914	P49B-49	49.15	08/01/2005	3		2	

From DOE/RL-2006-58, *Carbon Tetrachloride DNAPL Source Term Characterization Report*, Appendix D.

CAS = Chemical Abstracts Service.
ID = identification (number).
ppmv = parts per million by volume.
Q = laboratory data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

The highest carbon tetrachloride soil-vapor concentration measured at the 216-Z Ditch location (P41) during the Step II investigation was 4 ppmv at depths of 0.88, 12.03, and 12.43 m (2.89, 39.47, and 40.78 ft). This is consistent with the Step I results, in which the maximum carbon tetrachloride concentration detected at the mid-point of the original 216-Z Ditches system was 2.9 ppmv at a depth of 11.6 to 11.9 m (38 to 39 ft) bgs (CP-13514). The highest carbon tetrachloride soil-vapor concentration measured at the head-end of the 216-Z-12 Crib (P48) during the Step II investigation was 18 ppmv at a depth of 21.98 m (72.11 ft). Between 1.18 and 15.3 m (3.87 and 50.3 ft) bgs, the maximum Step II carbon tetrachloride result was 9 ppmv. This is consistent with the Step I results, in which the maximum carbon tetrachloride soil-vapor concentration at this location was 8 ppmv at a depth of 15.1 m (49.4 ft) (refusal) bgs.

Borehole C4183 was drilled and sampled to evaluate subsurface impacts beneath the 216-Z-7 Crib as part of the 200-LW-2 OU RI (DOE/RL-2005-61). The soil-vapor sampling results from this borehole are presented in Table 3-6. The highest carbon tetrachloride soil-vapor concentration was 12.2 ppmv at a total borehole depth of 67.7 m (222 ft), which is just above the water table. The shallowest soil-vapor sample collected from Borehole C4183 was at a depth of 22.6 m (74 ft) bgs. Carbon tetrachloride was not detected at this depth above the detection limit of 1 ppmv. This is consistent with the Step I results, in which the only detection of carbon tetrachloride at the 216-Z-7 Crib was 2.06 ppmv at a depth of 18.6 m (61 ft) (refusal) (CP-13514).

Table 3-6. Field-Screening Results for Soil-Vapor Samples Collected While Drilling Borehole C4183 at the 216-Z-7 Crib. (2 Pages)

Sample Date and Time	Analysis Date and Time	HEIS Number	Sample Depth Start (ft)	Sample Depth End (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methyl Ethyl Ketone (CAS 78-93-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
03/01/2005 8:35	03/01/2005 9:14	B1CKM9	--	74	1.00	U	2.52		2.90		1.00	U
03/01/2005 8:35	03/01/2005 9:15	B1CKN0	--	74	1.00	U	2.70		2.70		1.00	U
03/01/2005 8:37	03/01/2005 9:18	B1CKN1	--	74	1.00	U	2.45		1.00	U	1.00	U
03/01/2005 8:37	03/01/2005 9:20	B1CKN2	--	74	1.00	U	2.59		1.00	U	1.00	U
03/03/2005 8:15	03/03/2005 10:46	B1CKN3	--	96.5	1.00	U	2.27		2.13		1.00	U
03/03/2005 8:15	03/03/2005 10:48	B1CKN4	--	96.5	1.00	U	2.11		2.11		1.00	U
03/03/2005 8:17	03/03/2005 10:50	B1CKN5	--	96.5	1.00	U	1.99		2.02		1.00	U
03/03/2005 8:17	03/03/2005 10:52	B1CKN6	--	96.5	1.00	U	1.98		2.03		1.00	U
03/04/2005 14:18	03/04/2005 15:02	B1CKN7	--	117.5	3.18		2.64		2.20		4.02	
03/04/2005 14:18	03/04/2005 15:04	B1CKN8	--	117.5	3.05		2.56		2.13		3.90	
03/04/2005 14:20	03/04/2005 15:06	B1CKN9	--	117.5	3.31		2.79		2.37		4.00	
03/04/2005 14:20	03/04/2005 15:08	B1CKP0	--	117.5	3.34		2.75		2.43		3.95	
03/08/2005 14:12	03/08/2005 14:50	B1CKP1	--	149.4	1.00	U	1.00	U	1.31		1.87	
03/08/2005 14:12	03/08/2005 14:58	B1CKP2	--	149.4	1.00	U	1.00	U	1.29		1.73	
03/08/2005 14:16	03/08/2005 15:02	B1CKP3	--	149.4	1.00	U	1.00	U	1.39		2.04	
03/08/2005 14:16	03/08/2005 15:04	B1CKP4	--	149.4	1.00	U	1.00	U	1.54		2.32	
03/14/2005 14:58	03/14/2005 17:02	B1CKP5	170	174.5	1.00	U	1.00	U	1.00	U	1.00	U
03/14/2005 14:58	03/14/2005 17:04	B1CKP6	170	174.5	1.00	U	1.00	U	1.00	U	1.00	U
03/14/2005 14:59	03/14/2005 17:04	B1CKP7	170	174.5	1.00	U	1.00	U	1.00	U	1.00	U
03/14/2005 14:59	03/14/2005 17:08	B1CKP8	170	174.5	1.00	U	1.00	U	1.00	U	1.00	U
03/18/2005 8:56	03/18/2005 9:47	B1CKP9	195	198.5	3.28		1.12		1.00	U	1.00	U
03/18/2005 8:56	03/18/2005 9:49	B1CKR0	195	198.5	3.32		1.00	U	1.00	U	1.00	U
03/18/2005 8:57	03/18/2005 9:51	B1CKR1	195	198.5	3.32		1.00	U	1.00	U	1.00	U

Table 3-6. Field-Screening Results for Soil-Vapor Samples Collected While Drilling Borehole C4183 at the 216-Z-7 Crib. (2 Pages)

Sample Date and Time	Analysis Date and Time	HEIS Number	Sample Depth Start (ft)	Sample Depth End (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methyl Ethyl Ketone (CAS 78-93-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
03/18/2005 8:57	03/18/2005 9:54	B1CKR2	195	198.5	3.25		1.00	U	1.00	U	1.00	U
03/24/2005 10:31	03/24/2005 11:19	B1CPR0	219	222	12.1		2.67		1.00	U	1.51	
03/24/2005 10:31	03/24/2005 11:21	B1CPR1	219	222	12.2		2.04		1.00	U	2.35	
03/24/2005 10:31	03/24/2005 11:23	B1CPR2	219	222	12.1		1.98		1.00	U	3.57	
03/24/2005 10:31	03/24/2005 11:25	B1CPR3	219	222	12.2		1.88		1.00	U	2.59	
03/24/2005 10:35	03/24/2005 11:27	B1CPR4	219	222	11.9		1.86		1.00	U	2.37	
03/24/2005 10:35	03/24/2005 11:29	B1CPR5	219	222	12.0		1.46		1.00	U	2.86	
03/24/2005 10:36	03/24/2005 11:31	B1CPR6	219	222	12.1		1.48		1.00	U	2.63	
03/24/2005 10:36	03/24/2005 11:33	B1CPR7	219	222	11.8		1.55		1.00	U	2.66	

CAS = Chemical Abstracts Service.
ppmv = parts per million by volume.
Q = laboratory data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

The highest carbon tetrachloride concentration measured during the Step II investigation at these sites was 18 ppmv. This concentration is significantly below the lower action level of 1,200 ppmv specified for collection of contingency soil samples (Table 1-1). Therefore, as noted in Section 2.3, no soil samples were collected at these locations, in response to the Step II sampling design.

3.4 RESULTS OF ACTIVITIES AT TRENCH T-04 IN THE 218-W-4C BURIAL GROUND

The results of vent-riser sampling at trenches in the 218-W-4C Burial Ground in 2003 in support of Tri-Party Agreement Milestone M-91-40 for retrieval of retrievably stored waste are provided in Appendix C1. The results are consistent with the results of vent-riser sampling in this waste site during the Step I investigation in 2002 (CP-13514). Both investigations found the highest volatile organic compound concentrations at the east end of Trench T-04. The highest carbon tetrachloride concentration detected using field-screening instruments during Step I was 1,760 ppmv from vent riser T4-04 (CP-13514). The highest carbon tetrachloride concentration detected using field-screening instruments during the 2003 investigation was 668 ppmv, also from vent riser T4-04 (Appendix C1).

The sampling in 2003 included collection of soil-vapor samples in SUMMA canisters. The SUMMA canister samples were analyzed in the laboratory for volatile organic compounds, using a gas chromatograph/mass spectrometer according to a modified EPA Method TO-15 (EPA/625/R-96/010b, *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*). The SUMMA canister samples were collected from the vent riser in each trench that had the highest volatile organic compound concentrations, based on the field-screening results (Appendix C2). The sample and duplicate sample from vent riser T4-04 required multiple dilutions to bring the tetrachloroethylene (PCE) into calibration range. The very high concentration of PCE in the initial lower dilutions of these samples saturated the instrument detector, requiring the laboratory to recondition the mass-spectrometer detector. The samples then were analyzed at higher dilutions. Only one other compound (1-butanol) also was detected at the high-dilution level in the T4-04 sample (sample B17TL2), and no other compounds were detected at the high-dilution level in the vent riser T4-04 duplicate sample (sample B17TL3).

The U.S. Environmental Protection Agency concurred that no additional sampling was required in the 218-W-4C Burial Ground as part of the Step II investigation (FH-0602151, "Area Unit Managers' Meeting, 200 Area Groundwater and Source Operable Units," Attachment 12, "Source Operable Units and Facilities Status").

3.5 RESULTS IN THE PLUTONIUM FINISHING PLANT PROTECTED AREA

3.5.1 Active Soil-Vapor Sampling Results

Relatively low concentrations of carbon tetrachloride (1 to 4.24 ppmv) were detected in active soil-vapor samples from 6 of the 17 sampling locations. The detections were typically, but not exclusively, in the samples collected from an approximate depth of 12.2 m (40 ft) bgs. The relatively low concentrations of carbon tetrachloride vapor measured suggest that there is not an active source of contamination in the upper vadose zone at these locations. Based on these relatively low concentrations, additional sampling at these locations during the Step II investigation was not needed.

Soil vapor was sampled at one or more depth intervals at each borehole location (Table 3-7). The samples were collected in 1 L Tedlar bags and analyzed within the six-hour holding time using an Innova 1312 multi-gas analyzer. Between sample collection and sample analysis, the Tedlar bags containing the samples were kept in an unrefrigerated ice chest to minimize exposure to sunlight.

Table 3-7. Field-Screening Results for Soil-Vapor Samples Collected Using a GeoProbe Within the Plutonium Finishing Plant Protected Area. (2 Pages)

Location Identification	HEIS Number	Date	Sample Time	Analysis Time	Depth (ft bgs)		Innova 1312 Photoacoustic Multi-Gas Analyzer, Serial Number 010-019			
							Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q
C3876	B15JT4	08/19/2003	09:55	11:52	14.0	14.5	1.00	U	1.70	
C3876	B15JT3	08/18/2003	14:25	16:45	23.7	25.0	1.00	U	1.40	
C3876	B15JT2	08/18/2003	14:02	16:40	33.2	34.2	1.00	U	1.90	
C3877	B15JV1	08/20/2003	10:48	11:32	15.0	15.6	1.00	U	1.00	U
C3877	B15JV0	08/20/2003	10:18	11:29	24.4	27.3	1.00	U	1.00	U
C3877	B15JT9	08/20/2003	09:45	11:25	45.8	46.5	1.00	U	1.00	U
C3878	B15JT1	08/18/2003	12:21	12:40	14.0	14.5	1.00	U	1.10	
C3878	B15JT0	08/18/2003	11:58	12:35	25.0	25.5	1.01		1.00	U
C3878	B15JR9	08/18/2003	11:22	12:30	43.6	43.6	1.78		3.20	
C3879	B15JT7	08/19/2003	12:33	12:40	13.1	13.8	1.00	U	1.00	U
C3879	B15JT6	08/19/2003	12:05	12:11	25.0	27.0	1.00	U	1.00	U
C3879	B15JT5	08/19/2003	11:40	11:55	40.3	40.3	1.00	U	1.40	
C4059	B15JV4	08/20/2003	14:05	14:16	15.5	17.6	1.00	U	1.00	U
C4059	B15JV3	08/20/2003	13:40	14:14	23.8	24.6	1.00	U	1.00	U
C4059	B15JV2	08/20/2003	13:10	14:11	41.7	42.8	1.00	U	2.40	
C4060	B15LN3	08/22/2003	13:20	13:43	13.5	14.0	1.00	U	1.62	
C4060	B15LN2	08/22/2003	12:55	13:41	25.0	25.5	1.00	U	1.69	
C4060	B15JT8	08/22/2003	11:35	13:38	35.0	35.5	1.00	U	1.71	
C4061	B15LN9	08/25/2003	13:09	13:35	15.5	16.5	1.00	U	1.00	U
C4061	B15LN8	08/25/2003	12:49	13:34	24.0	25.0	1.00	U	1.00	U
C4061	B15LN7	08/25/2003	12:24	13:33	35.5	36.5	1.00	U	2.48	
C4062	B15LP2	08/26/2003	09:47	13:04	14.0	14.7	1.00	U	1.00	U
C4062	B15LP1	08/26/2003	09:29	13:03	24.0	25.8	1.00	U	1.00	U
C4062	B15LP0	08/26/2003	09:07	13:02	30.0	31.0	1.00	U	1.00	U
C4063	B15LP5	08/26/2003	11:33	13:07	13.5	15.3	1.41		1.00	U
C4063	B15LP4	08/26/2003	11:10	13:06	22.8	23.3	2.32		1.00	U
C4063	B15LP3	08/26/2003	10:36	13:05	41.4	42.2	4.24		1.00	U
C4064	B15JV6	08/21/2003	10:51	11:07	14.0	14.5	1.00	U	1.11	
C4064	B15JV5	08/21/2003	10:27	11:04	27.3	28.5	1.00	U	1.69	
C4065	B15LN6	08/25/2003	10:17	13:32	15.0	16.0	1.00	U	1.21	
C4065	B15LN5	08/25/2003	09:57	13:31	22.2	23.2	1.00	U	1.53	
C4065	B15LN4	08/25/2003	09:20	13:30	43.0	44.0	1.22		1.76	
C4066	B15LN1	08/21/2003	12:37	12:50	14.5	15.0	1.00	U	1.00	U

Table 3-7. Field-Screening Results for Soil-Vapor Samples Collected Using a GeoProbe Within the Plutonium Finishing Plant Protected Area. (2 Pages)

Location Identification	HEIS Number	Date	Sample Time	Analysis Time	Depth (ft bgs)		Innova 1312 Photoacoustic Multi-Gas Analyzer, Serial Number 010-019			
							Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q
C4066	B15LN0	08/21/2003	12:16	12:47	24.5	25.5	1.00	U	1.00	U
C4066	B15JV7	08/21/2003	11:55	12:44	39.0	40.0	1.33		1.13	
C4067	B15LT0	08/28/2003	14:02	14:07	15.5	17.5	1.00	U	1.00	U
C4067	B15LR9	08/28/2003	13:45	13:52	24.3	25.3	1.00	U	1.00	U
C4067	B15LR8	08/28/2003	13:23	13:50	38.0	39.0	2.41		3.64	
C4068	B15LP8	08/26/2003	13:10	13:55	14.3	14.8	1.00	U	1.00	U
C4068	B15LP7	08/26/2003	13:09	13:34	25.0	26.0	1.00	U	1.00	U
C4068	B15LP6	08/26/2003	13:08	13:18	31.0	32.0	1.00	U	1.00	U
C4136	B15LR4	08/27/2003	14:11	15:42	15.5	16.5	1.00	U	1.00	U
C4136	B15LR3	08/27/2003	13:47	15:40	23.5	25.0	1.00	U	1.00	U
C4136	B15LR2	08/27/2003	13:23	15:39	35.0	36.0	1.00	U	1.00	U
C4137	B15LR1	08/27/2003	10:47	11:02	14.0	14.5	1.00	U	1.00	U
C4137	B15LR0	08/27/2003	10:21	11:00	24.8	25.3	1.00	U	1.00	U
C4137	B15LP9	08/27/2003	09:55	10:58	37.3	38.3	1.00	U	1.00	U
C4138	B15LR7	08/28/2003	12:05	13:07	14.5	15.5	1.00	U	1.00	U
C4138	B15LR6	08/28/2003	11:47	13:05	22.0	25.0	1.00	U	1.00	U
C4138	B15LR5	08/28/2003	11:21	13:02	46.5	47.5	1.21		1.00	U

1312 multi-gas analyzer is a trademark of Innova AirTech Instruments A/S, Ballerup, Denmark.
bgs = below ground surface.
CAS = Chemical Abstracts Service.
HEIS = *Hanford Environmental Information System* database.
ppmv = parts per million by volume.
Q = laboratory data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

The samples were analyzed for carbon tetrachloride, the only contaminant of concern for this investigation. The samples also were analyzed for chloroform, which is the degradation product of carbon tetrachloride that was considered most likely to be detected (DOE/RL-2001-01, Appendix C). The instrument also was configured to analyze the vapor samples for water; the water-vapor results were recorded and are included in HEIS for completeness.

The Innova 1312 multi-gas analyzer is configured with two carbon tetrachloride filters. One is calibrated from 1 to 100 ppmv, and the other is calibrated from 100 to 20,000 ppmv. Samples that exceeded 100 ppmv were analyzed using the high-concentration filter. The Innova 1312 has one chloroform filter. The detection level of the instrument is 1 ppmv for both carbon tetrachloride and chloroform.

The Innova 1312 instrument was calibrated at the factory on March 26, 2002, using a 3-point calibration curve for each analyte (carbon tetrachloride low, carbon tetrachloride high, and chloroform). The calibration standards used for the three analytes were as follows:

Filters	Low Calibration Value (ppmv)	Middle Calibration Value (ppmv)	High Calibration Value (ppmv)
Carbon tetrachloride low (1 to 100 ppmv)	16.7	41.2	77
Carbon tetrachloride high (100 to 20,000 ppmv)	1,113	10,083	18,100
Chloroform (1 to 1,000 ppmv)	118	327	1,950

ppmv = parts per million by volume.

Chloroform was detected at apparent low levels in many samples in which no carbon tetrachloride was detected. However, because these low concentrations of chloroform are considerably below the 3-point calibration curve for chloroform, a conclusion cannot be drawn regarding the actual concentration, or even the occurrence, of chloroform. As a result, the chloroform concentrations are not discussed below. All sample results are included in the tables of analytical results.

Carbon tetrachloride concentrations were detected at Boreholes C3878, C4066, C4065, C4063, C4138, and C4067 (Table 3-7). Concentrations at the other locations all were below minimum detection values. Additionally, no consistent pattern was observed in the distribution of carbon tetrachloride contamination at the six sites that had detectable concentrations, other than at each sample location; the highest, or only, detection is at the deepest sampling depth. Of the six sites, one site (Borehole C4063) had detectable concentrations at all sampling depths. Borehole C3878 had detectable levels at the two deeper sample depths, and the other four borehole locations had detectable levels only at the deepest sample depth.

3.5.1.1 Sample Results for the Southwest Portion of the Plutonium Finishing Plant Protected Area

At Borehole C4063, carbon tetrachloride was detected at all depths sampled (4.1 to 12.9 m [13.5 to 42.2 ft] bgs). The highest concentration of 4.24 ppmv was detected at the deepest depth, with decreasing concentrations at the shallower depths (2.32 ppmv at approximately 7 m [23 ft] bgs, and 1.41 ppmv at approximately 4.3 m [14 ft] bgs). No reports are present to indicate that an unplanned release of carbon tetrachloride occurred at or near the site. An unplanned release (UPR-200-W-159) of sodium hydroxide did occur in the vicinity in May 1985, but the contaminated soil was collected and disposed of as hazardous waste.

Borehole C4067 had a carbon tetrachloride concentration of 2.41 ppmv at a depth of approximately 11.7 m (38.5 ft) bgs. Carbon tetrachloride was below detection limits at the other two sampled depths.

3.5.1.2 Sample Results for Heating, Ventilation, and Air Conditioning French Drain Locations

Two of the french drain sites (Boreholes C4065 and C4066) had detectable carbon tetrachloride concentrations. Borehole C4065 had 1.22 ppmv at approximately 13.3 m (43.5 ft) bgs, and Borehole C4066 had 1.33 ppmv at approximately 12 m (39.5 ft) bgs. The sampled concentration and depth are nearly identical for these sites, which are separated by approximately 30 m (100 lineal ft). No carbon tetrachloride was detected at the other french drain site (Borehole C4064), which reached refusal at approximately 8.7 m (28.5 ft) bgs, at which depth both of the other french drain sites had nondetect values for carbon tetrachloride.

3.5.1.3 Sample Results for the Northern Portion of the Plutonium Finishing Plant Protected Area

Borehole C4138, northeast of the PFP, had a carbon tetrachloride vapor concentration of 1.21 ppmv at an approximate depth of 14.3 m (47 ft) bgs. Borehole C3878 (Section 3.5.1.4) also is located on the east side of the PFP Protected Area and had detectable carbon tetrachloride vapor concentrations.

3.5.1.4 Sample Results for Carbon Tetrachloride Tank Storage Area

Borehole C3878 had two depths (approximately 13.3 m [43.5 ft] bgs and 7.8 m [25.5 ft] bgs) where carbon tetrachloride vapor concentrations were detectable (1.78 ppmv and 1.01 ppmv, respectively). Borehole C3877, which had no recordable carbon tetrachloride vapor concentrations, is located approximately 30 m (100 lineal ft) from Borehole C3878 and had sample depths at nearly the same intervals as the sample depths for Borehole C3878.

3.5.1.5 Sample Results for Liquid-Waste Discharge Pipeline to the 216-Z-9 Trench

Results for soil-vapor sampling during drilling of Borehole C3494 (well 299-W15-764) and Borehole C3803 (well 299-W15-42) are reported in Table 16 of BHI-01631. The maximum (and only) carbon tetrachloride concentration detected in soil-vapor samples from Borehole C3494 was 17.8 ppmv from a depth of 24.4 m (80 ft) bgs. The maximum carbon tetrachloride concentration detected in soil-vapor samples from Borehole C3803 was 48.9 ppmv from a depth of 24.2 to 24.9 m (79.4 to 81.7 ft) bgs.

3.5.2 Active Soil-Vapor Sampling Quality Control

A nonrecorded duplicate analysis was conducted for every sample collected. Two soil-vapor samples from the same Tedlar bag were analyzed sequentially from each sample bag, as required for a sample and duplicate. The first reading was recorded as the result. The second analysis from the sample bag was used by the analyst to verify the first reading and to make sure that the instrument was being operated correctly. These results, which would be the equivalent of duplicates, were not recorded, because the analyst considered these second analyses to be self-checks. All of the duplicate sample results were consistent with the primary sample results.

A gas-calibration check standard of known carbon tetrachloride concentration was analyzed at the beginning and end of analysis each day (Table 3-8). A gas-standard concentration of 25.5 ppmv was used for the low-concentration filter, and a gas-standard concentration of 200 ppmv was used for the high-concentration filter. The 200 ppmv standard was analyzed only on the first day, to confirm the proper functioning of the high-concentration filter. After the first day, no sample values exceeding 100 ppmv were measured on the low-concentration filter and therefore did not require confirmation calibration with the 200 ppmv calibration standard.

Table 3-8. Field-Screening Results for Carbon Tetrachloride Concentration Standards during Sampling and Analysis Within the Plutonium Finishing Plant Protected Area.

Carbon Tetrachloride Concentration Standard (ppmv)	Carbon Tetrachloride Concentration Analyzed (ppmv)	Date Analyzed	Time Analyzed
200	194	08/18/2003	16:55
25.5	23.7	08/18/2003	12:26
25.5	22.6	08/18/2003	16:50
25.5	21.2	08/19/2003	11:47
25.5	22.3	08/19/2003	12:46
25.5	21.7	08/20/2003	11:22
25.5	23.1	08/20/2003	14:08
25.5	23.2	08/20/2003	14:20
25.5	22.3	08/21/2003	11:01
25.5	23.0	08/21/2003	12:53
25.5	21.5	08/22/2003	13:35
25.5	21.7	08/22/2003	13:46
25.5	22.6	08/25/2003	13:29
25.5	22.6	08/25/2003	13:36
25.5	23.1	08/26/2003	13:01
25.5	23.1	08/26/2003	13:11
25.5	22.5	08/27/2003	10:55
25.5	22.5	08/27/2003	11:04
25.5	22.2	08/27/2003	15:37
25.5	22.3	08/27/2003	15:43
25.5	22.8	08/28/2003	13:00
25.5	23.7	08/28/2003	23.7

ppmv = parts per million by volume.

The pairs of standard and measured carbon tetrachloride concentrations for the low-concentration filter were used to evaluate the accuracy of the carbon tetrachloride analyses. The percent recovery (%R) was calculated according to the formula:

$$\%R = 100x(C_m / C_s)$$

where

C_m = the measured concentration of carbon tetrachloride
C_s = is the standard.

The maximum %R was 97 percent, the minimum was 83 percent, and the average was 88 percent. These calculations indicate that the Innova 1312 analyses of the carbon tetrachloride concentrations were accurate within 17 percent at a maximum and within 12 percent on average. These results indicate good recovery.

A blank sample was analyzed at the beginning and end of each analytical session. The analytical results for the blank samples were all nondetect for carbon tetrachloride (Table 3-9). Three detectable values for chloroform were recorded during analysis of the blank samples. As the water-vapor concentration increases, there is a greater probability of false positive detections of chloroform because water vapor causes interference with the infrared absorbence in the Innova analyzer. On the two days with detections of chloroform in the blank samples, the vapor concentrations may have exceeded the working range of the humidity cross-interference compensation for chloroform.

Table 3-9. Field-Screening Results for Blank Samples during Sampling and Analysis Within the Plutonium Finishing Plant Protected Area. (2 Pages)

Sample Location	Analysis Date	Analysis Time	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
Blank	08/18/2003	12:25	1.00	U	1.00	U	12,300
Blank	08/18/2003	16:35	1.00	U	1.00	U	12,400
Blank	08/18/2003	16:47	1.00	U	1.00	U	14,500
Blank	08/19/2003	11:45	1.00	U	1.00	U	11,400
Blank	08/19/2003	12:45	1.00	U	1.00	U	11,800
Blank	08/20/2003	11:20	1.00	U	1.00	U	8,700
Blank	08/20/2003	14:07	1.00	U	1.00	U	8,060
Blank	08/20/2003	14:21	1.00	U	1.00	U	9,050
Blank	08/21/2003	11:00	1.00	U	1.00	U	10,800
Blank	08/21/2003	12:54	1.00	U	1.00	U	9,240
Blank	08/22/2003	13:30	1.00	U	1.46		19,300
Blank	08/22/2003	13:47	1.00	U	1.57		20,500
Blank	08/25/2003	13:28	1.00	U	1.46		19,300
Blank	08/25/2003	13:37	1.00	U	1.00	U	20,500
Blank	08/26/2003	13:00	1.00	U	1.00	U	19,300
Blank	08/26/2003	13:12	1.00	U	1.00	U	20,100
Blank	08/27/2003	10:53	1.00	U	1.00	U	9,350
Blank	08/27/2003	11:06	1.00	U	1.00	U	10,600
Blank	08/27/2003	15:35	1.00	U	1.00	U	11,600

Table 3-9. Field-Screening Results for Blank Samples during Sampling and Analysis Within the Plutonium Finishing Plant Protected Area. (2 Pages)

Sample Location	Analysis Date	Analysis Time	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
Blank	08/27/2003	15:44	1.00	U	1.00	U	10,700
Blank	08/28/2003	12:58	1.00	U	1.00	U	9,740
Blank	08/28/2003	14:13	1.00	U	1.00	U	10,100

CAS = Chemical Abstracts Service.
ppmv = parts per million by volume.
Q = laboratory data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

3.5.3 Active Soil-Vapor Sampling Radiological Field Screening

Radiological field screening was conducted by a radiological control technician on GeoProbe rods and sampling tubes as they were withdrawn from the subsurface. No radiological contamination was detected on the rods or sample tubing.

3.5.4 Active Soil-Vapor Sampling Health and Safety Monitoring

Health and safety monitoring was conducted continuously by an industrial hygiene technician during sampling activities. Monitoring included breathing-zone and point-source readings for volatile organics and combustible gases. During vadose-zone sampling, the vapor sample was drawn to the surface using the industrial hygiene technician's photoionization detector as a pump to purge the tubing and atmospheric air within the GeoProbe rod. The purged vapor was discharged to the atmosphere as the photoionization detector provided a real-time reading of vapor concentrations being exhausted to the breathing zone.

3.5.5 Passive Soil-Vapor Sampling Results

The passive soil-vapor survey, consisting of 35 sampling points, was conducted by Vista Engineering. The results are presented in DOE/RL-2006-58, Section 4.1.3.2. The highest concentration of carbon tetrachloride soil vapor measured in the passive soil-vapor survey was 147 ng/trap at sampling point C25 near the southwest corner of the PFP (DOE/RL-2006-58, Figure 4.5). This location is near push Borehole C4063, which had the highest detections of carbon tetrachloride in the active soil-vapor sampling discussed in Section 3.5.1 of this report.

3.6 RESULTS ADJACENT TO THE 216-S-25 CRIB

The soil-vapor sampling results for EAPS Boreholes C4890 and C4891 adjacent to the 216-S-25 Crib are included in Table 3-2. The only detectable concentration of carbon tetrachloride soil vapor was 1.89 ppmv in the sample from a depth of 65.5 m (215 ft) from Borehole C4890.

The groundwater sample (HEIS number B1DFF8) collected from Borehole C4890 at 4:00 p.m. on July 11, 2005, from a depth of 65.8 m (216 ft) was analyzed for volatile organic compounds in the laboratory using gas chromatography/mass spectrometry equipment in accordance with the U.S. Environmental Protection Agency Method 8260B (SW-846). The only compounds detected in this sample were carbon tetrachloride at 1 µg/L (J – estimated) and chloroform at 14 µg/L. A trip blank (HEIS number B1DFF9) also was collected on July 11, 2005. No volatile organic compounds were detected in the trip blank.

3.7 RESULTS AT THE 218-W-3A BURIAL GROUND

The investigation of the 218-W-3A Burial Ground included a passive soil-vapor survey of two trenches, T-9S and T-06, and active vapor sampling from all 17 vent risers, which are present in portions of trenches T-9S, T-3S, T-05, and T-08 (Figure 2-6).

3.7.1 Passive Vapor-Sampling Results

Carbon tetrachloride was detected at 3 of the 22 locations sampled using passive soil-vapor technology (Table 3-10). The highest concentration detected was 231.08 ng/trap in sample B1DDY5, located in Trench T-06 (Figure 2-6). Chloroform also was detected in sample B1DDY5, at a concentration (25.42 ng/trap) close to the detection limit (25 ng/trap). Chloroform was not detected at any other sampling locations. Tetrachloroethylene was detected at 16 sampling locations. The maximum concentration detected was 839.12 ng/trap in sample B1DDY5. 1,1,1-Trichoroethane was detected at seven sampling locations. The maximum concentration was 687.34 ng/trap in sample B1DDY3 in Trench T-06 (Figure 2-6). The results for all volatile organic compounds analyzed using the passive soil-vapor technology are provided in Appendix A.

Two duplicate samples were collected, one in each of the two trenches. Carbon tetrachloride was detected in both sample-duplicate pairs (sample B1DDX2 and duplicate B1DDX3; and samples B1DDY4 and B1DDY5). One trip blank was prepared in accordance with the vendor's specifications. No contamination was detected in the trip blank.

Table 3-10. Passive Soil-Vapor Sample Results for Carbon Tetrachloride from the 218-W-3A Burial Ground.

Sample Identifier	HEIS Number	Carbon Tetrachloride (CAS 56-23-5) (ng/trap)	Q	Chloroform (CAS 67-66-3) (ng/trap)	Q	Tetrachloro-ethylene (CAS 127-18-4) (ng/trap)	Q	111-Trichloro-ethane (CAS 71-55-6) (ng/trap)	Q
T9S-2	B1DDW5	25	U	25	U	25	U	25	U
T9S-3	B1DDW6	25	U	25	U	25	U	25	U
T9S-4	B1DDW7	25	U	25	U	26.35		25	U
T9S-5	B1DDW8	25	U	25	U	294.26		58.28	
T9S-6	B1DDW9	25	U	25	U	25	U	25	U
T9S-7	B1DDX0	25	U	25	U	25	U	58.34	
T9S-8	B1DDX1	25	U	25	U	25	U	88.19	
T9S-9	B1DDX2	163.23		25	U	181.34		25	U
T9S-9D	B1DDX3	81.42		25	U	63.39		25	U
T9S-1	B1DDX4	25	U	25	U	25.22		25	U
T9S-10	B1DDX5	25	U	25	U	25	U	25	U
T06-2	B1DDX6	25	U	25	U	389.73		25	U
T06-3	B1DDX7	25	U	25	U	801.6		67.29	
T06-4	B1DDX8	25	U	25	U	852.49		54.19	
T06-5	B1DDX9	25	U	25	U	634.65		28	
T06-6	B1DDY0	25	U	25	U	181.08		25	U
T06-7	B1DDY1	25	U	25	U	781.19		25	U
T06-8	B1DDY2	25	U	25	U	260.1		25	U
T06-9	B1DDY3	25.1		25	U	385.99		687.34	
T06-10	B1DDY4	110.5		25	U	510.56		25	U
T06-10D	B1DDY5	231.08		25.42		839.12		34.96	
T06-11	B1DDY6	25	U	25	U	160.14		25	U
T06-12	B1DDY7	25	U	25	U	195.67		25	U
T06-1	B1DDY8	25	U	25	U	119.02		25	U

CAS = Chemical Abstracts Service.
Q = laboratory data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

3.7.2 Active Vapor-Sampling Results

The active soil-vapor samples collected from vent risers in the 218-W-3A Burial Ground were introduced directly to the MIRAN analyzer for field screening. The MIRAN analyzer identifies up to five compounds with the highest concentrations in the vapor sample from a library of more than 100 volatile organic compounds.

The results measured using the MIRAN analyzer field-screening instrument for samples collected through 218-W-3A Burial Ground vent risers are provided in Table 3-11. The only concentrations of carbon tetrachloride (5 to 36 ppmv) were detected in the western part of Trench T-08.

Soil-vapor samples also were collected in SUMMA canisters for laboratory analysis in support of Tri-Party Agreement Milestone M-91 for the 218-W-3A Burial Ground environmental release investigation. The SUMMA canister samples were collected from vent risers T-05-02, T-08-03, and T-08-05 on September 8, 2005. The analytes detected by laboratory analysis of the 218-W-3A Burial Ground vent-riser samples are provided in Table 3-12 and discussed in Appendix D.

3.7.3 Active Vapor-Sampling Quality Control

For vent-riser vapor samples introduced directly into the MIRAN analyzer, field quality control consisted of duplicate samples. (The 200-PW-1 sampling and analysis plan [DOE/RL-2001-01, Appendix D] specified equipment blanks for soil-vapor samples collected in Tedlar bags. However, equipment blanks cannot be collected when the soil vapor is introduced directly into the MIRAN analyzer.) For vent-riser vapor samples collected in SUMMA canisters, field quality control consisted of duplicate samples and equipment-blank samples (DOE/RL-2004-71).

For vent-riser vapor samples drawn directly into the MIRAN analyzer, at least one duplicate sample was analyzed on each day of sampling. As a result, one field duplicate was analyzed for every 20 samples, as required. Duplicate samples were collected on August 25, 2005, at vent risers T-05-02 and T-05-06 and on September 6, 2005, at vent riser T-08-01 (Table 3-11). The duplicate samples were collected to evaluate the performance of the analytical method by comparing two analyses of the vapor concentration. Of the three sample/duplicate pairs analyzed using the MIRAN analyzer, one pair from August 25, 2005 (vent riser T-05-02) had three detectable volatile organic compounds in both the sample and the duplicate. The September 6, 2005, pair (vent riser T-08-01) had four detected volatile organic compounds in the duplicate, of which three also were detected in the sample.

The relative percent difference (RPD) was calculated for the pairs of volatile organic compound results according to the formula:

$$RPD = \frac{(C_1 - C_2)x100}{(C_1 + C_2)/2}$$

where

C_1 = the larger of the two observed values
C_2 = the smaller of the two observed values.

Table 3-11. Field-Screening Results for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches. (2 Pages)

Sample Identifier	HEIS Number	Sample Date	Sample and Analysis Time	MIRAN SapphIRe Ambient Air Analyzer [a]																	
				PCE (ppmv) CAS 127-18-4	Q	1,1,1-TCA (ppmv) CAS 71-55-6	Q	CCl_4 (ppmv) CAS 56-23-5	Q	Methyl Chloride (ppmv) CAS 74-87-3	Q	TCE (ppmv) CAS 79-01-6	Q	Toluene (ppmv) CAS 108-88-3	Q	Acetylene (ppmv) CAS 74-86-2	Q	Nitrous Oxide (ppmv) CAS 10024-97-2	Q	Carbon Dioxide [b] (ppmv) CAS 124-38-9	Q
T-3S-1	B1DVM2	08/25/05	1330	2	U	0.15	U	0.05	U	1.7	U	4	U	1	U	0.5	U	0.04	U	1	U
T-3S-2	B1DVM3	08/25/05	1353	2	U	0.15	U	0.05	U	89		4	U	1	U	0.5	U	0.04	U	4,200	
T-3S-3	B1DVM4	08/25/05	1425	2	U	0.15	U	0.05	U	1.7	U	4	U	1	U	0.5	U	0.04	U	1	U
T-9S-1	B1DVM5	08/25/05	1440	2	U	1.4		0.05	U	21		4	U	44		0.5	U	0.04	U	3,800	
T-05-1	B1DVL6	08/25/05	0950	2	U	0.15	U	0.05	U	1.7	U	4	U	1	U	0.5	U	0.04	U	1	U
T-05-2	B1DVL7	08/25/05	1042	2	U	9		0.05	U	1.7	U	4	U	1	U	70		0.04	U	3,055	
T-05-2 duplicate	B1DVN5	08/25/05	1048	2	U	11		0.05	U	1.7	U	4	U	1	U	50		0.04	U	2,985	
T-05-3	B1DVL8	08/25/05	1115	2	U	0.15	U	0.05	U	1.7	U	4	U	1	U	0.5	U	0.04	U	1	U
T-05-4	B1DVL9	08/25/05	1143	2	U	0.15	U	0.05	U	1.7	U	4	U	1	U	0.5	U	0.04	U	1	U
T-05-5	B1DVM0	08/25/05	1208	2	U	1.3		0.05	U	1.7	U	4	U	24		0.5	U	0.04	U	3,050	
T-05-6	B1DVM1	08/25/05	1238	2	U	0.15	U	0.05	U	1.7	U	4	U	1	U	0.5	U	0.04	U	1	U
T-05-6 duplicate	B1DVN3	08/25/05	1245	2	U	0.15	U	0.05	U	1.7	U	4	U	1	U	0.5	U	0.04	U	1	U
T-08-1	B1DVM6	09/06/05	1005	20		0.15	U	0.05	U	1.7	U	3		1	U	0.5	U	0.04	U	1,200	
T-08-1 duplicate	B1DVN4	09/06/05	1012	52		18.8		0.05	U	1.7	U	13		1	U	0.5	U	0.04	U	2,950	
T-08-2	B1DVM7	09/06/05	1050	240		14		0.05	U	1.7	U	4	U	1	U	0.5	U	0.04	U	2,800	
T-08-3	B1DVM8	09/06/05	1120	460		0.15	U	36		186		4	U	1	U	0.5	U	0.04	U	1	U
T-08-4	B1DVM9	09/06/05	1220	328		0.15	U	7		1.7	U	4	U	1	U	0.5	U	0.04	U	1	U
T-08-5	B1DVN0	09/06/05	1320	305		0.15	U	5		1.7	U	4	U	1	U	0.5	U	0.04	U	1,000	
T-08-6	B1DVN1	09/06/05	1345	153		0.15	U	0.05	U	1.7	U	4	U	1	U	0.5	U	19		5,300	
T-08-7	B1DVN2	09/06/05	1415	96		0.15	U	0.05	U	1.7	U	4	U	1	U	0.5	U	0.04	U	1	U

Table 3-11. Field-Screening Results for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches. (2 Pages)

Sample Identifier	HEIS Number	Sample Date	Sample and Analysis Time	MIRAN SapphIRe Ambient Air Analyzer [a]																	
				PCE (ppmv) CAS 127-18-4	Q	1,1,1-TCA (ppmv) CAS 71-55-6	Q	CCl_4 (ppmv) CAS 56-23-5	Q	Methyl Chloride (ppmv) CAS 74-87-3	Q	TCE (ppmv) CAS 79-01-6	Q	Toluene (ppmv) CAS 108-88-3	Q	Acetylene (ppmv) CAS 74-86-2	Q	Nitrous Oxide (ppmv) CAS 10024-97-2	Q	Carbon Dioxide [b] (ppmv) CAS 124-38-9	Q

[a] The MIRAN SapphIRe Ambient Air Analyzer identifies up to 5 compounds with the highest concentrations in the vapor sample. MIRAN and the SapphIRe Ambient Air Analyzer are registered trademarks of Thermo Scientific, a part of Thermo Fisher Scientific, Inc., Waltham, Massachusetts.

[b] CO_2 levels are baselined to zero at ambient atmospheric conditions of 360 ppmv. Values shown are CO_2 concentrations above ambient.

CAS = Chemical Abstracts Service.
CCl_4 = carbon tetrachloride.
HEIS = *Hanford Environmental Information System* database.
PCE = tetrachloroethylene.
ppmv = parts per million by volume.
Q = laboratory data qualifier.
TCA = trichloroethane.
TCE = trichloroethylene.
U = Analyzed for but not detected. Value reported is the reporting limit.

Table 3-12. Analytes Detected by Laboratory Analysis of 218-W-3A Burial Ground Vent-Riser Samples.

Analyte	Chemical Abstracts Service Registry Number	Concentration Detected in Vent-Riser Samples* (ppmv)			
		Vent Riser T-05-02	Vent Riser T-08-03	Vent Riser T-08-05*	Vent Riser T-08-05 Duplicate
		HEIS No. B1DX09	HEIS No. B1DX12	HEIS No. B1DX10	HEIS No. B1DX11
1,1-Dichloroethene	75-35-4	1.6			
1,2-Dichloroethane	107-06-2	0.62			
Chloroform	67-66-3	4			
Tetrachloroethene (PCE)	127-18-4	3	4,200	18	17
Trichloroethene	79-01-6	1.3	8.8		

*Vapor samples from vent risers T-05-02 and T-08-03 contained the highest volatile organic compound concentrations, based on field screening, in trenches T-05 and T-08, respectively. An additional SUMMA canister sample and the duplicate sample were collected from vent riser T-08-05. The additional and duplicate SUMMA canister samples were collected from a vent riser with slightly lower volatile organic compound concentrations to reduce the potential that the highest volatile organic compound concentrations would exceed calibration standards and make the duplicate analysis of little value. SUMMA is a trademark of Moletrics, Inc., Cleveland, Ohio.

HEIS = *Hanford Environmental Information System* database.

ppmv = parts per million by volume.

For the three detections in the sample/duplicate pair from vent riser T-05-02, the RPD ranged from 2 to 33 percent. With the exception of the one volatile organic compound pair with an RPD of 33 percent, these data met the required precision of 25 percent. The RPD was calculated for two of the three volatile organic compound detections in the sample/duplicate pair from vent riser T-08-01. In this sample/duplicate pair, the RPD was not calculated for the volatile organic compound that was detected at concentrations that were less than five times the method-detection limit. The required precision of 25 percent applies only to volatile organic compound detections that are greater than five times the method-detection limit. The RPD calculated for the two volatile organic compound detections in the sample/duplicate pair ranged from 84 to 89 percent. These data did not meet the required precision of 25 percent. However, the positive detection of a compound still indicates that it is present in the sample.

The calculations for vent riser T-08-01 potentially indicate that the MIRAN analyzer analytical method did not produce repeatable measurements. However, another explanation may be that the concentration of volatile organic compounds in the vapor changed during pumping of the samples. The volatile organic compound concentrations in the original sample from vent riser T-08-01 were lower than the concentrations in the duplicate sample. While the original sample is being analyzed, the sample pump continues to run, but the flow is bypassed around the sample cell in the MIRAN analyzer. When the analysis of the original sample is complete, the sampling cell bypass is removed and the sampling cell is purged with sample vapor and then filled with the next sample. This second sample then is analyzed as the duplicate. Vent riser T-08-01 was still being pumped during the 4 to 5 minutes it took to analyze the original sample. This continued pumping could have drawn higher concentration vapors from a contamination zone located further from vent riser T-08-01.

For the vent-riser vapor samples collected in SUMMA canisters, one duplicate sample was collected from vent riser T-08-05 in a separate SUMMA canister (Table 3-12).

The purpose of collecting equipment blanks is to verify the adequacy of sampling equipment decontamination procedures. The SUMMA canisters are analyzed for cleanliness at the laboratory.

The MIRAN analyzer contains factory calibration data for 120 chemical compounds. The calibration data have been confirmed on Site using calibration gases for the following eight volatile organic compounds: carbon tetrachloride, chloroform, methylene chloride, 1,1,1-trichloroethane (1,1,1-TCA), 1,1,2-trichloroethane (1,1,2-TCA), 1,1-dichloroethane (1,1-DCA), trichloroethylene (TCE), and tetrachloroethylene (PCE). Additionally, on a quarterly basis, the MIRAN analyzer is checked for instrument response using a closed-loop injection system and 10 certified chemical compounds. Results of the instrument-response checks for all 10 of these compounds are provided in Table 3-13.

The pairs of standard and measured volatile organic compound concentrations were used to evaluate the accuracy of the analyses conducted using the MIRAN analyzer. The percent recovery (%R) was calculated according to the formula:

$$\%R = 100x(C_m / C_s)$$

where

C_m = the measured concentration
C_s = is the standard.

The maximum %R was 122 percent, and the minimum was 75 percent. These calculations indicate that the analyses of the volatile organic compound concentrations using the MIRAN analyzer were accurate within 25 percent, as required. These results indicate good recovery. Good agreement between the expected concentration and the instrument response indicates that the data generated from these analyses are reliable.

A blank sample consisting of ambient atmosphere was analyzed each day using the MIRAN analyzer. No volatile organic compounds were detected in the blanks (Table 3-14).

No holding times were exceeded during collection and field screening of vent-riser vapor samples.

Formal data validation was not performed on these field-screening analytical results. For field-screening data, the data were reviewed to ensure that they are usable.

Table 3-13. Field-Screening Results for Calibration Standards During the Third Quarter of Fiscal Year 2005.

Analysis Type	HEIS Number	Analysis Date	Analysis Time	MIRAN SapphIRe Ambient Air Analyzer									
				DCM (ppmv)	1,1-DCA (ppmv)	TCM (ppmv)	1,1,1-TCA (ppmv)	CCl_4 (ppmv)	TCE (ppmv)	1,1,2-TCA (ppmv)	PCE (ppmv)	Methane (ppmv)	CO_2 (ppmv)
Calibration standard	N/A	N/A	N/A	1.0	1.4	1.37	4.4	0.57	4	0.59	0.53	51	105.1
Calibration check	B1D9R2	06/03/05	0900	0.8	1.5	1.40	4.5	0.65	4	0.64	0.4	62	105.0
% recovery	N/A	N/A	N/A	80	107	102	102	114	100	108	75	122	100

MIRAN and the SapphIRe Ambient Air Analyzer are registered trademarks of Thermo Scientific, a part of Thermo Fisher Scientific, Inc., Waltham, Massachusetts.

CCl_4 = carbon tetrachloride.
CO_2 = carbon dioxide.
DCA = dichloroethane.
DCM = dichloromethane (methylene chloride).
HEIS = *Hanford Environmental Information System* database.
N/A = not applicable.
ppmv = parts per million by volume.
PCE = tetrachloroethylene.
TCA = trichloroethane.
TCE = trichloroethylene.
TCM = trichloromethane (chloroform).

Table 3-14. Field-Screening Results for Blank Samples Analyzed During Field Screening of Vent-Riser Samples from the 218-W-3A Burial Ground.

Analysis Type	HEIS Number	Analysis Date	Analysis Time	MIRAN SapphIRe Ambient Air Analyzer [a]																	
				DCM (ppmv)	Q	1,1-DCA (ppmv)	Q	TCM (ppmv)	Q	1,1,1-TCA (ppmv)	Q	CCl_4 (ppmv)	Q	TCE (ppmv)	Q	1,1,2 TCA (ppmv)	Q	PCE (ppmv)	Q	Methane (ppmv)	CO_2 [b] (ppmv)
Ambient air	N/A	08/25/05	1346	0.44	U	0.22	U	0.07	U	0.15	U	0.09	U	1.2	U	0.07	U	0.16	U	0.0	0.0
Ambient air	N/A	09/06/05	1019	0.44	U	0.22	U	0.07	U	0.15	U	0.09	U	1.2	U	0.07	U	0.16	U	0.0	0.0

[a] MIRAN and the SapphIRe Ambient Air Analyzer are registered trademarks of Thermo Scientific, a part of Thermo Fisher Scientific, Inc., Waltham, Massachusetts.
[b] CO_2 levels are baselined to zero at ambient atmospheric conditions of 360 ppmv. Values shown are CO_2 concentrations above ambient.

CCl_4 = carbon tetrachloride.
CO_2 = carbon dioxide.
DCA = dichloroethane.
DCM = dichloromethane (methylene chloride).
HEIS = *Hanford Environmental Information System* database.
N/A = not applicable.
ppmv = parts per million by volume.
PCE = tetrachloroethylene.
Q = laboratory data qualifier.
TCA = trichloroethane.
TCE = trichloroethylene.
TCM = trichloromethane (chloroform).
U = Analyzed for but not detected. Value reported is the reporting limit.

3.7.4 Active Sampling Health and Safety Monitoring

Health and safety monitoring was conducted by industrial hygienists during the active vapor-sampling activities at the 218-W-3A Burial Ground. Before they removed the cap from each vent riser, the industrial hygienists conducted screening for volatile organic compounds and for combustible gases. (NOTE: Combustible gases were monitored to test the environment for intrinsic safeness for equipment selection and breathing-zone exposure.) The organic-vapor analyzer used to screen for volatile organic compounds included an 11.8 eV lamp and was calibrated for carbon tetrachloride. The lamp will ionize and measure compounds with lower ionization potentials, such as carbon tetrachloride (ionization potential of 11.47 eV). However, the total concentration measured may include other volatile organic compounds with ionization potentials equal to or less than 11.8 eV. The industrial hygienists surveyed for volatile organic compounds again at the top of the riser following removal of the vent-riser cap. The radiological control technician then surveyed for radiological contamination.

After each riser was surveyed and monitored for entry, a vapor sample was collected for analysis. During the sampling activities, the industrial hygienists performed continuous monitoring in the breathing zone and point source for volatile organic compounds. Controls put in place to prevent exposure included restricted access, to limit personnel entry to only those persons designated to perform the work. A vapor and gas barrier was placed at the top of the vent riser to prevent bypass during vapor sampling.

After the vent-riser sample was collected, the radiological control technician wiped the tubing and filter with a cloth as it was retrieved, to monitor for potential radiological contamination. Radiological field screening detected no radiological contamination at the vent risers in the 218-W-3A Burial Ground.

3.8 RESULTS OF GROUNDWATER "HOT SPOTS" INVESTIGATION

The likelihood that carbon tetrachloride detected in the vadose zone is or will be impacting groundwater was evaluated using Henry's law for the equilibrium partitioning of carbon tetrachloride between vapor and aqueous phases. As a rule of thumb, the concentration of carbon tetrachloride in the vapor phase will be 0.156 ppmv per 1 μg/L of carbon tetrachloride in the aqueous phase, at 20 °C (DOE/RL-2001-01, Section D1.4.2). For example, if the soil-vapor concentration is 156 ppmv, the calculated equilibrium groundwater concentration will be approximately 1,000 μg/L. If the measured carbon tetrachloride groundwater concentration is less than the equilibrium value, then the vadose-zone soil vapor is likely to impact groundwater as the carbon tetrachloride vapor dissolves into the groundwater. However, if the measured carbon tetrachloride groundwater concentration is greater than the equilibrium value, then the vadose-zone soil vapor is not likely to impact groundwater, and the carbon tetrachloride in the groundwater will be expected to volatilize into the soil vapor.

As described below, evaluation of the data from the groundwater "hot spots" investigation indicates that the vadose-zone soil-vapor concentrations are not significant sources of carbon tetrachloride contamination in the groundwater at these locations.

Soil-vapor and groundwater samples were collected near the water table from 31 groundwater wells within eight areas identified as having elevated concentrations of carbon tetrachloride in groundwater (hot spots), as described in Section 2.8. All of the carbon tetrachloride soil-vapor results are summarized in Table 3-15, and all of the carbon tetrachloride groundwater results are summarized in Table 3-16. The measured carbon tetrachloride concentrations in these samples used in the evaluation are summarized in Table 3-17. Using the soil-vapor results and Henry's law, the hypothetical groundwater concentration that would be in equilibrium with each soil-vapor measurement was calculated as shown in Table 3-17. The calculated hypothetical equilibrium groundwater concentrations then were compared to the measured carbon tetrachloride concentrations in groundwater to determine if the soil vapors could be impacting the groundwater. As shown in Table 3-17, in all but three cases, the measured groundwater concentrations are greater than the calculated equilibrium groundwater concentrations, indicating that the vadose-zone soil vapor in 28 of the 31 well locations is not impacting the groundwater.

In two cases (sampling of well 299-W11-40 in Area 3 and sampling of well 299-W15-15 in Area 6), the measured groundwater concentrations are close to the calculated equilibrium groundwater concentrations, indicating that the vadose-zone soil vapor could be the source of the shallow groundwater concentration in these wells (Table 3-17). In both of these cases, the measured groundwater concentrations were low (3 and 6.9 μg/L of carbon tetrachloride, respectively), so the vadose-zone soil vapors are not significant sources of groundwater contamination at these wells.

In one case (sampling of well 299-W23-4 in Area 8), the groundwater concentration measured in June 2006 was half of the calculated equilibrium groundwater concentration, indicating that the vadose-zone soil vapor is impacting shallow groundwater in this well (Table 3-17). However, carbon tetrachloride concentrations in groundwater samples from this well were considerably higher (190 to 400 μg/L) during routine groundwater sampling in February and August 2006 using a submersible pump. The pump is set approximately 5 ft below the water table. In addition, carbon tetrachloride concentrations were found to increase from 211 to 232 μg/L at depths from 6 to 26 m (20 to 85 ft) below the water table during the depth discrete groundwater sampling described below (Table 3-18). Based on the increase in carbon tetrachloride concentration with depth in this well, it is unlikely that the relatively low vapor concentrations in the vadose zone are a significant source of the carbon tetrachloride contamination in the groundwater at this location.

To evaluate the carbon tetrachloride concentration gradient in the upper 3 m (10 ft) of the unconfined aquifer, depth-discrete groundwater samples were collected from selected wells within the groundwater "hot spot" areas. The selection of wells is summarized in Table 2-10. Carbon tetrachloride results for the depth-discrete groundwater samples collected by Fluor Hanford are provided in Table 3-18: well 299-W11-42 (Area 2), well 299-W11-10 (Area 4), and well 299-W23-4 (Area 8). Depth-discrete groundwater samples were collected in well 299-W11-25B (Area 2) by Pacific Northwest National Laboratory (PNNL-15776) and in wells 299-W15-40, 299-W15-43, and 299-W15-765 (Area 5) and well 299-W15-30 (Area 7) by Vista Engineering (DOE/RL-2006-58, Section 5.1).

Table 3-15. Carbon Tetrachloride Results for Hot-Spot Soil-Vapor Sampling. (3 Pages)

N	Well	Soil-Vapor Sample and Analysis Date	Soil-Vapor Sample Time	Soil-Vapor Analysis Time	HEIS Number	Sample Depth (ft below TOC)	Carbon Tetrachloride (CAS 56-23-5) Soil Vapor	
							Concentration (ppmv)	Q
1	299-W10-19	09/06/05	13:40	14:36	B1HL73	233.9	1.00	U
		09/06/05 duplicate	13:40	14:38	B1HL74	233.9	1.00	U
	299-W10-20	09/19/05	08:20	14:55	B1HL75	236.7	1.00	U
		09/19/05 duplicate	08:20	14:57	B1HL76	236.7	1.00	U
	299-W10-21	09/19/05	10:40	15:01	B1HL77	229.3	1.00	U
		09/19/05 duplicate	10:40	15:03	B1HL78	229.3	1.00	U
	299-W7-4						(a)	
2	299-W10-1	08/29/05	10:50	14:05	B1HL66	233.5	1.00	U
		08/29/05 duplicate	10:50	14:07	B1HL67	233.5	1.00	U
		09/27/05	10:15	13:11	B1HLB5	234.9	10.2	
		09/27/05 duplicate	10:15	13:13	B1HLB6	234.9	10.3	
	299-W10-4	09/26/05	13:27	14:18	B1HL95	228.2	1.00	U
		09/26/05 duplicate	13:27	14:20	B1HL96	228.2	1.00	U
	299-W10-8	08/25/05	13:29	14:20	B1HL64	237.6	1.00	U
		08/25/05 duplicate	13:29	14:23	B1HL65	237.6	1.00	U
		09/27/05	10:31	16:41	B1HLB7	238.7	14.7	
		09/27/05 duplicate	10:31	16:43	B1HLB8	238.7	14.9	
	299-W10-23	09/19/05	13:00	15:07	B1HL79	259.6	1.00	U
		09/19/05 duplicate	13:00	15:09	B1HL80	259.6	1.00	U
	299-W10-24	09/20/05	08:55	12:16	B1HL81	243.4	1.00	U
		09/20/05 duplicate	08:55	12:18	B1HL82	243.4	1.00	U
	299-W11-28	09/27/05	07:45	12:47	B1HL97	247.6	1.00	U
		09/27/05 duplicate	07:45	12:49	B1HL98	247.6	1.00	U
	299-W11-40	11/23/05	10:34	10:56	B1HLD9	243.5	1.00	U
		11/23/05 duplicate	10:34	10:58	B1HLF0	243.5	1.00	U
	299-W11-41	09/26/05	12:43	14:12	B1HL93	245.5	1.00	U
		09/26/05 duplicate	12:43	14:22	B1HL94	245.5	1.00	U
	299-W11-42	09/30/05	10:05	12:06	B1HLC9	246.6	1.00	U
		09/30/05 duplicate	10:05	12:08	B1HLD0	246.6	1.00	U

Table 3-15. Carbon Tetrachloride Results for Hot-Spot Soil-Vapor Sampling. (3 Pages)

N	Well	Soil-Vapor Sample and Analysis Date	Soil-Vapor Sample Time	Soil-Vapor Analysis Time	HEIS Number	Sample Depth (ft below TOC)	Carbon Tetrachloride (CAS 56-23-5) Soil Vapor	
							Concentration (ppmv)	Q
3	299-W11-3	08/30/05	08:30	11:42	B1HL69	270.7	2.92	R
		10/03/05	10:30	13:37	B1HLD5	125.0	1.00	UR
		10/03/05 duplicate	10:30	13:39	B1HLD6	125.0	1.00	UR
		10/11/05	09:35	14:49	B1JFP0	279.5	1.00	U
		10/11/05 duplicate	09:35	14:51	B1JFP1	279.5	1.00	U
	299-W11-7	09/27/05	08:18	12:53	B1HL99	268.1	1.00	U
		09/27/05 duplicate	08:18	12:55	B1HLB0	268.1	1.00	U
	299-W11-14	10/03/05	09:30	13:23	B1HLD1	276.0	1.00	U
		10/03/05 duplicate	09:30	13:25	B1HLD2	276.0	1.00	U
		10/03/05	10:03	13:29	B1HLD3	276.0	1.00	U
		10/03/05 duplicate	10:03	13:31	B1HLD4	276.0	1.00	U
	299-W11-37	09/27/05	09:15	12:59	B1HLB1	285.2	1.00	U
		09/27/05 duplicate	09:15	13:01	B1HLB2	285.2	1.00	U
4	299-W11-10	08/30/05	07:25	11:40	B1HL68	291.9	1.00	U
		09/27/05	11:26	16:45	B1HLB9	292.7	7.61	
		09/27/05 duplicate	11:26	16:47	B1HLC0	292.7	7.61	
5	299-W10-5	08/30/05	09:28	11:44	B1HL70	227.8	7.09	
		08/30/05 duplicate	09:28	11:46	B1HL71	227.8	7.10	
		09/27/05	09:55	13:05	B1HLB3	229.2	1.00	U
		09/27/05 duplicate	09:55	13:07	B1HLB4	229.2	1.00	U
	299-W15-40	06/22/05	13:30	15:35	B1HL58	225.6	12.1	
		06/22/05 duplicate	13:30	15:37	B1HL59	225.6	12.0	
	299-W15-43	06/23/05	09:30	11:36	B1HL62	228.6	15.4	
		06/23/05 duplicate	09:30	11:38	B1HL63	228.6	15.2	
	299-W15-765	06/22/05	14:30	15:39	B1HL60	223.6	56.5	
		06/22/05 duplicate	14:30	15:41	B1HL61	223.6	56.7	

Table 3-15. Carbon Tetrachloride Results for Hot-Spot Soil-Vapor Sampling. (3 Pages)

N	Well	Soil-Vapor Sample and Analysis Date	Soil-Vapor Sample Time	Soil-Vapor Analysis Time	HEIS Number	Sample Depth (ft below TOC)	Carbon Tetrachloride (CAS 56-23-5) Soil Vapor	
							Concentration (ppmv)	Q
6	299-W15-14	08/30/05	10:15	11:48	B1HL72	204.0	1.00	U
		09/27/05	11:45	16:50	B1HLC1	205.2	1.74	
		09/27/05 duplicate	11:45	16:52	B1HLC2	205.2	1.72	
	299-W15-15	09/26/05	10:45	12:04	B1HL91	250.2	1.00	U
		09/26/05 duplicate	10:45	12:06	B1HL92	250.2	1.00	U
7	299-W15-16	09/29/05	09:30	11:28	B1HLC5	242.6	1.00	U
		09/29/05 duplicate	09:30	11:30	B1HLC6	242.6	1.00	U
	299-W15-17	09/29/05	10:25	11:34	B1HLC7	239.1	1.02	
		09/29/05 duplicate	10:25	11:36	B1HLC8	239.1	1.03	
	299-W15-30	09/29/05	08:50	11:22	B1HLC3	240.7	1.00	U
		09/29/05 duplicate	08:50	11:24	B1HLC4	240.7	1.00	U
	299-W15-31A	09/22/05	14:00	14:38	B1HL89	236.0	2.40	
		09/22/05 duplicate	14:00	14:40	B1HL90	236.0	2.40	
8	299-W18-15	09/22/05	13:00	14:35	B1HL87	216.6	1.65	
		09/22/05 duplicate	13:00	14:37	B1HL88	216.6	1.65	
	299-W23-4	10/03/05	11:00	13:45	B1HLD7	218.85	6.66	
		10/03/05 duplicate	11:00	13:47	B1HLD8	218.85	6.67	
	299-W23-10	09/22/05	08:20	12:25	B1HL83	221.0	1.00	U
		09/22/05 duplicate	08:20	12:27	B1HL84	221.0	1.00	U
	299-W23-15	09/22/05	10:40	12:33	B1HL85	212.6	1.00	U
		09/22/05 duplicate	10:40	12:35	B1HL86	212.6	1.00	U

[a] The sample was scheduled during pre-job planning, but a sample was not collected.
[b] An unplanned sample was collected.
CAS = Chemical Abstracts Service.
HEIS = *Hanford Environmental Information System* database.
N = The hot-spot identification number from the sampling and analysis plan (DOE/RL-2001-01, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit RI/FS Work Plan: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*, Appendix D).
ppmv = parts per million by volume.
Q = laboratory qualifier.
R = The results for samples taken from well 299-W11-3 on August 30, 2005, and October 3, 2005, are rejected for use in the remedial investigation. It is suspected that the water in the well was not in equilibrium with the groundwater on those dates and that the soil-vapor samples were not taken at a point immediately overlying the groundwater. These samples are not considered in the discussions in this report.
TOC = top of casing.
U = Analyzed for but not detected. Value reported is the reporting limit.

Table 3-16. Carbon Tetrachloride Results for Hot-Spot Groundwater Sampling. (2 Pages)

N	Well	Groundwater Sample Date	Groundwater Sample Time	Laboratory Receipt Date (Groundwater)	HEIS Number	Sample Depth (ft below TOC)	Carbon Tetrachloride (CAS 56-23-5) Groundwater	
							Concentration (µg/L)	Q
1	299-W10-19	09/06/05					(a)	
	299-W10-20	09/19/05	11:00	09/20/05	B1DVC2	240.1	200	
	299-W10-21	09/19/05	13:30	09/20/05	B1DVD2	229.7	350	
	299-W7-4						(b)	
2	299-W10-1	08/29/05	10:55	08/29/05	B1DVB1	234.5	330	
	299-W10-4	09/26/05	13:40	09/26/05	B1DVB7	228.6	950	
	299-W10-8	08/25/05	13:33	08/25/05	B1DVB0	238.7	320	
	299-W10-23	09/19/05	13:20	09/20/05	B1DVC3	260.0	110	
	299-W10-24	09/20/05	08:55	09/20/05	B1DVC4	243.8	54	
	299-W11-28	09/27/05					(a)	
	299-W11-40	11/23/05	10:00	11/23/05	B1H2F0	243.5	3	
	299-W11-41	09/26/05	12:50	09/26/05	B1DVD7	245.9	99	
	299-W11-42	09/30/05	10:10	09/30/05	B1DVB3	247.0	900	
3	299-W11-3	08/30/05	08:35	08/30/05	B1DVB6	272.0	21	R
		10/03/05	10:40	10/03/05	B1DVD4	125.0	(c)	
		10/11/05	09:40	10/11/05	B1F813	279.9	210	
	299-W11-7	09/27/05	08:20	09/27/05	B1DVC5	268.4	560	
	299-W11-14	10/03/05	09:45	10/03/05	B1DVB4	276.0	(c)	
		06/21/06	09:30	06/21/06	B1JMB8	276.98	240	
	299-W11-37	09/27/05	09:30	09/27/05	B1DVD8	285.6	200	
4	299-W11-10	08/30/05	07:30	08/30/05	B1DVB5	293.8	120	
5	299-W10-5	08/30/05	09:31	08/30/05	B1DVB8	229.1	86	
	299-W15-40	06/22/05	13:30	06/23/05	B1DCK5	226.0	660	
	299-W15-43	06/23/05	09:00	06/23/05	B1DCK6	229.9	340	
	299-W15-765	06/22/05	14:30	06/23/05	B1DCK7	224.0	1700	
6	299-W15-14	08/30/05	10:22	08/30/05	B1DVB9	205.3	1	U
	299-W15-15	09/26/05	10:50	09/26/05	B1DVC6	250.6	6.9	
7	299-W15-16	09/29/05					(a)	
	299-W15-17	09/29/05	10:30	09/30/05	B1DVD9	239.5	26[d]	
	299-W15-30	09/29/05	09:00	09/30/05	B1DVC8	240.7	720	
	299-W15-31A	09/22/05	14:10	09/22/05	B1DVC9	236.1	850	

Table 3-16. Carbon Tetrachloride Results for Hot-Spot Groundwater Sampling. (2 Pages)

N	Well	Groundwater Sample Date	Groundwater Sample Time	Laboratory Receipt Date (Groundwater)	HEIS Number	Sample Depth (ft below TOC)	Carbon Tetrachloride (CAS 56-23-5) Groundwater	
							Concentration (µg/L)	Q
8	299-W18-15	09/22/05	13:15	09/22/05	B1DVC0	217.0	58	
	299-W23-4	10/03/05	11:05	10/03/05	B1DVF3	218.85	(c)	
		06/21/06	08:55	06/21/06	B1JMB6	218.2	23	
	299-W23-10	09/22/05	09:00	09/22/05	B1DVD0	221.3	44	
	299-W23-15	09/22/05	10:40	09/22/05	B1DVD1	213.0	120	

[a] The sample was scheduled during pre-job planning, but a groundwater sample could not be collected because the well was dry.

[b] The sample was scheduled during pre-job planning, but a sample was not collected.

[c] The analysis of sample B1DVD4 was cancelled because it was suspected that the water in the well was not in equilibrium with the groundwater, based on the sample depth. The analyses for samples B1DVB4 and B1DVF3, which were collected on the same day and delivered to the laboratory in the same sample deliver group, were inadvertently cancelled also. Sample Disposition Record 06-001

[d] An unplanned sample was collected.

CAS = Chemical Abstracts Service.
HEIS = *Hanford Environmental Information System* database.
N = The hot-spot identification number from the sampling and analysis plan (DOE/RL-2001-01, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit RI/FS Work Plan: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*, Appendix D).
Q = laboratory qualifier.
R = The results for samples taken from well 299-W11-3 on August 30, 2005, and October 3, 2005, are rejected for use in the remedial investigation. It is suspected that the water in the well was not in equilibrium with the groundwater on those dates and that the soil-vapor samples were not taken at a point immediately overlying the groundwater. These samples are not considered in the discussions in this report.
TOC = top of casing.
U = Analyzed for but not detected. Value reported is the reporting limit.
µg/L = micrograms analyte per liter of water.

Table 3-17. Results and Evaluation of Groundwater "Hot-Spot" Soil-Vapor and Groundwater Sampling. (2 Pages)

Groundwater "Hot Spot" for Carbon Tetrachloride	Associated Potential Release Site	Well	Sample Date	Carbon Tetrachloride (CAS 56-23-5)					
				Soil-Vapor Concentration (ppmv)	Soil-Vapor Data Qualifier	Groundwater Concentration (µg/L)	Groundwater Data Qualifier	Calculated Groundwater Concentration (µg/L) [c]	Vapor-Source Impact to Groundwater?
1. 299-W10-20	218-W-3A Burial Ground	299-W10-19	09/06/2005	1.00	U	np		6.41	(a)
		299-W10-20	09/19/2005	1.00	U	200		6.41	No
		299-W10-21	09/19/2005	1.00	U	350		6.41	No
2. T Tank Farm	T Tank Farm	299-W10-1	08/29/2005	1.00	U	330		6.41	No
			09/27/2005	10.3		np		66.03	(a)
		299-W10-4	09/26/2005	1.00	U	950		6.41	No
		299-W10-8	08/25/2005	1.00	U	320		6.41	No
			09/27/2005	14.9		np		95.51	(a)
		299-W10-23	09/19/2005	1.00	U	110		6.41	No
		299-W10-24	09/20/2005	1.00	U	54		6.41	No
		299-W11-28	09/27/2005	1.00	U	np		6.41	(a)
		299-W11-40	11/23/2005	1.00	U	3		6.41	Possible
		299-W11-41	09/26/2005	1.00	U	99		6.41	No
		299-W11-42	09/30/2005	1.00	U	900		6.41	No
		299-W11-3	10/11/2005	1.00	U	210		6.41	No
		299-W11-7	09/27/2005	1.00	U	560		6.41	No
		299-W11-14	10/03/2005 [d]	1.00	U	240		6.41	No
		299-W11-37	09/27/2005	1.00	U	200		6.41	No
4. 299-W11-10	T Plant	299-W11-10	08/30/2005	1.00	U	120		6.41	No
			09/27/2005	7.61		np		48.78	(a)
5. 216-T-25 Trench	216-T-25 Trench, 218-W-1 and 218-W-2 Burial Grounds, TX-TY Tank Farms	299-W10-5	08/30/2005	7.10		86		45.51	No
			09/27/2005	1.00	U	np		6.41	(a)
		299-W15-40 [e]	06/22/2005	12.1		660		77.56	No
		299-W15-43 [e]	06/23/2005	15.4		340		98.72	No
		299-W15-765 [e]	06/22/2005	56.7		1700		363.46	No

Table 3-17. Results and Evaluation of Groundwater "Hot-Spot" Soil-Vapor and Groundwater Sampling. (2 Pages)

Groundwater "Hot Spot" for Carbon Tetrachloride	Associated Potential Release Site	Well	Sample Date	Carbon Tetrachloride (CAS 56-23-5)					
				Soil-Vapor Concentration (ppmv)	Soil-Vapor Data Qualifier	Groundwater Concentration (µg/L)	Groundwater Data Qualifier	Calculated Groundwater Concentration (µg/L) [c]	Vapor-Source Impact to Groundwater?
6. 299-W15-15	218-W-4B and 218-W-4C Burial Grounds	299-W15-14	08/30/2005	1.00	U	1	U	6.41	Inconclusive [b]
			09/27/2005	1.74		np		11.15	(a)
		299-W15-15	09/26/2005	1.00	U	6.9		6.41	Possible
7. 299-W15-16	218-W-4C Burial Grounds	299-W15-16	09/29/2005	1.00	U	np		6.41	(a)
		299-W15-17	09/29/2005	1.03		26		6.60	No
		299-W15-30	09/29/2005	1.00	U	720		6.41	No
		299-W15-31A	09/22/2005	2.40		850		15.38	No
8. West of S-SX Tank Farms	216-S-25 Crib, S-SX Tank Farm	299-W18-15	09/22/2005	1.65		58		10.58	No
		299-W23-4	10/03/2005 [d]	6.67		23		42.76	Yes
		299-W23-10	09/22/2005	1.00	U	44		6.41	No
		299-W23-15	09/22/2005	1.00	U	120		6.41	No

[a] No groundwater analytical data available.
[b] Not determined because soil-vapor and groundwater values are less than detection limit.
[c] Calculated using Henry's Law equilibrium partitioning between soil vapor and groundwater (0.156 ppmv vapor ~1 µg/L groundwater according to DOE/RL-2001-01, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit RI/FS Work Plan, Includes: 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*).
[d] Groundwater samples from wells 299-W11-14 and 299-W23-4 collected on June 21, 2006.
[e] These three wells were sampled before they became extraction wells as part of the 200-ZP-1 Groundwater Operable Unit pump-and-treat system on July 27, 2005 (DOE/RL-2005-91, *Fiscal Year 2005 Annual Summary Report for 200-UP-1 and 200-ZP-1 Pump-and-Treat Operations*).

CAS = Chemical Abstracts Service.
µg/L = micrograms analyte per liter of water.
np = groundwater not present for sampling.
ppmv = parts per million volume.
U = Analyzed for but not detected. Value reported is the reporting limit.

Table 3-18. Results of Depth-Discrete Groundwater Sampling in Existing Wells.

Sample Location	HEIS Number	Sample Date	Sample Time	Sample Depth (ft below TOC)	Analysis Date	Carbon Tetrachloride (CAS 56-23-5) (µg/L)	Q	Chloroform (CAS 67-66-3) (µg/L)	Q	TCE (CAS 79-01-6) (µg/L)	Q	PCE (CAS 127-18-4) (µg/L)	Q
299-W11-10	B1FW12	11/28/05	11:00	297.15	12/05/05	709		5.9		2.0	U	2.0	U
299-W11-10	B1FW13	11/28/05	12:25	298.65	12/05/05	774		6.2		2.0	U	2.0	U
299-W11-42	B1FW10	11/15/05	13:30	252.4	11/22/05	1271		13		7.2		2.0	U
299-W11-42	B1FW11	11/16/05	11:45	257.4	12/05/05	1181	X	10	X	6.5	X	2.0	X
299-W23-4	B1FW14	11/12/05	10:35	224.0	12/05/05	211	X	5.3	X	2.0	X	2.0	X
299-W23-4	B1FW15	11/17/05	12:30	234.0	12/05/05	222	X	5.2	X	2.0	X	2.0	X
299-W23-4	B1FW16	11/21/05	10:50	244.0	12/05/05	232		5.3		2.0	U	2.0	U

CAS = Chemical Abstracts Service.
HEIS = *Hanford Environmental Information System* database.
PCE = tetrachloroethylene.
TCE = trichloroethylene.
TOC = top of casing.
U = Analyzed for but not detected. Value reported is the reporting limit.
X = Samples were analyzed after the 14-day hold time.

In all but two wells (wells 299-W11-42 and 299-W15-30), the carbon tetrachloride concentration gradient increased with depth in the top of the unconfined aquifer. If there were potential source areas in the deep vadose zone near these wells, the carbon tetrachloride concentration in the groundwater was expected to be highest near the water table and then to decrease with depth in the aquifer.

The profile plot for well 299-W11-42 shows a slight decrease in concentration from the 1.5 to 3 m (5 to 10 ft) sample. However, the 14-day holding time for the deeper sample was exceeded before analysis, so this lower concentration may be due in part to this issue. The profile plot for well 299-W15-30 shows that the three depth-discrete samples all had the same carbon tetrachloride concentration of 1,500 µg/L. Although the reason for this trend is not clear, it does not appear to be related to a potential vadose-zone source, because the evaluation of the carbon tetrachloride soil-vapor and groundwater concentrations indicated that the soil vapor was not impacting the groundwater (Table 3-17) at this well.

A gas-calibration check standard of known carbon tetrachloride concentration (25.37 ppmv) was analyzed at the beginning and end of each day that soil-vapor samples were analyzed (Table 3-19). The pairs of standard and measured carbon tetrachloride concentrations were used to evaluate the accuracy of the carbon tetrachloride soil-vapor analyses. The percent recovery (%R) was calculated according to the formula:

$$\%R = 100x(C_m / C_s)$$

where

C_m = the measured concentration of carbon tetrachloride
C_s = is the standard.

Table 3-19. Field-Screening Results for Carbon Tetrachloride Concentration Standards during Groundwater "Hot Spot" Soil-Vapor Analyses. (2 Pages)

Carbon Tetrachloride Concentration Standard (ppmv)	Carbon Tetrachloride Concentration Analyzed (ppmv)	Date Analyzed	Time Analyzed
25.37	22.0	06/22/05	15:32
25.37	22.4	06/22/05	15:43
25.37	21.7	06/23/05	11:34
25.37	22.6	06/23/05	17:39
25.37	20.5	08/25/05	14:18
25.37	20.7	08/25/05	14:27
25.37	17.2	08/29/05	14:03
25.37	17.3	08/29/05	14:09
25.37	22.0	08/30/05	11:38
25.37	22.1	08/30/05	11:50
25.37	22.2	09/06/05	14:34
25.37	22.3	09/06/05	14:40

Table 3-19. Field-Screening Results for Carbon Tetrachloride Concentration Standards during Groundwater "Hot Spot" Soil-Vapor Analyses. (2 Pages)

Carbon Tetrachloride Concentration Standard (ppmv)	Carbon Tetrachloride Concentration Analyzed (ppmv)	Date Analyzed	Time Analyzed
25.37	22.7	09/19/05	14:52
25.37	22.9	09/19/05	15:11
25.37	22.5	09/20/05	12:12
25.37	22.4	09/20/05	12:25
25.37	20.1	09/22/05	12:16
25.37	20.5	09/22/05	14:43
25.37	21.7	09/26/05	12:00
25.37	21.8	09/26/05	14:10
25.37	21.9	09/26/05	14:25
25.37	22.1	09/27/05	12:45
25.37	22.7	09/27/05	16:39
25.37	23.0	09/27/05	16:57
25.37	22.2	09/29/05	11:18
25.37	22.4	09/29/05	11:40
25.37	21.8	09/30/05	12:04
25.37	21.8	09/30/05	12:16
25.37	21.3	10/03/05	13:21
25.37	21.3	10/03/05	13:53
25.37	22.5	10/11/05	14:47
25.37	22.4	10/11/05	14:55
25.37	22.1	11/23/05	10:54
25.37	22.2	11/23/05	11:02

ppmv = parts per million by volume.

The maximum %R was 91 percent, the minimum was 68 percent, and the average was 86 percent. If the two low measurements on August 25, 2005, are not included, the minimum was 79 percent and the average was 87 percent. These calculations indicate that, with the exception of the two measured concentrations on August 25, 2005, the B&K 1302 analyses of the carbon tetrachloride concentrations were accurate within 21 percent at a maximum and within 13 percent on average. These results indicate good recovery.

A blank sample was analyzed at the beginning and end of each soil-vapor analytical session. The analytical results for the blank samples were all nondetect for carbon tetrachloride (Table 3-20).

Table 3-20. Field-Screening Results for Blank Samples during Groundwater "Hot Spot" Soil-Vapor Analyses.

Sample Location	Analysis Date	Analysis Time	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q	Methyl Ethyl Ketone (CAS 78-93-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
Blank	06/22/05	15:30	1.00	U	1.00	U	1.00	U	1.00	U	8,080
Blank	06/22/05	15:44	1.00	U	1.00	U	1.00	U	1.00	U	8,450
Blank	06/23/05	11:32	1.00	U	1.00	U	1.00	U	1.00	U	9,760
Blank	06/23/05	17:41	1.00	U	1.00	U	1.00	U	1.00	U	8,490
Blank	08/25/05	14:16	1.00	U	1.00	U	1.00	U	1.00	U	6,980
Blank	08/25/05	14:29	1.00	U	1.00	U	1.00	U	1.00	U	6,880
Blank	08/29/05	14:01	1.00	U	1.00	U	1.00	U	1.00	U	7,620
Blank	08/29/05	14:12	1.00	U	1.00	U	1.00	U	1.00	U	7,650
Blank	08/30/05	11:36	1.00	U	1.00	U	1.00	U	1.00	U	8,130
Blank	08/30/05	11:53	1.00	U	1.00	U	1.00	U	1.00	U	8,360
Blank	09/06/05	14:32	1.00	U	1.00	U	1.00	U	1.00	U	4,690
Blank	09/06/05	14:43	1.00	U	1.00	U	1.00	U	1.00	U	4,870
Blank	09/19/05	14:50	1.00	U	1.00	U	1.00	U	1.00	U	10,800
Blank	09/19/05	15:13	1.00	U	1.00	U	1.00	U	1.00	U	10,700
Blank	09/20/05	12:06	1.00	U	1.00	U	1.00	U	1.00	U	8,120
Blank	09/20/05	12:27	1.00	U	1.00	U	1.00	U	1.00	U	8,420
Blank	09/22/05	12:14	1.00	U	1.00	U	1.00	U	1.00	U	6,810
Blank	09/22/05	14:45	1.00	U	1.00	U	1.00	U	1.00	U	7,530
Blank	09/26/05	11:52	1.00	U	1.00	U	1.00	U	1.00	U	8,500
Blank	09/26/05	14:08	1.00	U	1.00	U	1.00	U	1.00	U	8,730
Blank	09/26/05	14:27	1.00	U	1.00	U	1.00	U	1.00	U	8,150
Blank	09/27/05	11:52	1.00	U	1.00	U	1.00	U	1.00	U	10,100
Blank	09/27/05	16:36	1.00	U	1.00	U	1.00	U	1.00	U	9,090
Blank	09/27/05	16:59	1.00	U	1.00	U	1.00	U	1.00	U	9,240
Blank	09/29/05	11:16	1.00	U	1.00	U	1.00	U	1.00	U	8,280
Blank	09/29/05	11:42	1.00	U	1.00	U	1.00	U	1.00	U	8,490
Blank	09/30/05	12:00	1.00	U	1.04		1.00	U	1.00	U	13,200
Blank	09/30/05	12:18	1.00	U	1.21		1.00	U	1.00	U	12,800
Blank	10/03/05	13:19	1.00	U	1.00	U	1.06		1.00	U	11,500
Blank	10/03/05	13:55	1.00	U	1.00	U	1.39		1.00	U	11,200
Blank	10/11/05	14:45	1.00	U	1.00	U	1.13		1.00	U	10,800
Blank	10/11/05	14:57	1.00	U	1.00	U	1.00	U	1.00	U	9,360
Blank	11/23/05	10:52	1.00	U	1.00	U	1.00	U	1.00	U	6,680
Blank	11/23/05	11:04	1.00	U	1.00	U	1.00	U	1.00	U	6,710

CAS = Chemical Abstracts Service.
ppmv = parts per million by volume.
Q = data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

Trip blanks are prepared as a check for possible contamination originating from container preparation methods, shipment, handling, storage, or site conditions. The Step II SAP (DOE/RL-2001-01, Appendix D) required a trip blank to accompany each batch of groundwater samples sent to a laboratory for analysis. A trip blank consists of deionized water that is added to a clean volatile organic analysis sample container. Trip blanks are prepared in the laboratory or other similarly contaminant-free setting, and then are sent to the sampling location with the clean, empty sample containers. Groundwater samples were delivered to the laboratory on 11 dates, so at least 11 trip blanks were required. However, only four trip blanks were collected. Trip blank sample B1DCK8 was delivered on June 23, 2005, with groundwater samples from wells 299-W15-40, 299-W15-43, and 299-W15-765. Trip blank samples B1DF91 and B1DVC1 were delivered on September 20, 2005, with groundwater samples from wells 299-W10-20, 299-W10-21, 299-W10-23, and 299-W10-24. Trip blank sample B1F2W9 was delivered on September 22, 2005, with groundwater samples from wells 299-W15-31A, 299-W18-15, 299-W23-10, and 299-W23-15. Although the Step II SAP requirement for the number of trip blanks was not met, it is unlikely that the samples were significantly contaminated during transportation. This statement is based on the following two observations.

- Trip blanks accompanied a significant fraction (39 percent) of the groundwater samples.
- Carbon tetrachloride was detected in only one of the trip blanks (B1DCK8), and the concentration found (3.8 μg/L) was much less than that found in most of the groundwater samples.

No equipment blanks were collected during groundwater sampling of existing wells.

3.9 RESULTS OF POSSIBLE RELEASE SITES/ SOURCES INVESTIGATIONS

Three investigations were conducted within the Step II study area during the Step II RI that provide useful information on the nature and extent of the dispersed plume. The results are summarized in Sections 3.9.1, 3.9.2, and 3.9.3. As described in Section 3.9.4, data collected during drilling of wells at the carbon tetrachloride release sites in 1992-1993 were compiled and entered into HEIS during the 200-PW-1 OU RI.

3.9.1 T Plant Passive Soil-Vapor Survey

Carbon tetrachloride was not detected above the laboratory method detection limit (25 ng/trap) at any of the 28 sampling locations in the T Plant passive soil-vapor survey (Table 3-21). The only volatile organic compound detected was 111-trichloroethane at a concentration of 25.02 ng/trap, which only slightly exceeds the detection limit (25 ng/trap). These results indicate the absence of a source of carbon tetrachloride in the shallow vadose zone (i.e., above the Cold Creek unit). The results for all volatile organic compounds analyzed are provided in Appendix A.

Table 3-21. T Plant Passive Soil-Vapor Sampling Results.

Field-Sample Points	HEIS Number	Carbon Tetrachloride (CAS 56-23-5) (ng/trap)	Q	111-Trichloroethane (CAS 71-55-6) (ng/trap)	Q
1	B1D831	25	U	25	U
2	B1D832	25	U	25	U
2-DUP	B1D833	25	U	25	U
3	B1D834	25	U	25	U
4	B1D830	25	U	25	U
5	B1D829	25	U	25	U
6	B1D828	25	U	25	U
7	B1D827	25	U	25	U
8	B1D841	25	U	25	U
9	B1D842	25	U	25	U
10	B1D837	25	U	25	U
11	B1D822	25	U	25	U
12	B1D835	25	U	25	U
13	B1D836	25	U	25	U
14	B1D840	25	U	25	U
15	B1D839	25	U	25	U
16	B1D838	25	U	25	U
17	B1D821	25	U	25	U
18	B1D823	25	U	25	U
19	B1D824	25	U	25	U
20	B1D820	25	U	25	U
21	B1D819	25	U	25	U
22	B1D826	25	U	25	U
23	B1D825	25	U	25	U
24	B1D818	25	U	25.02	
25	B1D817	25	U	25	U
26	B1D843	25	U	25	U
27	B1D844	25	U	25	U
28	B1D845	25	U	25	U
28-DUP	B1D846	25	U	25	U
29	B1D847	25	U	25	U
30	B1D848	25	U	25	U

CAS = Chemical Abstracts Service.
HEIS = *Hanford Environmental Information System* database.
Q = laboratory data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

Two trip blanks were prepared in accordance with the vendor's specifications. No contamination was detected in the trip blanks.

3.9.2 Fiscal Year 2001 to 2006 Well Drilling for Other Operable Units

The results of soil-vapor samples collected during well drilling from fiscal years 2001 to 2006 are summarized in Table 3-22. The carbon tetrachloride vapor concentrations detected in most of these samples generally were less than 10 ppmv. The highest carbon tetrachloride soil-vapor concentration measured in these samples was 86.9 ppmv from well 299-W18-16 at a depth of 37.2 m (122 ft) bgs. This well is located on the east side of the 216-Z-1A Tile Field.

In samples collected from Borehole C3102, carbon tetrachloride was not detected in any of the soil samples, which were analyzed at an offsite laboratory (DOE/RL-2002-42). The soil-vapor sample was collected at a depth of 68.6 m (225 ft) bgs, which was 0.22 m (0.72 ft) above the water table. An inflatable packer was used to isolate the lower portion of the borehole, and the sample was pumped into a 1-L Tedlar bag for onsite analysis using a B&K 1302 photoacoustic gas analyzer. The analytical results for this sample (HEIS number B12D87) were 4.12 ppmv carbon tetrachloride and 4.73 ppmv chloroform (BHI-01606) (Table 3-22).

3.9.3 Results of Monitoring Step I Temporary Probes

Results of monitoring the eight temporary soil-vapor probes installed during the Step I investigation are provided in Table 3-23.

A gas-calibration check standard of known carbon tetrachloride concentration (25.37 ppmv) was analyzed at the beginning and end of each day that soil-vapor samples were analyzed (Table 3-24). The pairs of standard and measured carbon tetrachloride concentrations were used to evaluate the accuracy of the carbon tetrachloride soil-vapor analyses. The percent recovery (%R) was calculated according to the formula:

$$\%R = 100x(C_m / C_s)$$

where

C_m = the measured concentration of carbon tetrachloride
C_s = is the standard.

The maximum %R was 96 percent, the minimum was 83 percent, and the average was 89 percent. These calculations indicate that the Innova 1312 analyses of the carbon tetrachloride concentrations were accurate within 4 percent at a maximum and within 11 percent on average. These results indicate good recovery.

A blank sample was analyzed at the beginning and end of each soil-vapor analytical session. The analytical results for the blank samples were all nondetect for carbon tetrachloride (Table 3-25).

Table 3-22. Soil-Vapor Sampling Results from Fiscal Year 2001 to Fiscal Year 2006 Well Drilling. (7 Pages)

Well Name	HEIS Number	Sample Date	Bottom Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
299-W10-25	B1J2M0	04/06/06	89.0	1.00	U	1.29		1.00	U
299-W10-25	B1JN33	04/06/06	89.0	1.00	U	1.00	U	1.16	
299-W10-25	B1J2M1	04/06/06	122.0	1.00	U	1.00	U	1.00	U
299-W10-25	B1JN34	04/06/06	122.0	1.00	U	1.00	U	1.00	U
299-W10-31	B1J2M2	04/27/06	236.0	1.00	U	1.26		1.00	U
299-W10-31	B1JN35	04/27/06	236.0	1.00	U	1.00	U	1.45	
299-W11-47	B1JHB3	01/13/06	90.0	1.00	U	1.00	U	4.35	
299-W11-47	B1JHB4	01/13/06	90.0	1.00	U	1.00	U	4.34	
299-W11-47	B1JHB5	01/13/06	90.0	1.00	U	1.00	U	4.54	
299-W11-47	B1JHB6	01/13/06	90.0	1.00	U	2.10		1.30	
299-W11-47	B1JHB7	01/18/06	133.0	2.49		1.00	U	9.90	
299-W11-47	B1JHB8	01/18/06	133.0	2.49		1.00	U	9.84	
299-W11-47	B1JHB9	01/18/06	133.0	2.49		1.00	U	9.82	
299-W11-47	B1JHC0	01/18/06	133.0	2.49		1.00	U	9.97	
299-W11-47	B1JHC1	02/08/06	235.0	1.00	U	5.13		17.4	
299-W11-47	B1JHC2	02/08/06	235.0	1.00	U	4.91		17.9	
299-W11-86	B1JH58	06/05/06	102.0	1.00	U	1.30		1.00	U
299-W11-86	B1JH59	06/05/06	102.0	1.00	U	1.05		1.00	U
299-W11-86	B1JH60	06/06/06	149.0	1.00	U	1.24		2.53	
299-W11-86	B1JH61	06/06/06	149.0	1.00	U	1.10		2.40	
299-W11-86	B1JH62	06/28/06	285.0	1.00	U	2.87		6.61	
299-W11-86	B1JH63	06/28/06	285.0	1.00	U	3.11		8.21	
299-W14-71	B1JX04	08/08/06	149.5	1.00	U	1.58		2.01	
299-W14-71	B1JX05	08/08/06	149.5	1.00	U	1.23		1.81	
299-W14-71	B1JX06	09/14/06	275.8	1.00	U	1.00	U	1.00	U
299-W14-71	B1JX07	09/14/06	275.8	1.00	U	1.00	U	1.39	
299-W14-72	B1JX08	09/08/06	130.0	1.00	U	1.00	U	1.89	

Table 3-22. Soil-Vapor Sampling Results from Fiscal Year 2001 to Fiscal Year 2006 Well Drilling. (7 Pages)

Well Name	HEIS Number	Sample Date	Bottom Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
299-W14-72	B1JX09	09/08/06	130.0	1.00	U	1.00	U	1.94	
299-W14-72	B1JX10	09/11/06	157.0	1.00	U	1.00	U	1.29	
299-W14-72	B1JX11	09/11/06	157.0	1.00	U	1.00	U	1.43	
299-W14-72	B1KL43	09/19/06	191.0	2.03		1.00	U	1.00	U
299-W14-72	B1KL44	09/19/06	191.0	1.98		1.00	U	1.00	U
299-W14-72	B1JX12	09/27/06	270.0	1.00	U	1.00	U	1.29	
299-W14-72	B1JX13	09/27/06	270.0	1.00	U	1.00	U	1.00	U
299-W15-224	B1JN36	02/09/06	116.0	1.00	U	1.00	U	1.00	U
299-W15-224	B1JN37	02/09/06	116.0	1.00	U	1.00	U	1.00	U
299-W15-224	B1JN38	02/14/06	146.7	2.41		1.00	U	1.58	
299-W15-224	B1JN39	02/14/06	146.7	2.33		1.00	U	1.23	
299-W15-224	B1JN40	02/15/06	230.0	26.5		1.00	U	1.14	
299-W15-224	B1JN41	02/15/06	230.0	26.6		1.00	U	1.21	
299-W15-42	B13F38	11/28/01	30.5	1.00	U	1.00	U	1.00	U
299-W15-42	B13F39	11/30/01	62.5	8.60		1.07		1.91	
299-W15-42	B13F40	12/04/01	81.7	48.9		1.00	U	1.00	U
299-W15-42	B13F41	12/17/01	102.0	1.56		1.00	U	1.00	U
299-W15-42	B13F42	12/19/01	119.8	10.9		1.63		1.00	U
299-W15-42	B13F43	12/20/01	125.5	5.90		1.48		1.25	
299-W15-42	B13F44	01/03/02	134.0	20.0		1.64		5.31	
299-W15-42	B13F45	01/03/02	138.7	1.00	U	1.00	U	1.00	U
299-W15-42	B13F46	01/04/02	161.2	1.00	U	1.00	U	1.00	U
299-W15-42	B13F47	01/08/02	182.1	3.61		1.43		1.00	U
299-W15-42	B13F48	01/14/02	190.5	24.7		6.93		2.56	
299-W15-42	B13Y00	01/15/02	201.5	1.00	U	1.00	U	1.00	U

Table 3-22. Soil-Vapor Sampling Results from Fiscal Year 2001 to Fiscal Year 2006 Well Drilling. (7 Pages)

Well Name	HEIS Number	Sample Date	Bottom Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
299-W15-42	B13Y01	01/17/02	222.5	13.0		2.61		5.51	
299-W15-43	B1HL62	06/23/05	228.5	15.4		1.00	U	1.30	
299-W15-43	B1HL63	06/23/05	228.5	15.2		1.00	U	1.57	
299-W15-49	B1C7R2	11/12/04	130.0	1.35		1.18		4.01	
299-W15-49	B1C7R3	11/12/04	130.0	1.30		1.00	U	4.33	
299-W15-49	B1C7R4	11/16/04	167.8	5.17		1.00	U	2.64	
299-W15-49	B1C7R5	11/16/04	167.8	1.00	U	1.00	U	1.44	
299-W15-49	B1C7R6	11/16/04	167.8	1.00	U	1.00	U	1.28	
299-W15-49	B1C7R7	11/16/04	167.8	1.00	U	1.00	U	1.28	
299-W15-49	B1C7R8	11/16/04	167.8	1.00	U	1.00	U	1.54	
299-W15-49	B1C7R9	11/23/04	229.9	4.13		2.22		3.03	
299-W15-49	B1C7T0	11/23/04	229.9	3.54		1.70		2.78	
299-W15-49	B1C7T1	11/23/04	229.9	3.18		1.48		2.98	
299-W15-49	B1C7T2	11/23/04	229.9	2.81		1.46		2.45	
299-W15-49	B1C7T3	11/23/04	229.9	2.86		1.36		2.50	
299-W15-50	B1C3H9	01/10/05	109.0	1.00	U	1.00	U	1.00	U
299-W15-50	B1C3J0	01/10/05	109.0	1.00	U	1.00	U	1.00	U
299-W15-50	B1C3J1	01/10/05	109.0	1.00	U	1.00	U	1.00	U
299-W15-50	B1C3J2	01/10/05	111.0	1.00	U	1.00	U	1.27	
299-W15-50	B1C3J3	01/10/05	111.0	1.00	U	1.00	U	1.21	
299-W15-50	B1C3J4	01/10/05	111.0	1.00	U	1.00	U	1.19	
299-W15-50	B1C3J5	01/17/05	210.0	1.00	U	1.00	U	1.00	U
299-W15-50	B1C3J6	01/17/05	210.0	1.00	U	1.00	U	1.00	U
299-W15-50	B1C3J7	01/17/05	210.0	1.00	U	1.00	U	1.00	U
299-W15-764	B12XH5	10/10/01	28.0	1.00	U	1.00	U	1.00	U
299-W15-764	B12XH6	10/12/01	60.0	1.00	U	1.00	U	1.00	U
299-W15-764	B12XH7	10/15/01	80.0	17.8		1.00	U	1.05	

Table 3-22. Soil-Vapor Sampling Results from Fiscal Year 2001 to Fiscal Year 2006 Well Drilling. (7 Pages)

Well Name	HEIS Number	Sample Date	Bottom Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
299-W15-764	B12XH8	10/16/01	100.0	1.00	U	1.00	U	1.00	U
299-W15-764	B12XH9	10/18/01	120.0	1.00	U	1.08		1.36	
299-W15-764	B12XJ0	10/18/01	125.0	1.00	U	1.00	U	1.00	U
299-W15-84	B124R3	06/08/01	109.5	522		2.72		4.02	
299-W15-84	B124R4	06/11/01	120.6	537		4.73		1.95	
299-W15-84	B124R5	06/12/01	131.0	1.50		1.00	U	1.00	U
299-W15-84	B124R6	06/12/01	149.8	1.13		1.18		2.35	
299-W15-84	B12621	06/13/01	170.0	34.7		1.61		4.77	
299-W15-84	B12622	06/14/01	180.8	37.6		1.59		4.24	
299-W15-84	B12693	06/15/01	193.0	1.50		5.30		14.1	
299-W15-94	B1FRW5	09/20/05	127.0	1.00	U	1.00	U	1.00	U
299-W15-94	B1FRW6	09/20/05	127.0	1.00	U	1.00	U	1.00	U
299-W15-94	B1FRW7	09/20/05	169.0	1.00	U	1.00	U	1.00	U
299-W15-94	B1FRW8	09/20/05	169.0	1.00	U	1.00	U	1.34	
299-W15-94	B1FRW9	09/22/05	235.0	1.00	U	1.00	U	1.00	U
299-W15-94	B1FRX0	09/22/05	235.0	1.00	U	1.00	U	1.00	U
299-W15-95	B12192	05/21/01	105.5	5.46		3.98		not analyzed	
299-W15-95	B12193	05/22/01	114.0	95.0		3.59		3.62	
299-W15-95	B12195	05/23/01	122.0	174		1.00	U	4.59	
299-W15-95	B12196	05/25/01	146.5	46.1		1.35		4.54	
299-W15-95	B12197	05/30/01	164.5	1.00	U	1.07		1.31	
299-W15-95	B12198	05/31/01	184.4	20.9		1.44		3.16	
299-W15-95	B12199	05/31/01	184.4	20.9		1.34		3.11	
299-W15-95	B121B0	06/01/01	184.4	19.7		1.46		1.80	
299-W15-95	B121B1	06/01/01	184.4	20.4		1.00	U	2.25	
299-W18-16	B1C7N7	11/01/04	122.0	69.8		1.80		1.00	U
299-W18-16	B1C7N8	11/01/04	122.0	70.4		1.42		1.00	U

Table 3-22. Soil-Vapor Sampling Results from Fiscal Year 2001 to Fiscal Year 2006 Well Drilling. (7 Pages)

Well Name	HEIS Number	Sample Date	Bottom Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
299-W18-16	B1C7N9	11/01/04	122.0	73.5		1.28		1.00	U
299-W18-16	B1C7P0	11/01/04	122.0	73.6		1.25		1.00	U
299-W18-16	B1C7P1	11/01/04	122.0	86.9		118.7		1.00	U
299-W18-16	B1C7P2	11/03/04	144.0	2.60		1.00	U	1.13	
299-W18-16	B1C7P3	11/03/04	144.0	8.50		1.00	U	1.55	
299-W18-16	B1C7P4	11/03/04	144.0	14.5		1.00	U	1.47	
299-W18-16	B1C7P5	11/03/04	144.0	19.9		1.00	U	2.02	
299-W18-16	B1C7P6	11/03/04	144.0	19.8		1.00	U	1.44	
299-W18-16	B1C7P7	11/15/04	229.4	21.8		4.31		15.1	
299-W18-16	B1C7P8	11/15/04	229.4	24.7		3.37		12.9	
299-W18-16	B1C7P9	11/15/04	229.4	24.7		3.30		12.8	
299-W18-16	B1C7R0	11/15/04	229.4	26.9		2.75		10.6	
299-W18-16	B1C7R1	11/15/04	229.4	28.4		2.13		8.97	
C3102	B12D87	07/19/01	225.0	4.12		4.73		1.00	U
C3808	B14DM6	5/3/2002	28.5	1.00	U	1.72		1.00	U
C3808	B14DM7	5/3/2002	48.0	1.00	U	1.00	U	1.00	U
C3808	B14DM8	5/6/2002	75.0	1.00	U	1.00	U	1.00	U
C3808	B14DM9	5/7/2002	97.1	1.00	U	1.00	U	1.00	U
C3808	B14DN0	5/8/2002	112.0	1.00	U	1.00	U	1.00	U
C3808	B14DN1	5/9/2002	141.3	1.00	U	1.00	U	1.00	U
C3808	B14DN2	5/9/2002	143.5	1.00	U	1.00	U	1.00	U
C3808	B14DN3	5/10/2002	152.0	1.00	U	1.00	U	1.00	U
C3808	B14DN4	5/10/2002	157.0	1.00	U	1.00	U	1.00	U
C3808	B14DN5	5/14/2002	180.4	1.00	U	1.00	U	1.00	U
C3808	B14DN6	5/15/2002	202.3	1.00	U	1.00	U	1.00	U
C3808	B14DN7	5/17/2002	217.8	1.00	U	1.00	U	1.90	
C4183	B1CKM9	03/01/05	74.0	1.00	U	2.52		1.00	U

Table 3-22. Soil-Vapor Sampling Results from Fiscal Year 2001 to Fiscal Year 2006 Well Drilling. (7 Pages)

Well Name	HEIS Number	Sample Date	Bottom Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
C4183	B1CKN0	03/01/05	74.0	1.00	U	2.70		1.00	U
C4183	B1CKN1	03/01/05	74.0	1.00	U	2.45		1.00	U
C4183	B1CKN2	03/01/05	74.0	1.00	U	2.59		1.00	U
C4183	B1CKN3	03/03/05	96.5	1.00	U	2.27		1.00	U
C4183	B1CKN4	03/03/05	96.5	1.00	U	2.11		1.00	U
C4183	B1CKN5	03/03/05	96.5	1.00	U	1.99		1.00	U
C4183	B1CKN6	03/03/05	96.5	1.00	U	1.98		1.00	U
C4183	B1CKN7	03/04/05	117.5	3.18		2.64		4.02	
C4183	B1CKN8	03/04/05	117.5	3.05		2.56		3.90	
C4183	B1CKN9	03/04/05	117.5	3.31		2.79		4.00	
C4183	B1CKP0	03/04/05	117.5	3.34		2.75		3.95	
C4183	B1CKP1	03/08/05	149.4	1.00	U	1.00	U	1.87	
C4183	B1CKP2	03/08/05	149.4	1.00	U	1.00	U	1.73	
C4183	B1CKP3	03/08/05	149.4	1.00	U	1.00	U	2.04	
C4183	B1CKP4	03/08/05	149.4	1.00	U	1.00	U	2.32	
C4183	B1CKP5	03/14/05	174.5	1.00	U	1.00	U	1.00	U
C4183	B1CKP6	03/14/05	174.5	1.00	U	1.00	U	1.00	U
C4183	B1CKP7	03/14/05	174.5	1.00	U	1.00	U	1.00	U
C4183	B1CKP8	03/14/05	174.5	1.00	U	1.00	U	1.00	U
C4183	B1CKP9	03/18/05	198.4	3.28		1.12		1.00	U
C4183	B1CKR0	03/18/05	198.4	3.32		1.00	U	1.00	U
C4183	B1CKR1	03/18/05	198.4	3.32		1.00	U	1.00	U
C4183	B1CKR2	03/18/05	198.4	3.25		1.00	U	1.00	U
C4183	B1CPR0	03/24/05	222.0	12.1		2.67		1.51	
C4183	B1CPR1	03/24/05	222.0	12.2		2.04		2.35	
C4183	B1CPR2	03/24/05	222.0	12.1		1.98		3.57	
C4183	B1CPR3	03/24/05	222.0	12.2		1.88		2.59	

Table 3-22. Soil-Vapor Sampling Results from Fiscal Year 2001 to Fiscal Year 2006 Well Drilling. (7 Pages)

Well Name	HEIS Number	Sample Date	Bottom Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Methylene Chloride (CAS 75-09-2) (ppmv)	Q
C4183	B1CPR4	03/24/05	222.0	11.9		1.86		2.37	
C4183	B1CPR5	03/24/05	222.0	12.0		1.46		2.86	
C4183	B1CPR6	03/24/05	222.0	12.1		1.48		2.63	
C4183	B1CPR7	03/24/05	222.0	11.8		1.55		2.66	
C4738	B1C7T4	02/07/05	132.5	1.00	U	1.72		1.00	U
C4738	B1C7T5	02/07/05	132.5	1.00	U	1.80		1.00	U

CAS = Chemical Abstracts Service.
HEIS = *Hanford Environmental Information System* database.
ppmv = parts per million by volume.
Q = laboratory data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

Table 3-23. Analytical Results for Eight Temporary Soil-Vapor Probes Installed During the Step I Investigation. (7 Pages)

Location	Depth (ft bgs)	SAF F02-011				Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
		HEIS Number	Sample and Analysis Date	Sample Time	Analysis Time					
216-Z-1A Tile Field, east side Borehole C3872	62.0 – 62.5	B15WC3	10/30/02	9:36	11:57	2.38		1.00	U	3,790
		B163F2	11/27/02	10:58	12:41	1.00	U	1.00	U	4,990
		B167T6	12/31/02	8:30	12:12	1.39		1.00	U	10,200
		B167V1 (duplicate)	12/31/02	8:30	12:47	1.30		1.00	U	10,100
		B16KF6	03/04/03	10:02	11:24	3.10		1.00	U	6,870
		B17990	07/21/03	8:00	10:45	1.00	U	1.00	U	12,900
		B17JK2	09/09/03	10:18	12:30	1.00	U	1.00	U	12,000
		B17X73	10/31/03	9:43	13:00	1.30		1.00	U	3,020
		B184L7	12/04/03	8:53	13:50	1.89		1.00	U	3,970
		B18D29	01/20/04	9:49	13:28	8.33		2.57		8,090
		B18K57	02/19/04	9:24	14:16	8.04		1.04		6,340
		B18K62 (duplicate)	02/19/04	9:24	14:20	7.92		1.04		6,370
		B18P91	03/30/04	11:02	14:31	3.01		1.00	U	3,650
		B199X9	06/03/04	8:30	12:20	3.57		2.33		6,500
		B19LP0	06/24/04	8:57	12:48	1.60		2.21		8,410
		B19TM7	07/23/04	11:25	13:50	1.00	U	1.12		11,100
		B1B3J4	08/26/04	11:59	18:22	1.01		1.56		9,800
		B1BFK8	10/07/04	12:57	15:12	1.15		1.00	U	7,100
		B1C3L4	11/15/04	12:55	17:51	1.07		1.00	U	8,410

Table 3-23. Analytical Results for Eight Temporary Soil-Vapor Probes Installed During the Step I Investigation. (7 Pages)

Location	Depth (ft bgs)	SAF F02-011				Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
		HEIS Number	Sample and Analysis Date	Sample Time	Analysis Time					
216-Z-1A Tile Field, south side Borehole C3871	57.0 – 57.6	B15WC4	10/30/02	9:30	11:58	1.00	U	1.00	U	3,410
		B163F3	11/27/02	11:02	12:42	1.00	U	1.00	U	5,020
		B167T7	12/31/02	8:18	12:13	1.00	U	1.00	U	10,700
		B16KF7	03/04/03	9:54	11:25	1.00	U	1.00	U	6,330
		B17991	07/21/03	10:05	10:46	1.00	U	2.46		10,700
		B17JK3	09/09/03	10:30	12:31	1.00	U	1.00	U	11,000
		B17X74	10/31/03	11:25	13:01	1.00	U	1.00	U	3,690
		B184L8	12/04/03	8:39	13:51	1.00	U	1.00	U	4,010
		B18D30	01/20/04	9:34	13:30	30.5		1.94		7,960
		B18D34 (duplicate)	01/20/04	9:34	13:32	30.6		2.12		7,530
		B18K58	02/19/04	9:06	14:17	1.33		1.33		6,350
		B18P92	03/30/04	10:54	14:33	1.00	U	1.00	U	3,510
		B199Y0	06/03/04	8:22	12:22	1.00	U	2.17		6,650
		B19LP1	06/24/04	8:46	12:50	1.00	U	2.69		7,810
		B19TM8	07/23/04	11:00	13:52	2.02		1.00	U	11,500
		B1B3J5	08/26/04	12:15	18:21	1.00	U	1.45		9,710
		B1BFK9	10/07/04	14:03	15:15	1.00	U	1.00	U	6,720
		B1BFL4 (duplicate)	10/07/04	14:03	15:16	1.00	U	1.00	U	6,730
		B1C3L3	11/15/04	12:46	17:50	1.00	U	1.00	U	7,900

Table 3-23. Analytical Results for Eight Temporary Soil-Vapor Probes Installed During the Step I Investigation. (7 Pages)

Location	Depth (ft bgs)	SAF F02-011				Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
		HEIS Number	Sample and Analysis Date	Sample Time	Analysis Time					
216-Z Ditches Borehole C3873	44.0 – 44.5	B15WC5	10/30/02	10:01	11:59	4.28		1.00	U	4,410
		B15WC8 (duplicate)	10/30/02	10:01	12:01	4.29		1.00	U	4,410
		B163F4	11/27/02	10:14	12:43	1.90		1.00	U	5,090
		B163H0 (duplicate)	11/27/02	10:14	12:47	1.87		1.00	U	5,180
		B167T8	12/31/02	8:52	12:14	2.15		1.00	U	10,600
		B16KF8	03/04/03	10:07	11:26	1.88		1.00	U	6,880
		B17992	07/21/03	8:10	10:47	3.06		1.00	U	13,400
		B17996 (duplicate)	07/21/03	8:10	10:51	3.10		1.00	U	13,100
		B17JK4	09/09/03	10:23	12:32	2.25		1.00	U	12,900
		B17X75	10/31/03	10:07	13:02	3.03		1.00	U	3,080
		B17X78 (duplicate)	10/31/03	10:07	13:05	3.02		1.00	U	3,070
		B184L9	12/04/03	9:16	13:52	3.59		1.00	U	4,370
		B184M2 (duplicate)	12/04/03	9:16	13:54	3.62		1.00	U	4,450
		B18D31	01/20/04	10:14	13:31	2.93		1.00	U	7,540
		B18K59	02/19/04	10:21	14:18	3.22		1.15		6,530
		B18P93	03/30/04	13:17	14:29	3.39		1.00	U	7,310
		B199Y1	06/03/04	8:40	12:23	5.07		2.60		7,130
		B199Y5 (duplicate)	06/03/04	8:40	12:24	5.13		2.64		7,140
		B19LP2	06/24/04	9:07	12:46	4.56		1.92		8,530
		B19LP6 (duplicate)	06/24/04	9:07	12:47	4.77		2.01		8,620
		B19TM9	07/23/04	11:38	13:54	4.77		1.00	U	11,700
		B1B3J6	08/26/04	16:42	18:23	4.42		1.43		11,800
		B1B3K0 (duplicate)	08/26/04	16:42	18:24	4.42		1.44		11,800
		B1BFL0	10/07/04	12:23	15:17	3.88		1.18		7,710
		B1C3L5	11/15/04	14:05	17:52	3.70		1.00	U	8,330

Table 3-23. Analytical Results for Eight Temporary Soil-Vapor Probes Installed During the Step I Investigation. (7 Pages)

Location	Depth (ft bgs)	SAF F02-011				Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
		HEIS Number	Sample and Analysis Date	Sample Time	Analysis Time					
216-Z-7 Crib Borehole C3875	61.5 – 62.0		10/30/02	Unable to sample (no flow).						
		B163F5	11/27/02	9:24	12:44	1.00	U	1.00	U	5,080
		B167T9	12/31/02	9:43	12:15	1.00	U	1.00	U	10,400
		B16KF9	03/04/03	10:15	11:27	1.00	U	1.00	U	5,490
		B17993	07/21/03	9:14	10:48	1.00	U	1.00	U	10,100
		B17JK5	09/09/03	11:00	12:33	1.00	U	1.00	U	11,300
		B17X76	10/31/03	11:19	13:03	1.00	U	1.00	U	2,140
			12/04/03	Unable to sample (no flow).						
			01/20/04	Unable to sample (no flow).						
			02/19/04	Unable to sample (no flow).						
			03/30/04	Unable to sample (no flow).						
		B199Y2	06/03/04	11:45	12:24	1.00	U	3.93		6,980
		B19LP3	06/24/04	11:12	12:50	1.00	U	2.96		7,200
			07/23/04	Unable to sample (construction).						
		B1B3J7	08/26/04	16:07	18:26	1.00	U	1.65		10,100
		B1BFL1	10/07/04	14:31	15:18	1.00	U	1.17		6,970
		B1C3L7	11/15/04	17:15	17:54	1.00	U	1.00	U	8,750

Table 3-23. Analytical Results for Eight Temporary Soil-Vapor Probes Installed During the Step I Investigation. (7 Pages)

Location	Depth (ft bgs)	SAF F02-011				Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
		HEIS Number	Sample and Analysis Date	Sample Time	Analysis Time					
216-T-19 Crib Borehole C3874	31.0 – 31.5	B15WC7	10/30/02	10:18	12:12	1.52		1.00	U	4,090
		B163F6	11/27/02	9:16	12:45	1.00	U	1.00	U	5,100
		B167V0	12/31/02	9:38	12:16	1.00	U	1.00	U	10,800
		B16KH0	03/04/03	10:12	11:28	1.01		1.00	U	7,250
		B17994	07/21/03	10:31	10:49	1.23		1.00	U	15,600
		B17JK6	09/09/03	11:15	12:34	1.26		1.00	U	15,300
		B17JK7 (duplicate)	09/09/03	11:15	12:35	1.28		1.00	U	15,200
		B17X77	10/31/03	11:14	13:04	1.50		1.00	U	3,550
		B184M1	12/04/03	10:04	13:53	1.70		1.00	U	4,900
		B18D33	01/20/04	11:02	13:29	9.62		2.48		11,000
		B18K61	02/19/04	11:22	14:19	1.43		1.43		7,440
		B18P95	03/30/04	13:12	14:35	1.35		1.00	U	8,970
		B199Y3	06/03/04	11:24	12:21	1.00	U	2.41		9,130
		B19LP4	06/24/04	11:06	12:49	1.26		2.03		9,280
			07/23/04	Unable to sample (construction).						
		B1B3J8	08/26/04	16:00	18:25	1.45		1.70		10,900
		B1BFL2	10/07/04	14:23	15:19	1.00	U	1.76		9,560
		B1C3L6	11/15/04	17:02	17:53	1.31		1.00	U	7,580
		B1C3L9 (duplicate)	11/15/04	17:02	17:56	1.32		1.00	U	7,760
218-W-4C Burial Ground, Site 2 Borehole C4057 Well 244-W15-2	8.9 – 9.4	B163F8	12/10/02	8:45	10:27	28.6		7.43		7,780
		B16567 (duplicate)	12/10/02	8:45	10:29	28.5		7.38		7,680
		B16BW7	01/13/03	9:21	09:31	7.19		2.12		8,330
		B16KH2	03/04/03	9:40	11:30	30.9		7.38		7,940
		B16KH4 (duplicate)	03/04/03	9:40	11:32	30.9		7.30		7,920

Table 3-23. Analytical Results for Eight Temporary Soil-Vapor Probes Installed During the Step I Investigation. (7 Pages)

Location	Depth (ft bgs)	SAF F02-011				Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
		HEIS Number	Sample and Analysis Date	Sample Time	Analysis Time					
		B179N9	07/24/03	7:30	08:49	48.0		10.1		17,000
		B179P1 (duplicate)	07/24/03	7:30	08:51	48.3		9.88		16,600
		B17VB1	10/23/03	10:42	12:01	43.0		10.3		11,000
		B17VB3 (duplicate)	10/23/03	10:42	12:03	44.0		10.5		11,000
		B186J7	11/25/03	10:39	10:52	22.7		1.00	U	10,100
		B186J9 (duplicate)	11/25/03	10:39	10:56	22.7		1.00	U	10,100
		B18K66	02/25/04	13:17	13:26	9.78		3.61		10,300
		B18P97	03/30/04	not recorded	14:39	6.58		1.00	U	7,340
		B18P99 (duplicate)	03/30/04	not recorded	14:43	6.50		1.00	U	7,310
218-W-4C Burial Ground, Site 2 Borehole C4056 Well 244-W15-1	34.3 – 34.8	B163F7	12/10/02	8:40	10:26	18.8		5.25		7,870
		B16BW6	01/13/03	9:19	09:30	8.46		2.34		8,410
		B16BW9 (duplicate)	01/13/03	9:19	09:33	8.63		2.40		8,300
		B16KH1	03/04/03	9:42	11:29	18.1		4.56		7,500
		B179N8	07/24/03	7:35	08:48	19.5		4.93		12,500
		B17VB0	10/23/03	10:35	12:00	11.4		4.50		10,700
		B186J6	11/25/03	10:37	10:50	6.92		1.00	U	8,170
		B18K65	02/25/04	13:15	13:25	1.00	U	1.00	U	8,200
		B18MW7 (duplicate)	02/25/04	11:53	13:28	1.00	U	1.00	U	8,100
		B18P96	03/30/04	not recorded	14:41	1.00	U	1.00	U	6,730

Table 3-23. Analytical Results for Eight Temporary Soil-Vapor Probes Installed During the Step I Investigation. (7 Pages)

Location	Depth (ft bgs)	SAF F02-011				Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
		HEIS Number	Sample and Analysis Date	Sample Time	Analysis Time					
218-W-4C Burial Ground, Site 6 Borehole C4058 Well 244-W15-3	30.5 – 31.0	B163F9	12/10/02	8:50	10:28	5.26		1.91		7,990
		B16BW8	01/13/03	9:39	09:32	3.54		1.00	U	8,560
		B16KH3	03/04/03	9:49	11:31	4.85		1.24		7,560
		B17995	07/21/03	7:55	10:50	2.57		1.00	U	13,100
		B179P0	07/24/03	7:45	08:50	5.52		1.29		12,200
		B17VB2	10/23/03	11:30	12:02	4.11		1.64		12,900
		B186J8	11/25/03	10:42	10:54	3.69		1.00	U	7,980
		B18K67	02/25/04	11:53	13:27	4.06		3.57		7,560
		B18P98	03/30/04	14:23	14:37	3.87		1.00	U	17,200
		B199Y4	06/03/04	13:17	13:25	3.54		2.41		10,700
		B19LP5	06/24/04	11:30	12:51	3.50		2.13		10,100
		B19TN0	07/23/04	10:36	13:56	2.82		1.47		11,300
		B19TN1 (duplicate)	07/23/04	10:36	13:58	2.79		1.45		11,300
		B1B3J9	08/26/04	10:47	18:27	1.68		2.37		9,900
		B1BFL3	10/07/04	14:10	15:20	1.00	U	16.9		8,980
		B1C3L8	11/15/04	13:51	17:55	1.00	U	29.3		8,530

After April 2004, the two sample probes (C4056 and C4057) in the 218-W-4C Burial Ground were covered with soil as a result of waste-retrieval operations and could not be sampled.

bgs = below ground surface.
CAS = Chemical Abstracts Service.
HEIS = *Hanford Environmental Information System* database.
ppmv = parts per million by volume.
Q = laboratory data qualifier.
SAF = Sampling Authorization Form.
U = Analyzed for but not detected. Value reported is the reporting limit.

Table 3-24. Field-Screening Results for Carbon Tetrachloride Concentration Standards during Temporary Probe Soil-Vapor Analyses. (2 Pages)

Carbon Tetrachloride Concentration Standard (ppmv)	Carbon Tetrachloride Concentration Analyzed (ppmv)	Date Analyzed	Time Analyzed
25.5	22.1	10/30/02	11:56
25.5	22.2	10/30/02	12:03
25.5	21.3	11/27/02	12:39
25.5	21.2	11/27/02	12:49
25.5	23.5	12/10/02	10:25
25.5	23.7	12/10/02	10:31
25.5	22.5	12/31/02	12:11
25.5	22.5	12/31/02	12:17
25.5	21.5	01/13/03	09:29
25.5	21.7	01/13/03	09:34
25.5	22.7	03/04/03	10:31
25.5	22.8	03/04/03	11:09
25.5	22.0	07/21/03	10:44
25.5	22.1	07/21/03	10:51
25.5	23.5	07/24/03	08:47
25.5	23.5	07/24/03	08:53
25.5	23.6	09/09/03	12:29
25.5	23.6	09/09/03	12:37
25.5	24.5	10/23/03	11:59
25.5	24.5	10/23/03	12:04
25.5	22.5	10/31/03	12:59
25.5	22.5	10/31/03	13:05
25.5	23.5	11/25/03	08:15
25.5	23.5	11/25/03	14:46
25.5	23.5	12/04/03	13:48
25.5	23.5	12/04/03	13:55
25.5	23.4	01/20/04	13:27
25.5	23.4	01/20/04	13:33
25.5	22.8	02/19/04	14:15
25.5	22.8	02/19/04	14:21
25.5	22.7	02/25/04	13:24
25.5	22.7	02/25/04	13:30
25.5	22.8	03/30/04	14:27
25.5	22.8	03/30/04	14:47
25.5	22.9	06/03/04	12:19
25.5	22.9	06/03/04	13:27

Table 3-24. Field-Screening Results for Carbon Tetrachloride Concentration Standards during Temporary Probe Soil-Vapor Analyses. (2 Pages)

Carbon Tetrachloride Concentration Standard (ppmv)	Carbon Tetrachloride Concentration Analyzed (ppmv)	Date Analyzed	Time Analyzed
25.5	21.4	06/24/04	12:45
25.5	21.4	06/24/04	12:52
25.5	22.6	07/23/04	13:32
25.5	22.6	07/23/04	14:00
25.5	22.8	08/26/04	18:20
25.5	22.7	08/26/04	18:28
25.5	22.0	10/07/04	15:10
25.5	22.2	10/07/04	15:21
25.5	22.9	11/15/04	17:49
25.5	23.2	11/15/04	17:57

ppmv = parts per million by volume.

Table 3-25. Field-Screening Results for Blank Samples during Temporary Probe Soil-Vapor Analyses. (2 Pages)

Sample Location	Analysis Date	Analysis Time	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
Blank	10/30/02	11:55	1.00	U	1.00	U	2,710
Blank	10/30/02	12:02	1.00	U	1.00	U	2,370
Blank	11/27/02	12:38	1.00	U	1.00	U	4,770
Blank	11/27/02	12:48	1.00	U	1.00	U	4,760
Blank	12/10/02	10:24	1.00	U	1.00	U	7,180
Blank	12/10/02	10:30	1.00	U	1.00	U	7,240
Blank	12/31/02	12:10	1.00	U	1.00	U	8,490
Blank	12/31/02	12:18	1.00	U	1.00	U	8,500
Blank	01/13/03	09:28	1.00	U	1.00	U	6,700
Blank	01/13/03	09:35	1.00	U	1.00	U	6,930
Blank	03/04/03	Not recorded	1.00	U	1.00	U	5,950
Blank	03/04/03	Not recorded	1.00	U	1.00	U	4,560
Blank	07/21/03	Not recorded	1.00	U	1.00	U	7,170
Blank	07/21/03	Not recorded	1.00	U	1.00	U	8,500
Blank	09/09/03	12:28	1.00	U	1.00	U	7,590
Blank	09/09/03	12:38	1.00	U	1.00	U	7,600
Blank	10/23/03	11:58	1.00	U	1.12		10,700

Table 3-25. Field-Screening Results for Blank Samples during Temporary Probe Soil-Vapor Analyses. (2 Pages)

Sample Location	Analysis Date	Analysis Time	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Q	Chloroform (CAS 67-66-3) (ppmv)	Q	Water Vapor (CAS 7732-18-5) (ppmv)
Blank	10/23/03	12:05	1.00	U	1.03		10,700
Blank	10/31/03	12:58	1.00	U	1.00	U	5,950
Blank	10/31/03	13:06	1.00	U	1.00	U	4,560
Blank	11/25/03	10:48	1.00	U	1.00	U	5,160
Blank	11/25/03	10:58	1.00	U	1.00	U	6,800
Blank	12/04/03	13:49	1.00	U	1.00	U	3,820
Blank	12/04/03	13:56	1.00	U	1.00	U	3,800
Blank	01/20/04	13:26	1.00	U	1.00	U	6,580
Blank	01/20/04	13:32	1.00	U	1.00	U	6,600
Blank	02/19/04	14:14	1.00	U	1.00	U	5,840
Blank	02/19/04	14:22	1.00	U	1.00	U	5,830
Blank	02/25/04	13:02	1.00	U	1.00	U	6,960
Blank	02/25/04	13:29	1.00	U	1.03		6,780
Blank	03/30/04	14:25	1.00	U	1.00	U	3,280
Blank	03/30/04	14:45	1.00	U	1.00	U	3,300
Blank	06/03/04	12:18	1.00	U	1.00	U	6,150
Blank	06/03/04	13:26	1.00	U	1.00	U	6,200
Blank	06/24/04	12:44	1.00	U	1.00	U	7,710
Blank	06/24/04	12:53	1.00	U	1.00	U	7,800
Blank	07/23/04	13:00	1.00	U	1.00	U	10,300
Blank	07/23/04	14:02	1.00	U	1.00	U	10,300
Blank	08/26/04	18:19	1.00	U	1.00	U	11,400
Blank	08/26/04	18:29	1.00	U	1.00	U	10,100
Blank	10/07/04	15:10	1.00	U	1.00	U	7,110
Blank	10/07/04	15:22	1.00	U	1.00	U	7,000
Blank	11/15/04	17:48	1.00	U	1.00	U	7,010
Blank	11/15/04	17:58	1.00	U	1.00	U	7,350

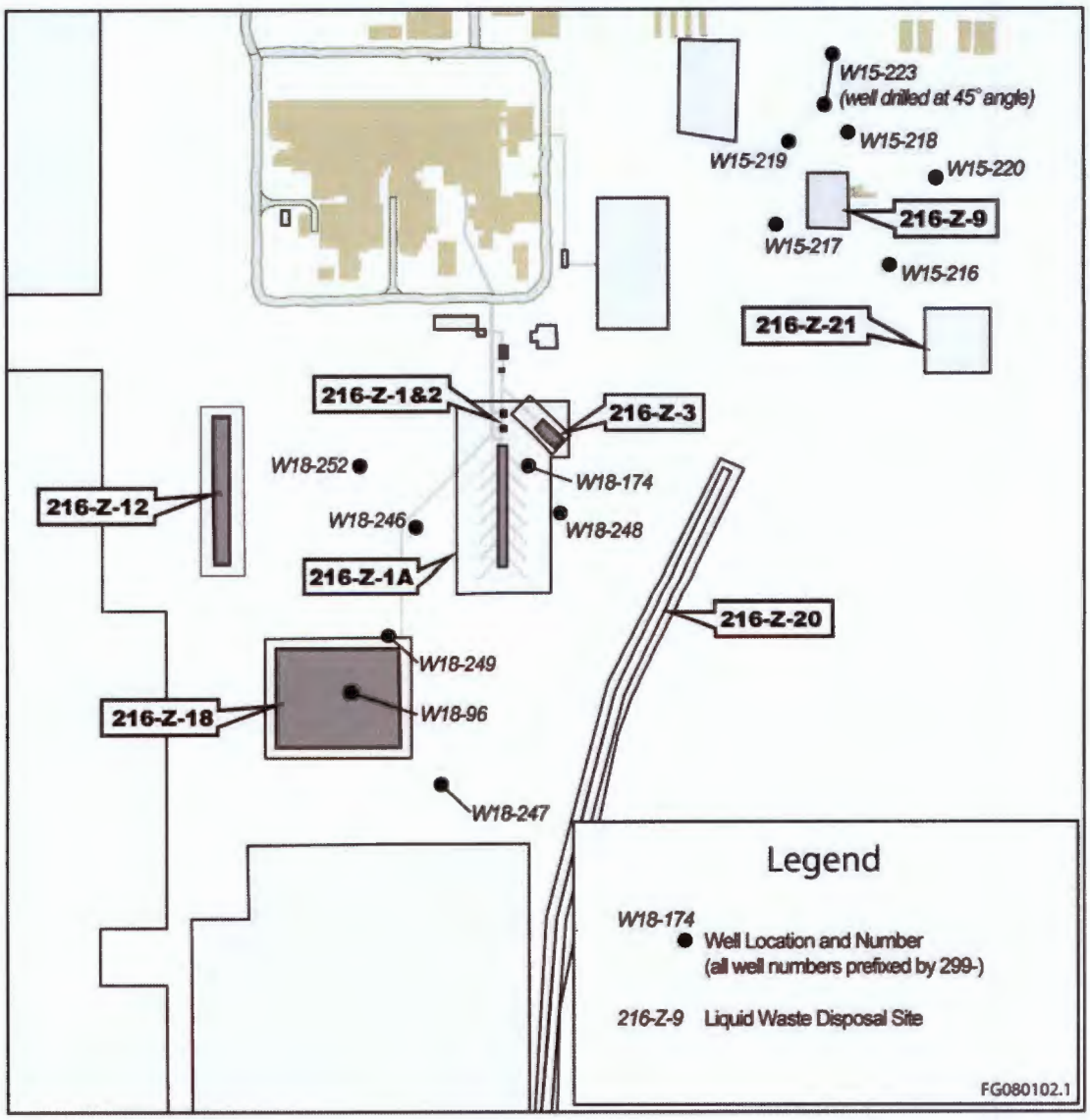
CAS = Chemical Abstracts Service.
ppmv = parts per million by volume.
Q = data qualifier.
U = Analyzed for but not detected. Value reported is the reporting limit.

As part of the fiscal years 2005 and 2007 scope, Pacific Northwest National Laboratory reviewed borehole logs, field activity reports, and chain-of-custody forms to confirm that sample numbers, depths, collection dates and times, and other sampling data were consistent among these three types of documents for a given well. Instances of inconsistencies were documented and solutions were implemented. Analytical results for chemical analytes were entered into HEIS in fiscal year 2005 for 12 of the wells. Analytical results for well 299-W15-223, which was drilled at a slant, and analytical results for radioactive analytes for all of these wells, were entered into HEIS in fiscal year 2008.

3.9.4 Characterization Data Collected During Drilling at Carbon Tetrachloride Release Sites from Fiscal Year 1992 to Fiscal Year 1993

Thirteen wells were drilled at the carbon tetrachloride release sites (216-Z-9 Trench, 216-Z-1A Tile Field, 216-Z-18 Crib) during fiscal years 1992 and 1993 to support characterization for the 200 West Area Expedited Response Action and the Volatile Organic Compounds – Arid Integrated Demonstration (Figure 3-1). Soil and soil-vapor samples were collected during well drilling to characterize the subsurface.

Figure 3-1. Location of Characterization Wells Drilled at Carbon Tetrachloride Release Sites in Fiscal Years 1992 and 1993.



During fiscal years 2005 and 2007, Pacific Northwest National Laboratory completed the tasks needed to support the entry of soil analytical data from these site-characterization activities into HEIS. During fiscal year 2007, Fluor Hanford completed the tasks needed to support entry of the soil-vapor analytical data from these wells into HEIS.

The task scope encompassed data from the following wells:

1992 Wells	1992 Wells	1993 Wells	1993 Wells
299-W15-216	299-W18-247	299-W15-218	299-W18-96
299-W15-217	299-W18-248	299-W15-219	299-W18-174
299-W18-246	299-W18-249	299-W15-220	299-W18-252
		299-W15-223	

During fiscal year 2007, Fluor Hanford reviewed and compiled all of the soil-vapor data collected during drilling of these wells in fiscal years 1992 and 1993. The soil-vapor data were collected using the SEAMIST system.[1] The SEAMIST system is a downhole membrane sampling system that allows sampling at discrete intervals within the borehole. The membrane is placed in the borehole and inflated against the walls of the borehole, isolating a sample tube that can be used to sample below the membrane. The soil-vapor sampling methodology used in fiscal years 1992 and 1993 using the SEAMIST system is similar to the soil-vapor sampling methodology used during the 200-PW-1 OU RI using a downhole inflatable packer.

The soil-vapor samples collected during drilling in fiscal years 1992 and 1993 were analyzed using a gas chromatograph/mass spectrometer in a mobile field laboratory. The results, which were entered into HEIS in fiscal year 2007, are provided in Table 3-26.

The fiscal years 1992 and 1993 soil and soil-vapor data in HEIS should supersede the preliminary results. The preliminary results of the soil samples were included in the following reports:

- WHC-SD-EN-TI-063, *FY1992 Site Characterization Status Report and Data Package for Carbon Tetrachloride*
- WHC-SD-EN-TI-202, *FY93 Site Characterization Status Report and Data Package for the Carbon Tetrachloride Site*
- BHI-00105, *FY 1993 Wellfield Enhancement Status Report and Data Package for the 200 West Area Carbon Tetrachloride Expedited Response Action*
- WHC-SD-EN-TI-248, *Conceptual Model of the Carbon Tetrachloride Contamination in the 200 West Area at the Hanford Site.*

[1] SEAMIST is a trademark of Flexible Liner Underground Technologies, LLC, Santa Fe, New Mexico.

Table 3-26. Results of Active Soil-Vapor Sampling During the Fiscal Year 1992-Fiscal Year 1993 Well Drilling Around the Release Sites. (4 Pages)

Sample Location	Sample Date	Sample ID	Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv/v)	Q	Chloroform (CAS 67-66-3) (ppmv/v)	Q
299-W15-216	05/19/92	B1LDK4	42	39.06		NR	
299-W15-216	05/19/92	B1LDK5	48	52.74		4.68	
299-W15-216	06/01/92	B1LDK7	127	41.85		NR	
299-W15-217	06/09/92	B1LDR0	21.7	21.5		NR	
299-W15-217	06/09/92	B1LDR1	21.7	26.16		NR	
299-W15-217	06/09/92	B1LDR2	21.7	22.83		NR	
299-W15-217	06/11/92	B1LDR3	40	344.67		NR	
299-W15-217	06/11/92	B1LDR4	40	491		NR	
299-W15-217	06/16/92	B1LDR5	52	3207		4.4	
299-W15-217	06/17/92	B1LDR6	54	2811.74		2.4	
299-W15-217	06/19/92	B1LDR7	81	6766.86		10	
299-W15-217	06/19/92	B1LDR8	81	7125.22		15.78	
299-W15-217	06/29/92	B1LDR9	103	78.8		NR	
299-W15-217	06/29/92	B1LDT0	103	75.2		NR	
299-W15-217	06/30/92	B1LDT1	116.1	156		NR	
299-W15-218	02/11/93	B1LDL0	60	45.39		NR	
299-W15-218	02/16/93	B1LDL1	92	102.85		NR	
299-W15-218	02/23/93	B1LDL2	111.8	20910		96.56	
299-W15-218	02/23/93	B1LDL3	111.8	16660		18.7	
299-W15-218	03/04/93	B1LDL4	127	29.75		NR	
299-W15-218	03/10/93	B1LDL5	139	10.2		NR	
299-W15-218	03/10/93	B1LDL6	139	7.905		NR	
299-W15-218	03/11/93	B1LDL7	161	155.04		NR	
299-W15-218	03/15/93	B1LDL8	180	778.6		NR	
299-W15-218	03/16/93	B1LDL9	191	10380		0.68	

Table 3-26. Results of Active Soil-Vapor Sampling During the Fiscal Year 1992-Fiscal Year 1993 Well Drilling Around the Release Sites. (4 Pages)

Sample Location	Sample Date	Sample ID	Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv/v)	Q	Chloroform (CAS 67-66-3) (ppmv/v)	Q
299-W15-220	06/09/93	B1LDT7	50	853.7		NR	
299-W15-220	06/15/93	B1LDT8	90	1511.6		11.09	
299-W15-220	06/24/93	B1LDT9	115	633		0.99	
299-W15-220	06/30/93	B1LDV0	142	149		0.97	
299-W15-220	06/30/93	B1LDV1	142	167.2		0.45	
299-W15-220	07/13/93	B1LDV2	160	108.36		1.305	
299-W15-220	07/15/93	B1LDV3	160	83.54		0.722	
299-W15-220	07/16/93	B1LDV4	182	49.37		1.551	
299-W15-220	07/16/93	B1LDV5	182	50.16		1.435	
299-W15-223	09/20/93	B1LDT2	120	27.673		8.06	
299-W15-223	09/21/93	B1LDT3	139.5	10.597		NR	
299-W15-223	09/21/93	B1LDV9	139.5	3.366		NR	
299-W15-223	09/21/93	B1LDW0	139.5	7.109		NR	
299-W15-223	09/21/93	B1LDW1	139.5	6.943		NR	
299-W15-223	09/21/93	B1LDW2	139.5	5.253		NR	
299-W15-223	09/22/93	B1LDT4	147	36.774		319.305	
299-W15-223	09/22/93	B1LDW3	147	0.538		NR	
299-W15-223	09/22/93	B1LDW4	147	3.312		NR	
299-W15-223	09/22/93	B1LDW5	147	17.645		NR	
299-W15-223	09/23/93	B1LDT5	156	11.138		NR	
299-W15-223	09/23/93	B1LDW6	156	4.987		NR	
299-W15-223	09/23/93	B1LDW7	156	6.562		NR	
299-W15-223	09/23/93	B1LDW8	156	6.995		NR	
299-W15-223	09/23/93	B1LDW9	156	7.972		NR	
299-W15-223	09/23/93	B1LDT6	169.5	116.654		NR	

Table 3-26. Results of Active Soil-Vapor Sampling During the Fiscal Year 1992-Fiscal Year 1993 Well Drilling Around the Release Sites. (4 Pages)

Sample Location	Sample Date	Sample ID	Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv/v)	Q	Chloroform (CAS 67-66-3) (ppmv/v)	Q
299-W15-223	09/23/93	B1LDX0	169.5	2.433		NR	
299-W15-223	09/23/93	B1LDX1	169.5	0.926		NR	
299-W15-223	09/23/93	B1LDX2	169.5	25.805		NR	
299-W15-223	09/23/93	B1LDX3	169.5	73.447		NR	
299-W18-246	03/27/92	B1LDM0	57.7	46.86		NR	
299-W18-246	04/06/92	B1LDM1	85	20.82		NR	
299-W18-246	04/10/92	B1LDM2	107	14.46		NR	
299-W18-246	04/17/92	B1LDM3	146	120.96		50.64	
299-W18-246	04/21/92	B1LDM4	152	278.7		5.7	
299-W18-246	04/30/92	B1LDM5	194	20.85		21.48	
299-W18-246	04/30/92	B1LDM6	196	14.52		14.59	
299-W18-247	03/27/92	B1LDK8	167	62.04		1.44	
299-W18-247	03/30/92	B1LDK9	179.8	49.98		17.46	
299-W18-248	05/04/92	B1LDM7	20	22.26		3.03	
299-W18-248	05/06/92	B1LDM8	40	21.66		3.24	
299-W18-248	05/06/92	B1LDM9	40	20.43		2.58	
299-W18-248	05/06/92	B1LDN0	40	23.34		2.91	
299-W18-248	05/07/92	B1LDN1	59.5	207.9		NR	
299-W18-248	05/11/92	B1LDN2	61.5	209.7		NR	
299-W18-248	05/15/92	B1LDN3	80	9.9		NR	
299-W18-248	05/15/92	B1LDN4	80	15.78		NR	
299-W18-248	05/18/92	B1LDN5	87	247.5		NR	
299-W18-248	05/18/92	B1LDN6	89	207		NR	
299-W18-248	05/20/92	B1LDK6	101	33.54		3.09	
299-W18-248	05/21/92	B1LDN7	120	277.5		NR	

Table 3-26. Results of Active Soil-Vapor Sampling During the Fiscal Year 1992-Fiscal Year 1993 Well Drilling Around the Release Sites. (4 Pages)

Sample Location	Sample Date	Sample ID	Sample Depth (ft)	Carbon Tetrachloride (CAS 56-23-5) (ppmv/v)	Q	Chloroform (CAS 67-66-3) (ppmv/v)	Q
299-W18-248	05/26/92	B1LDN8	141	1300		NR	
299-W18-249	07/07/92	B1LDN9	20	75	X	NR	
299-W18-249	07/09/92	B1LDP0	42	84.7		NR	
299-W18-249	07/13/92	B1LDP1	65	48.3		NR	
299-W18-249	07/14/92	B1LDP2	84	5.6		NR	
299-W18-252	05/07/93	B1LDP3	48.9	1.734		NR	
299-W18-252	05/13/93	B1LDP4	85.7	16.32		NR	
299-W18-252	05/18/93	B1LDP5	123	5.25		NR	
299-W18-252	05/20/93	B1LDP6	138	36.41		0.177	
299-W18-252	05/26/93	B1LDP7	160	1419.62		NR	
299-W18-252	06/01/93	B1LDP8	185.8	8.92		NR	
299-W18-252	06/04/93	B1LDP9	202.2	169.71		0.511	
299-W18-96	02/11/93	B1LDV6	86.7	8.1		NR	
299-W18-96	02/12/93	B1LDV7	101.1	8.31		NR	
299-W18-96	02/17/93	B1LDV8	121.8	98.09		NR	

CAS = Chemical Abstracts Service.
ID = identification (number).
NR = no result reported.
ppmv/v = parts per million by volume
ppm = parts per million.
Q = laboratory data qualifier.
X = Data sheet says "Actual Concentration: 75 ppm carbon tetrachloride" but the value printed under the concentration column (0.747 ppm) and the indicated dilution factor (500:1) do not match the result value.

The soil-vapor results were included in WHC-SD-EN-TI-202, Appendix E; BHI-00105, Appendix B; and BHI-01105, *Rebound Study Report for the Carbon Tetrachloride Soil Vapor Extraction Site, Fiscal Year 1997*, Appendix J.

3.10 NONFIELD INVESTIGATIONS

A variety of nonfield investigations have been conducted on different aspects of the carbon tetrachloride contamination within the 200 West Area as part of the RI for the 200-PW-1 OU. The following subsections present summaries of some of the key study findings from these investigations.

The results of these nonfield investigations conducted as part of the 200-PW-1 OU RI were used to refine the conceptual model of the carbon tetrachloride contamination in the vadose zone. Data collected by other projects, such as the following, also were used to augment the data collected by the 200-PW-1 OU RI:

- Well drilling within the PFP Protected Area, reported in BHI-01631
- Well deepening near the 216-Z-9 Trench, reported in BHI-01631
- Well drilling at the 216-T-26 Crib, reported in DOE/RL-2002-42 and summarized in CP-13514, Section 3.5.

3.10.1 Particle Tracking

A particle-tracking analysis depicting movement of the carbon tetrachloride plume at the water table was conducted by CH2M HILL Hanford Group, Inc., in support of the 200-PW-1 OU RI (D&D-28793, *Particle Tracking Analysis and Animations Depicting Movement of the Carbon Tetrachloride Plume*). The purpose of this analysis was to evaluate the hydraulic flow fields during and after the carbon tetrachloride disposal to known waste sites, to determine if the distribution of carbon tetrachloride in groundwater is reasonable, based on hydraulics alone. It was not intended to model the three-dimensional flow field in the unconfined aquifer and was used as a screening-level analysis to evaluate the need to look for other potential source locations. The following summary is derived from that report.

The animation files showed travel paths for hypothetical carbon tetrachloride particles in groundwater. The travel paths represent carbon tetrachloride movement at the average groundwater-flow velocity. The particle simulation is an estimate of the carbon tetrachloride travel path and does not indicate or imply carbon tetrachloride groundwater concentrations.

The forward particle tracks provide estimations of the distance from the source sites that the advective front of the plume traveled since the carbon tetrachloride entered the aquifer. The reverse particle tracks provide an indication of where the carbon tetrachloride that was observed in 2002 might have originated. Both the forward and the reverse particle-track simulations indicate that most of the carbon tetrachloride apparently is retarded in the groundwater. The reverse particle-track analyses resulted in very little movement from the mid-1980s to 1996. The

forward-tracking animations for nonretarded carbon tetrachloride indicate much greater movement than has been observed in Hanford Site groundwater monitoring programs. Furthermore, the high-concentration area of the plume (e.g., greater than 2,000 μg/L) would not remain limited in area and near the source sites. The reverse-tracking animations indicate that a zero retardation-factor value for existing groundwater contamination results in carbon tetrachloride sources that are farther away than the known source locations. A retardation factor of 4 produced both forward and reverse particle tracks representative of the current carbon tetrachloride distribution in groundwater.

The particle tracks also indicate that there is not a continuing carbon tetrachloride source capable of sustaining the observed maximum concentrations where the plume centroid was found in 1996. Before initiation of the 200-ZP-1 Groundwater OU Phase II pump-and-treat operations in 1996, the high-concentration area of the plume was centered near the PFP and was offset to the north of the known discharge sites. If a continuing source existed at the discharge sites, then the maximum carbon tetrachloride concentrations in groundwater would occur around the discharge sites and not to the north. Drilling and sampling of PFP well 299-W15-42 did not reveal greatly elevated carbon tetrachloride concentrations in the vadose zone or groundwater. Therefore, it does not appear as though the elevated carbon tetrachloride concentration in groundwater beneath the PFP results from contaminants entering the aquifer from the vadose zone in that area. A continuing source of carbon tetrachloride groundwater contamination is not likely.

The carbon tetrachloride source status (i.e., continuous or noncontinuous) and mobility (i.e., retarded or nonretarded) may be considered in a simplified "truth-table" format (D&D-28793). The actual environment may contain elements of all four of the logical outcomes combining source and mobility options. The intent of the truth table is to address the carbon tetrachloride source and movement in a general sense. For the purpose of the truth table, "continuous source" refers to ongoing, nonattenuating contaminants that enter groundwater and are capable of sustaining concentrations at the levels currently observed in the high-concentration area of the carbon tetrachloride plume.

1. If the source of carbon tetrachloride remained <u>continuous</u> and the movement were <u>nonretarded</u>, the extent of the high-concentration area would be much larger than that currently observed. The origin of the plume would remain fairly obvious and would include the known source areas. The carbon tetrachloride distribution within the plume area would be more uniform than is currently observed. The fact that the high-concentration area appears to have remained fairly restricted in size and near the known discharge sites contradicts the hypothesis that there is a continuous source and a nonretarded contaminant movement.

2. If the source of carbon tetrachloride remained <u>continuous</u> and the movement were <u>retarded</u>, the high-concentration area would be restricted in area and would encompass the known source areas. Such a scenario would be consistent with current data if the location where the carbon tetrachloride enters the groundwater were offset from the known discharge sites. The PFP well 299-W15-42 did not substantiate such a hypothesis.

3. If the source of carbon tetrachloride were <u>noncontinuous</u> and the movement were <u>nonretarded</u>, the high-concentration area would be much larger, extend much farther than

currently observed, and would consist of lower concentration values. The fact that the high-concentration area appears to have remained fairly restricted in size close to the known discharge sites seems to dispute this hypothesis. The effects of dispersion on the carbon tetrachloride in the aquifer would reduce the concentration and cause greater spreading of a more uniform plume.

4. If the source of carbon tetrachloride were noncontinuous and the movement were retarded, the high-concentration area would be restricted in area and would remain at or near the source areas. Such a scenario is the best description of current observations, unless the carbon tetrachloride arrived at the water table much later than 8 years after disposal began, as assumed in the simulations. The animations, including retardation factors of 2 and 4, appear to best approximate the currently observed groundwater conditions.

3.10.2 Numerical Modeling

Three-dimensional simulations of carbon tetrachloride fate and transport in the vadose zone were conducted by Pacific Northwest National Laboratory in support of the 200-PW-1 OU RI to enhance the conceptual model of the vertical and lateral distribution of carbon tetrachloride beneath the 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib. The following reports were prepared to describe the results:

- Fiscal years 2002, 2003, 2004: PNNL-14895, *Three-Dimensional Modeling of DNAPL in the Subsurface of the 216-Z-9 Trench at the Hanford Site*
- Fiscal year 2005: PNNL-15914, *Carbon Tetrachloride Flow and Transport in the Subsurface of the 216-Z-9 Trench at the Hanford Site: Heterogeneous Model Development and Soil Vapor Extraction Modeling*
- Fiscal year 2006: PNNL-16198, *Carbon Tetrachloride Flow and Transport in the Subsurface of the 216-Z-18 Crib and 216-Z-1A Tile Field at the Hanford Site, Multifluid Flow Simulations and Conceptual Model Update.*
- Fiscal year 2007: PNNL-17181, *Modeling of Carbon Tetrachloride Flow and Transport in the Subsurface of the 200 West Disposal Sites: Large-Scale Model Configuration and Local-Scale Prediction of Future Carbon Tetrachloride Distribution Beneath the 216-Z-9 Disposal Site.*

Pacific Northwest National Laboratory simulated carbon tetrachloride migration using the STOMP[1] multi-fluid flow and transport model (PNNL-12028, *STOMP Subsurface Transport Over Multiple Phases, Version 2.0, Application Guide*). A total of 23 three-dimensional simulations were conducted for the 216-Z-9 Trench site to examine carbon tetrachloride subsurface infiltration and redistribution before soil-vapor extraction remediation activities were implemented in 1993 (PNNL-14895). The simulations consisted of one base case simulation and

[1] STOMP is copyrighted by Battelle Memorial Institute, Columbus, Ohio.

22 sensitivity analysis simulations. The sensitivity simulations investigated the effects of eight variables on the movement and redistribution of DNAPL: (1) fluid composition; (2) disposal rate, area, and volume; (3) fluid retention; (4) permeability; (5) anisotropy; (6) sorption; (7) porosity; and (8) residual saturation. Additional simulations were conducted to investigate the effects of the soil-vapor extraction system.

The modeling simulations were expanded to include the 216-Z-1A Tile Field and 216-Z-18 Crib in PNNL-16198. A total of 34 simulations, including a base case and 33 sensitivity analyses, were conducted for carbon tetrachloride disposal to these two waste sites.

In summary, these modeling results led to the following conclusions for updating the conceptual carbon tetrachloride distribution model (PNNL-14895; PNNL-16198).

- *Where is carbon tetrachloride expected to accumulate?* Free-phase carbon tetrachloride DNAPL accumulates in the finer grained sediments of the vadose zone but does not appear to pool on top of these layers. Finer-grained sediments include the Cold Creek unit underlying all three sites and the Hanford formation upper fine unit underlying the 216-Z-1A and 216-Z-18 sites.

- *Where are continuing liquid carbon tetrachloride sources of groundwater contamination suspected?* Free-phase carbon tetrachloride preferentially migrates vertically downward below the disposal area. Lateral movement of free-phase carbon tetrachloride is not likely; however, significant lateral migration of vapor-phase carbon tetrachloride is expected. DNAPL migration to groundwater is likely to have occurred at the 216-Z-9 site. DNAPL movement to the groundwater is possible below the 216-Z-1A site. DNAPL movement to the groundwater is not likely below the 216-Z-18 site.

- *Where would DNAPL contamination in groundwater be suspected?* Sufficient carbon tetrachloride and other liquid wastes were disposed of for free-phase carbon tetrachloride to migrate as a DNAPL through the Cold Creek unit and, in some sensitivity cases, across the water table. For the base-case simulation, 43 percent of the original free-phase inventory (i.e., 450,000 kg) still was present in the vadose zone as a DNAPL in 1993. Most of the DNAPL was located just above and within the Cold Creek unit. Approximately 27,000 kg (i.e., 6 percent of the inventory) of DNAPL moved across the water table through the end of 1993. Simulations indicate that migration of DNAPL primarily is in the vertical direction such that DNAPL, if present in the groundwater, would be most likely expected in a zone distributed around the centerline of the disposal area.

- *What is the estimated distribution and state of carbon tetrachloride in the vadose zone?* The amount of carbon tetrachloride that accumulated in the vadose zone as a DNAPL through 1993 ranges from 19 to 65 percent of the total disposed of in the sensitivity simulations. The majority of the mass in 1993 typically was present in a free-phase DNAPL or sorbed phase. The center of mass for carbon tetrachloride in the vadose zone typically was directly beneath the disposal area and within the Cold Creek unit.

- *How does soil-vapor extraction affect the distribution of carbon tetrachloride in the vadose zone?* Soil-vapor extraction effectively removes carbon tetrachloride from the permeable layers of the vadose zone. The soil-vapor extraction that previously was applied to the 216-Z-9 Trench area likely removed a large portion of the carbon tetrachloride initially present in the permeable layers within the large radius of influence of the extraction wells. Finer grained layers with more moisture content are less affected by soil-vapor extraction and contain the remaining carbon tetrachloride in the vadose zone.

As summarized in PNNL-15914, additional three-dimensional modeling was performed at the 216-Z-9 site to simulate carbon tetrachloride transport in a layered and heterogeneous system. Six additional sensitivity analyses were first performed using the groundwater model from PNNL-14895. Heterogeneous subsurface models then were constructed using either a pedotransfer function or a similar media scaling method.

The layered heterogeneous modeling led to the following additional conclusions regarding migration of carbon tetrachloride in the subsurface.

- The layered heterogeneous model results indicated that DNAPL (if present) would tend to preferentially accumulate in the finer grained layers within the vadose zone.

- The presence of a large number of small-grained features within the vadose zone would limit the vertical migration of carbon tetrachloride DNAPL.

- Increased volatilization of carbon tetrachloride occurs with the presence of fine-grained layers, resulting in a higher distribution of carbon tetrachloride in the vapor, water, and sorbed phases.

- The Cold Creek unit accumulates and retains the largest mass of carbon tetrachloride DNAPL in the vadose zone.

Based on the simulations at the 216-Z-9 site, the total mass of carbon tetrachloride calculated to have moved across the water table from all three carbon tetrachloride sites (216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib) was 117,000 kg (258,000 lb). This mass is comparable to the average value of 132,000 kg (291,000 lb) of total mass within the aquifer calculated in PNNL-16509, *Geostatistical Analyses of the Persistence and Inventory of Carbon Tetrachloride in the 200 West Area of the Hanford Site*, and the total mass in the aquifer estimated as part of the carbon tetrachloride inventory summarized in DOE/RL-2006-58.

A large-scale model was configured to assess carbon tetrachloride and waste water discharges from the 216-Z-9, 216-Z-1A, and 216-Z-18 sites, as well as waste water disposal from nearby sites (216-U-10, 216-U-14, 216-Z-1:2, 216-Z-3, 216-Z-7, 216-Z-12, 216-Z-17, 216-Z-18, 216-Z-20, 216-Z-1A, 216-T-19, 2607-WA, 2607-WB, 2607-Z, and 284-WB) in PNNL-17181. The wastewater disposal resulted in increased water saturations in the Cold Creek Unit and a water table increase throughout the computational domain. The increased water saturations in the Cold Creek Unit reduced the downward movement of DNAPL carbon tetrachloride and vapor phase carbon tetrachloride.

4.0 SUMMARY AND CONCLUSIONS

No sources of carbon tetrachloride contamination were identified in the vadose zone other than the three primary, known release sites (216-Z-9 Trench, 216-Z-1A Tile Field, 216-Z-18 Crib).

The highest carbon tetrachloride concentrations in the shallow, intermediate, and deep vadose zone generally are located within about 75 to 150 m (250 to 500 ft) of the release sites.

Outside of the area around the release sites, carbon tetrachloride vapor concentrations up to about 10 to 12 ppmv were found at various locations in the vadose zone, but these concentrations are not considered to have the potential for significant current or future groundwater impacts.

The soil-vapor and shallow-groundwater sampling at wells within the eight carbon tetrachloride groundwater "hot spot" areas indicated that the deep vadose-zone soil-vapor concentrations are not significant sources of groundwater contamination in these areas.

All of the results from Step II of the RI will be included in the RI Report and will be used to support decisions for remedial alternatives for the 200-PW-1 OU. Chapter 4.0 of the RI Report summarizes the conclusions of the RIs and describes the path forward for the RI/FS process.

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APPENDIX A

PASSIVE SOIL-VAPOR SURVEY RESULTS

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TABLES

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9-Trench. A1-1

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. A2-1

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant A3-1

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Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane		U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D853	SG	05/26/2005 13:47	06/01/2005 12:58	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D854	SG	05/26/2005 14:12	06/01/2005 13:01	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D855	SG	05/26/2005 14:10	06/01/2005 13:02	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D856	SG	05/26/2005 14:06	06/01/2005 13:04	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D857	SG	05/26/2005 14:05	06/01/2005 13:06	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	104.66		08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D858	SG	05/26/2005 14:02	06/01/2005 13:07	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	34.89		08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	Duplicate

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	Duplicate
F05-025	B1D859	SG	05/27/2005 9:27	06/01/2005 13:09	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	Duplicate
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	97.32		08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D860	SG	05/26/2005 14:00	06/01/2005 13:11	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D861	SG	05/26/2005 13:57	06/01/2005 13:13	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D862	SG	05/26/2005 13:55	06/01/2005 13:15	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D863	SG	05/26/2005 13:53	06/01/2005 13:17	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D864	SG	05/26/2005 13:51	06/01/2005 13:19	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D865	SG	05/26/2005 13:50	06/01/2005 13:20	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D866	SG	05/26/2005 15:46	06/01/2005 13:42	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D867	SG	05/26/2005 15:52	06/01/2005 14:00	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D868	SG	05/26/2005 15:45	06/01/2005 14:10	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D869	SG	05/26/2005 14:19	06/01/2005 14:18	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	31.53		08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D870	SG	05/26/2005 14:20	06/01/2005 14:20	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	68.94		08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D871	SG	05/26/2005 14:22	06/01/2005 14:21	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D872	SG	05/26/2005 14:27	06/01/2005 14:24	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	45.45		09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	100.54		09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D873	SG	05/26/2005 14:28	06/01/2005 14:26	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	
F05-025	B1D874	SG	05/26/2005 14:29	06/01/2005 14:28	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	59.83		09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D875	SG	05/26/2005 14:31	06/01/2005 14:29	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D876	SG	05/26/2005 14:32	06/01/2005 14:31	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D877	SG	05/26/2005 14:34	06/01/2005 14:32	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D878	SG	05/26/2005 14:35	06/01/2005 14:33	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	32.18		09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D879	SG	05/26/2005 14:36	06/01/2005 14:34	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D880	SG	05/26/2005 14:38	06/01/2005 14:36	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	105.95		09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D881	SG	05/26/2005 15:04	06/01/2005 14:38	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D882	SG	05/26/2005 15:06	06/01/2005 14:39	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	68.11		09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D883	SG	05/26/2005 15:26	06/01/2005 14:40	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D884	SG	05/26/2005 15:27	06/01/2005 14:42	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	70.26		09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D888	SG	05/26/2005 15:21	06/02/2005 8:18	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D889	SG	05/26/2005 15:22	06/02/2005 8:20	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	67.06		09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	Duplicate
F05-025	B1D890	SG	05/27/2005 9:40	06/02/2005 8:22	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	Duplicate

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D891	SG	05/26/2005 15:23	06/02/2005 8:26	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D892	SG	05/26/2005 15:25	06/02/2005 8:28	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D893	SG	05/26/2005 15:09	06/02/2005 8:30	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D894	SG	05/26/2005 15:00	06/02/2005 8:33	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D895	SG	05/26/2005 14:41	06/02/2005 8:35	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	154.86		09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D896	SG	05/26/2005 16:08	06/02/2005 8:36	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	62.37		09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	Duplicate

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	Duplicate
F05-025	B1D897	SG	05/27/2005 9:45	06/02/2005 8:38	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	Duplicate
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D898	SG	05/26/2005 16:14	06/02/2005 8:40	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D899	SG	05/26/2005 16:13	06/02/2005 8:41	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	38.96		09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B0	SG	05/26/2005 16:12	06/02/2005 8:43	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	69.98		09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D8B1	SG	05/26/2005 16:11	06/02/2005 8:44	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	67.13		09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B2	SG	05/26/2005 16:10	06/02/2005 8:46	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B3	SG	05/26/2005 14:40	06/02/2005 8:47	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B4	SG	05/26/2005 16:06	06/02/2005 8:51	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B5	SG	05/26/2005 14:43	06/02/2005 8:52	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D8B6	SG	05/26/2005 14:57	06/02/2005 8:54	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	140.48		09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B7	SG	05/26/2005 14:55	06/02/2005 8:55	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	40.55		09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B8	SG	05/26/2005 14:53	06/02/2005 8:57	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	161.75		09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8B9	SG	05/26/2005 14:50	06/02/2005 9:01	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	74.97		10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D8C0	SG	05/26/2005 14:49	06/02/2005 9:02	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8C1	SG	05/26/2005 14:47	06/02/2005 9:04	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8C2	SG	05/26/2005 16:02	06/02/2005 9:06	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	
F05-025	B1D8C3	SG	05/26/2005 14:45	06/02/2005 9:08	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	08-Jun-05	Trip Blank
F05-025	B1D885	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	08-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	Trip Blank

Table A-1. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 216-Z-9 Trench. (28 Pages)

Sampling Authorization Form_#	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	Trip Blank
F05-025	B1D886	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	09-Jun-05	Trip Blank
F05-025	B1D887	QC		06/01/2005 0:00	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	09-Jun-05	Trip Blank

HEIS = *Hanford Environmental Information System* database. Medium: QC = quality control. SG = soil gas.
Method Name: 8260 VOA GCMS EMFLUX =
EPA Method 8260B, "Volatile Organic Compounds by GC/MS Capillary Column Technique" (SW-846, *Test Methods For Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update*, as amended, Ch 4.3.2).
VOA = volatile organic analysis.
GC/MS = gas chromatography / mass spectrometry.
EMFLUX is a registered trademark of Beacon Environmental Services, Inc., Bel Air, Maryland.
Laboratory Qualifier: U = Analyzed for but not detected. Value reported is the reporting limit.

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDW5	SG	06/30/2005 9:06	07/05/2005 8:55	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDW6	SG	06/30/2005 9:08	07/05/2005 8:57	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	26.35		12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDW7	SG	06/30/2005 9:11	07/05/2005 9:01	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	294.26		12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	58.28		12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDW8	SG	06/30/2005 9:13	07/05/2005 9:04	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDW9	SG	06/30/2005 9:15	07/05/2005 9:07	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	58.34		12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX0	SG	06/30/2005 9:17	07/05/2005 9:10	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	88.19		12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX1	SG	06/30/2005 9:19	07/05/2005 9:12	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	181.34		12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	163.23		12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX2	SG	06/30/2005 9:21	07/05/2005 9:15	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	63.39		12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	81.42		12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	Duplicate
F05-025	B1DDX3	SG	06/30/2005 9:21	07/05/2005 9:17	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	Duplicate
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25.22		12-Jul-05	

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX4	SG	06/30/2005 9:25	07/05/2005 9:20	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX5	SG	06/30/2005 9:27	07/05/2005 9:25	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	389.73		12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX6	SG	06/30/2005 9:38	07/05/2005 9:36	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	801.6		12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	67.29		12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX7	SG	06/30/2005 9:39	07/05/2005 9:40	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	852.49		12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	54.19		12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX8	SG	06/30/2005 9:41	07/05/2005 9:42	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	634.65		12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	28		12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDX9	SG	06/30/2005 9:43	07/05/2005 9:44	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	181.08		12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDY0	SG	06/30/2005 9:44	07/05/2005 9:47	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	781.19		12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDY1	SG	06/30/2005 9:46	07/05/2005 9:49	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	260.1		12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDY2	SG	06/30/2005 9:47	07/05/2005 9:52	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	385.99		12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25.1		12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	687.34		12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDY3	SG	06/30/2005 9:49	07/05/2005 9:53	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	510.56		12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	110.5		12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	12-Jul-05	
F05-025	B1DDY4	SG	06/30/2005 9:50	07/05/2005 9:56	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	12-Jul-05	
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	839.12		13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	231.08		13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25.42		13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	34.96		13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	13-Jul-05	Duplicate

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	13-Jul-05	Duplicate
F05-025	B1DDY5	SG	06/30/2005 9:51	07/05/2005 9:58	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	13-Jul-05	Duplicate
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	160.14		13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	13-Jul-05	
F05-025	B1DDY6	SG	06/30/2005 9:53	07/05/2005 9:59	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	195.67		13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	13-Jul-05	
F05-025	B1DDY7	SG	06/30/2005 9:55	07/05/2005 10:01	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	13-Jul-05	

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	119.02		13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	13-Jul-05	
F05-025	B1DDY8	SG	06/30/2005 9:59	07/05/2005 10:03	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	13-Jul-05	
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	13-Jul-05	Trip blank

Table A-2. HEIS Sample/Result Records for Passive Soil-Vapor Sampling at the 218-W-3A Burial Ground. (12 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	13-Jul-05	Trip blank
F05-025	B1DDY9	QC		07/05/2005 0:00	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	13-Jul-05	Trip blank

HEIS = *Hanford Environmental Information System* database.
Medium: QC = quality control. SG = soil gas.
Method Name: 8260 VOA GCMS EMFLUX =
EPA Method 8260B, "Volatile Organic Compounds by Gc/Ms Capillary Column Technique" (SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update*, as amended, Ch 4.3.2).
VOA = volatile organic analysis.
GC/MS = gas chromatography / mass spectrometry.
EMFLUX is a registered trademark of Beacon Environmental Services, Inc., Bel Air, Maryland.
Laboratory Qualifier: U = Analyzed for but not detected. Value reported is the reporting limit.

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D817	SG	05/26/2005 13:16	06/01/2005 9:43	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25.02		10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D818	SG	05/26/2005 12:54	06/01/2005 9:51	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D819	SG	05/26/2005 12:34	06/01/2005 10:30	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D820	SG	05/26/2005 12:39	06/01/2005 10:35	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D821	SG	05/26/2005 12:05	06/01/2005 10:40	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D822	SG	05/26/2005 12:13	06/01/2005 10:47	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D823	SG	05/26/2005 12:16	06/01/2005 10:51	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D824	SG	05/26/2005 12:18	06/01/2005 10:54	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D825	SG	05/26/2005 12:20	06/01/2005 10:57	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D826	SG	05/26/2005 12:25	06/01/2005 11:00	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D827	SG	05/26/2005 10:10	06/01/2005 11:50	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D828	SG	05/26/2005 10:15	06/01/2005 11:52	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D829	SG	05/26/2005 10:20	06/01/2005 11:54	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D830	SG	05/26/2005 10:22	06/01/2005 11:57	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D831	SG	05/26/2005 10:25	06/01/2005 11:58	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D832	SG	05/26/2005 10:30	06/01/2005 12:01	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	Duplicate
F05-025	B1D833	SG	05/27/2005 9:15	06/01/2005 12:02	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	Duplicate
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D834	SG	05/26/2005 10:33	06/01/2005 12:06	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D835	SG	05/26/2005 10:39	06/01/2005 12:09	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D836	SG	05/26/2005 10:41	06/01/2005 12:12	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D837	SG	05/26/2005 10:50	06/01/2005 12:17	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	11-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D838	SG	05/26/2005 10:54	06/01/2005 12:19	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D839	SG	05/26/2005 10:57	06/01/2005 12:22	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	11-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D840	SG	05/26/2005 10:59	06/01/2005 12:24	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D841	SG	05/26/2005 11:01	06/01/2005 12:26	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D842	SG	05/26/2005 11:04	06/01/2005 12:28	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	11-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D843	SG	05/26/2005 13:28	06/01/2005 12:33	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D844	SG	05/26/2005 13:30	06/01/2005 12:36	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	11-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D845	SG	05/26/2005 13:33	06/01/2005 12:38	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	11-Jun-05	
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	11-Jun-05	Duplicate
F05-025	B1D846	SG	05/27/2005 9:07	06/01/2005 12:40	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	11-Jun-05	Duplicate
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	11-Jun-05	

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	11-Jun-05	
F05-025	B1D847	SG	05/26/2005 13:35	06/01/2005 12:42	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	11-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	
F05-025	B1D848	SG	05/26/2005 13:37	06/01/2005 12:43	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	Trip blank

Table A-3. HEIS Sample/Result Records for Passive Soil-Vapor Sampling in the Vicinity of T Plant. (16 Pages)

Sampling Authorization Form #	Sample Number	Medium	Sample Date, Time On	Sample Date, Time Off	Method Name	Constituent Identification Number	Constituent Long Name	Value Reported (ng/Sample)	Lab Qualifier	Analysis Date	Comment
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	Trip blank
F05-025	B1D849	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	107-06-2	1,2-Dichloroethane	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	124-48-1	Dibromochloromethane	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	127-18-4	Tetrachloroethene	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	156-59-2	cis-1,2-Dichloroethylene	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	156-60-5	trans-1,2-Dichloroethylene	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	56-23-5	Carbon tetrachloride	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	67-66-3	Chloroform	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	71-55-6	1,1,1-Trichloroethane	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	74-87-3	Chloromethane	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	75-00-3	Chloroethane	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	75-09-2	Methylene chloride	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	75-34-3	1,1-Dichloroethane	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	75-35-4	1,1-Dichloroethene	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	78-87-5	1,2-Dichloropropane	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	79-00-5	1,1,2-Trichloroethane	25	U	10-Jun-05	Trip blank
F05-025	B1D850	QC		06/01/2005 0:01	8260_VOA_GCMS_EMFLUX	79-01-6	Trichloroethene	25	U	10-Jun-05	Trip blank

HEIS = *Hanford Environmental Information System* database.
Medium: QC = quality control. SG = soil gas.
Method Name: 8260 VOA GCMS EMFLUX =
EPA Method 8260B, "Volatile Organic Compounds by GC/MS Capillary Column Technique" (SW-846, *Test Methods For Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update*, as amended, Ch 4.3.2).
VOA = volatile organic analysis.
GC/MS = gas chromatography / mass spectrometry.
EMFLUX is a registered trademark of Beacon Environmental Services, Inc., Bel Air, Maryland.
Laboratory Qualifier: U = Analyzed for but not detected. Value reported is the reporting limit.

APPENDIX B

ENHANCED ACCESS PENETRATION SYSTEM SOIL-GAS SAMPLING AT THE HANFORD SITE 200-PW-1 OPERABLE UNIT

ACKNOWLEDGMENTS

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The attachment, "Analysis of Perturbation and Recovery of Ambient Carbon Tetrachloride Concentrations Caused by the Introduction of Drilling Air During Enhanced Access Penetration System Operations," was written by Stephen P. Farrington, P. E., at Applied Research Associates, Incorporated, on September 8, 2003.

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ATTACHMENT

ANALYSIS OF PERTURBATION AND RECOVERY OF AMBIENT CARBON TETRACHLORIDE CONCENTRATIONS CAUSED BY THE INTRODUCTION OF DRILLING AIR DURING ENHANCED ACCESS PENETRATION SYSTEM OPERATIONS B-11

TABLE

Table B-1. Summary of Soil-Gas Penetrations and Samples. B-7

TERMS

ARA	Applied Research Associates, Incorporated
bgs	below ground surface
CPT	cone penetrometer
OU	operable unit

APPENDIX B

ENHANCED ACCESS PENETRATION SYSTEM SOIL-GAS SAMPLING AT THE HANFORD SITE 200-PW-1 OPERABLE UNIT

B1.0 INTRODUCTION

Applied Research Associates, Inc. (ARA), collected soil-gas samples for carbon tetrachloride analyses from shallow and deep vadose zones in the 200-PW-1 Operable Unit (OU) waste sites of the Hanford Site U.S. Department of Energy complex in Washington State. These samples were obtained from depths between 4.6 and 68.3 m (15 and 224 ft) below the ground surface (bgs) using ARA's Enhanced Access Penetration System (EAPS). Samples were obtained from six borehole locations via a gas-sampling cone and an up-hole vacuum pump.

B1.1 BACKGROUND

The 200-PW-1 OU waste sites received plutonium-rich and organic-rich waste from several processes located in the Z Plant complex (now referred to as the Plutonium Finishing Plant complex). A primary component of the organic-rich waste was carbon tetrachloride. The 200-PW-1 OU remedial investigation being conducted consists of two major components: investigation of the known 200-PW-01 OU waste sites and investigation of the dispersed carbon tetrachloride vadose-zone plume.

The dispersed carbon tetrachloride vadose zone extends beyond the known 200-PW-1 OU waste site boundaries. The aqueous and organic discharges to the 200-PW-1 OU waste sites resulted in carbon tetrachloride contamination of the vadose zone and groundwater in the 200 West Area (DOE/RL-2001-01, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit RI/FS Work Plan, Includes: 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*).

B1.2 STUDY OBJECTIVE

The objective of this study is to reduce the uncertainty associated with the distribution of carbon tetrachloride in the vadose zone. A previous study of carbon tetrachloride in the shallow vadose zone overlying the highest concentrations of the groundwater plume has been completed. This study seeks to provide additional concentration information from the deep vadose zone.

B1.3 TECHNICAL APPROACH

To gain additional concentration information for carbon tetrachloride in the study area, soil-gas samples were collected from deep penetrations into the vadose zone. The scope of work also allowed for the collection of soil and water samples.

Penetrations into the deep vadose zone in the 200 West Area were best accomplished by a combination of direct-push cone-penetrometer (CPT) and air-rotary drilling methodologies. The EAPS effectively combines these methodologies into a highly integrated system (Applied Research Associates, 2004, *Enhanced Access Penetration System (EAPS) Draft Final Technical Report*). The EAPS can be deployed in varying configurations, depending on the penetration objectives and the strength characteristics of the geologic formation. For this subsurface investigation, the preferred penetration tool was the 5.1 cm (2-in.) EAPS.

The principal differentiator in EAPS deployments is the drilling system used. Two drilling systems are available: 7.3 cm and 5.1 cm (2.875 in. and 2 in.). The 7.3 cm (2.875-in.) drill is the more powerful of the two and is recommended in situations where very hard materials are encountered. A typical scenario for the 7.3 cm (2.875-in.) drill system is to drill through shallow, upper refusing layers to expose softer, deeper layers that can be further penetrated by a direct-push CPT. In this scenario, the center rods of the drill string are removed and 4.4 cm (1.75-in.) CPT rods and tools are advanced through the outer drill casing. The 5.1 cm (2-in.) drill system is an interchangeable direct-push and drilling system that can accomplish a penetration consisting of both direct-push and drilling methods. This system allows the changeover between penetration methods to be made at any point in the penetration and as many times as required.

B2.0 PENETRATIONS

This penetration activity completed six borings, with soil-gas samples taken from each boring. Fluor Hanford onsite personnel determined the depths at which samples would be collected. One groundwater sample also was taken in the initial penetration.

B2.1 LOCATION SUMMARIES

The following penetration summaries chronologically detail the activities at each location.

B2.1.1 Penetration 1

Penetration ID: C4890 Penetration Dates: 06/27/2005 to 07/12/2005

The first site investigated for this project was the 216-S-25 Crib, which is located in the 200 West Area of the Hanford Site. On June 27, 2005, the ARA field crew moved the CPT/EAPS truck onto the first location. The location chosen was on the south side center of the crib, 0.9 m (3 ft) from the edge of the crib. A CPT probe with a gas-sampling port initially was pushed to 17.3 m (56.8 ft), taking gas samples at 4.6, 7.6, and 15.2 m (15, 25, and 50 ft) bgs. The CPT rods were left in the ground overnight because of limited health-physics coverage for investigating potential radiological contamination of the rods. The following morning, the crew pulled the cone rods and used the 7.3 cm (2.875-in.) EAPS to drill to 23.8 m (78.2 ft). At the end of the day on June 29, the total depth of this hole was 44.5 m (146 ft).

On July 6, drilling continued at the 216-S-25 Crib to a total depth of 63.4 m (208 ft). The crew achieved the desired depth of 68.3 m (224 ft) on July 7. On July 11, the water level in the boring was measured at 65.8 m (216 ft). A bladder pump was lowered through the drill casing into the groundwater. The groundwater was pumped to the surface and collected in sample containers. Containerized samples were given to Fluor Hanford personnel for further processing.

On July 12, the first gas sample was taken at 65.5 m (215 ft), 0.3 m (1 ft) above the water level of 65.8 m (216 ft). Six samples then were taken at 7.6 m (25-ft) intervals from 61.0 to 22.9 m (200 to 75 ft). As each sampling depth was completed, the boring was filled with bentonite to the elevation of next sample. Upon completion of the soil-gas sampling, the hole was plugged using bentonite chips as the drill casing was extracted. All borings were decommissioned by a Washington State-licensed driller in accordance with WAC 173-160-420, "Minimum Standards for Construction and Maintenance of Wells," "What are the General Construction Requirements for Resource Protection Wells?"

B2.1.2 Penetration 2

Penetration ID: C4891 Penetration Dates: 07/13/2005 to 07/25/2005

The second penetration was located on the east side center of the crib, 1.2 m (4 ft) from the edge of the 216-S-25 Crib. It was decided that for this location the 5.0 cm (2-in.) EAPS would be used. On July 13, the gas sampler was advanced by direct push, collecting soil-gas samples at 4.6 and 7.6 m (15 and 25 ft) bgs. The final depth on this day was 10.2 m (33.5 ft). On July 14, the 5.0 cm (2-in.) EAPS drill was deployed and advanced to 15.2 m (50 ft), where a soil-gas sample was taken. This sample was taken before the prescribed 12-hour rebound time had elapsed. Drilling then resumed, achieving a total depth of 17.7 m (58 ft) bgs, before mechanical issues with the EAPS stopped progress for the day. July 15 was a scheduled Fluor Hanford day off.

On July 18, the cone was re-pushed to a depth of 17.7 m (58 ft), at which point it encountered refusal. The crew then drilled from 17.7 to 21.6 m (58 to 71 ft) using the 5.0 cm (2-in.) drill system. To resume soil-gas sampling, the wireline sampler was locked into place and the rods were advanced (direct push) to 22.9 m (75 ft). During this advancement, the wireline locking mechanism failed and the rod string was retracted to assess the problem. During the retraction, the outer drill bit detached from the drill casing and effectively plugged the boring.

On July 19, drilling began at a new location that was 1.5 m (5 ft) away from the previous boring. The 5.0 cm (2-in.) EAPS was advanced to 3.3 m (10.7 ft) bgs, where another bit failure occurred. The bit was repaired and the EAPS truck was moved to a third location, 1.5 m (5 ft) from the previous attempt. At this location, the CPT probe was advanced via direct push 9.9 m (32.5 ft) to refusal. The EAPS drill was inserted and drilling proceeded to 21.3 m (70 ft). The drill bit again became damaged so that the rods and casing required retraction. The drill bit was repaired and the hole was drilled to 21.3 m (70 ft). At this depth, the gas-sampling probe was lowered down hole to engage with the locking mechanism. The probe could not be advanced to the locked position because of an unknown obstruction. The insides of the outer rods were cleaned in an attempt to alleviate this situation; however, after cleaning, the gas-sampling probe would not

pass through the casing. The casing then was pulled in preparation for drilling at another location.

On July 20, the rig was moved another 1.5 m (5 ft) from the original location and the 7.3 cm (2.875-in.) EAPS was set up. A 4.4 cm (1.75-in.) soil-gas sampling probe was pushed to 22.9 m (75 ft) for the first gas sample and then encountered refusal at 27.0 m (88.5 ft). The next day, drilling began with the 7.3 cm (2.875-in.) drill system and was able to reach a depth of 25.0 m (82 ft) before the hydraulic system overheated and ended drilling for the day.

On July 22, the 7.3 cm (2.875-in.) EAPS drill was used to bore this location from 25.0 to 32.6 m (82 to 107 ft) bgs. At this depth, the center drill and rod string were retracted and the penetration was continued in direct-push mode with a 4.4 cm (1.75-in.) cone. The target depth of 45.7 m (150 ft) was achieved by 3:30 pm, and the boring was left overnight to allow carbon tetrachloride to rebound. Samples were taken in the morning on July 25 at depths of 45.7, 38.1, and 30.5 m (150, 125, and 100 ft). Each hole at this location was abandon by a licensed Washington State-licensed driller in accordance with WAC 173-160-420, and the equipment was moved to the next crib.

B2.1.3 Penetration 3

Penetration ID: C4885 Penetration Dates: 07/26/2005 to 08/03/2005

On July 26, the rig was set up at Borehole C4885, located on the west side center of the 216-Z-17 Crib, 1.5 m (5 ft) from the edge. The 5.0 cm (2-in.) drill system was loaded into the truck and used to push to 16.3 m (53.5 ft), collecting soil gas samples at 4.6, 7.6, and 15.2 m (15, 25, and 50 ft). The rods were pulled and the system was set up to use the 7.3 cm (2.875-in.) drill. Drilling activities for July 26 concluded at 15.4 m (50.5 ft).

Work resumed on August 1 and the hole was drilled to a depth of 20.6 m (67.5 ft). Then the center drill rods were retracted and a 4.4 cm (1.75-in.) CPT cone was direct pushed to 36.9 m (121 ft). On August 2, the 4.4 cm (1.75-in.) gas-sampling cone was deployed with hopes of reaching the target depth of 45.7 m (150 ft) by direct push. The CPT cone immediately meet refusal (at 37.5 m [123 ft]) and was retracted. The 7.3 cm (2.875-in.) EAPS then was used to drill to the desired depth of 45.7 m (150 ft). The hole was left overnight to allow carbon tetrachloride to rebound before sampling.

Gas samples were taken at 45.7, 38.1, 30.5, and 22.9 m (150, 125, 100, and 75 ft) on the morning of August 3. Upon completion of the gas sampling, the hole was abandon by the licensed Washington State driller in accordance with WAC 173-160-420.

B2.1.4 Penetration 4

Penetration ID: C4884 Penetration Dates: 08/04/2005 to 08/10/2005

On August 4, work began at Borehole C4884, located on the east side center of the 216-Z-16 Crib, 1.5 m (5 ft) from the edge. The CPT gas sampler was pushed to its first

sampling depth, at 4.6 m (15 ft), when it was determined that the internal tubing was damaged. The tubing was repaired and samples were taken at 4.6, 7.6, and 15.2 m (15, 25, and 50 ft) bgs. Refusal was encountered at a depth of 19.8 m (65 ft). The 7.3 cm (2.875-in.) EAPS was used to drill down to 21.8 m (71.5 ft).

On August 5, the ARA field crew drilled to the desired depth of 46.1 m (151.3 ft). On August 8, samples were taken at 45.7 and 38.1 m (150 and 125 ft). At 30.5 m (100 ft), the outer drill casing broke before a sample could be taken. A dozen sections of casing were damaged as well as three center drill rods.

The hole was re-drilled using the 7.3 cm (2.875-in.) drill to a depth of 30.5 m (100 ft) on August 9. The damaged drill rods and casing were either replaced or repaired. On August 10, soil-gas samples were collected at 30.5 and 22.9 m (100 and 75 ft). This location was grouted out and abandoned in accordance with WAC 173-160-420 upon completion of sampling.

B2.1.5 Penetration 5

Penetration ID: C4883 Penetration Dates: 08/10/2005 to 08/15/2005

On August 10, the rig was set up at Borehole C4883 on the north side center of the 216-Z-16 Crib, 1.5 m (5 ft) from the edge. The gas-sampling cone was used to take samples at 4.6, 7.6, and 12.5 m (15, 25, and 41 ft) before refusal. The hole then was drilled with the 7.3 cm (2.875-in.) EAPS to 30.5 m (100 ft).

On August 11, the hole was drilled with the 7.3 cm (2.875-in.) EAPS to 45.7 m (150 ft) and left overnight to rebound. The first gas sample was taken at 45.7 m (150 ft) on August 12. The drill casing broke while being pulled. The casing was left in place over the weekend.

On Monday August 15, the casing was pulled and samples were taken at 38.1, 30.5, 22.9, and 15.2 m (125, 100, 75, and 50 ft). After the sampling was completed, the hole was grouted by the Washington State-licensed driller in accordance with WAC 173-160-420.

B2.1.6 Penetration 6

Penetration ID: C4886 Penetration Dates: 08/15/2005 to 08/19/2005

On August 15, the CPT truck was set up at Borehole C4886 on the west side south of the 216-Z-17 Crib. On August 16, CPT direct-push gas samples were collected at 4.6, 7.6, 15.2, and 22.9 m (15, 25, 50, and 75 ft) with the 4.4 cm (1.75-in.) gas-sampling probe. Refusal for this push occurred at 30.5 m (100 ft). The rods and sampling cone were retracted in anticipation of drilling.

On August 17, drilling began with the 7.3 cm (2.875-in.) EAPS and reached a depth of 27.9 m (91.4 ft). Drilling was stopped at 12:30 pm for the crew to attend a mandatory site safety meeting. Continuing on August 18, with the 7.3 cm (2.875-in.) EAPS, the desired depth of

45.7 m (150 ft) was reached. The boring was left overnight for carbon tetrachloride concentrations to rebound.

Soil-gas samples were taken at 45.7, 38.1, and 30.5 m (150, 125, and 100 ft) on August 19. After the sampling was completed, the hole was plugged with bentonite chips as the casing was extracted.

The rig and support equipment were moved offsite at the completion of location number six.

B2.2 SPECIAL CONDITIONS

B2.2.1 Small-Diameter Enhanced Access Penetration System Performance

The small-diameter (5.0 cm [2-in.]) system has certain advantages over the larger system. The primary advantage is the minimization of drilling waste that must be handled at the surface. Also, because the small system can interchange quickly between direct-push and drilling modes, it is possible to maximize the direct-push component of a penetration. In contrast, the larger system must over-drill to the direct-push refusal depth before continuing beyond. The smaller system also conveniently supports the interchange of wireline tools (e.g., piezometer cone, gas-sampling cone, soil-sampling cone).

The 5.0 cm (2-in.) EAPS was used extensively at Borehole C4891 (Penetration 2). It also was used, to a lesser degree, at Borehole C4885 (Penetration 3). The system encountered several difficulties at Borehole C4891. These included broken outer-bit assemblies and wireline tool-locking mechanism failures. The overall penetration productivity of the 5.0 cm (2-in.) system was deemed marginal, and all subsequent locations were penetrated with the large-diameter EAPS (7.3 cm [2.875-in.] drill and 4.4 cm [1.75-in.] CPT cone).

B2.2.2 Penetrations 7, 8, and 9

As the project progressed and the preferred penetration method became the large-diameter EAPS, an additional constraint for penetrations 7, 8, and 9 emerged. The locations associated with these borings had significant radioactive contamination within 18.3 m (60 ft) of the ground surface.

Penetration with the large-diameter EAPS eventually will require the borehole to be drilled and hence will draw portions of this radioactive material to the surface. Fluor Hanford decided that these materials must not be drilled through and brought to the surface. This decision precluded penetrating with the large-diameter EAPS.

If the smaller diameter EAPS could penetrate the first 18.3 m (60 ft) in direct-push mode, then these locations could be sampled without bringing the unwanted materials to the surface. However, practical experience gained during the project with the smaller diameter system led to the decision that this would not be a viable approach.

Based on these considerations, Fluor Hanford decided not to pursue penetrations 7, 8, and 9 during this project.

B2.2.3 Gas-Sampling Model

Soil-gas samples were collected under several sampling regimes. The first and simplest was collection of soil gas through a soil-gas sampling cone that had been advanced to the target depth by direct push. In this case, samples were taken without any delay period, because the formation was regarded as undisturbed. The gas samples were transported to the surface through Teflon[1] lines pumped by a small bladder pump. Samples were collected in 1 L Tedlar[2] bags.

The second regime was related to soil-gas conditions after air-rotary drilling activities. It is recognized that the natural soil-gas concentration of any analyte will be perturbed by permeation of air into a formation, which is inevitable during air-rotary drilling. For this project, a period of 12 hours was adopted for the formation to recover after drilling; this time period was approved by Fluor Hanford personnel, based on modeling performed by ARA during EAPS development. After this rebound period, soil-gas samples were collected through the soil-gas sampling cone as the EAPS outer drill casing was retracted. The borehole was filled with grouting material just below the desired sampling depth and then the sample was taken.

A model for estimating rebound times is provided in the Attachment. During the project, ARA verified that the drilling operational parameters assumed in the model were valid, based on actual drilling of the 200-PW-1 OU boreholes.

B3.0 SUMMARY

The primary task in the project was to collect soil-gas samples from shallow and deep vadose zones in the 200-PW-1 OU waste sites. Table B-1 provides a summary of all sample locations. A total of 297.2 m (975 ft) were penetrated in 6 locations and 46 soil-gas samples were collected.

Table B-1. Summary of Soil-Gas Penetrations and Samples. (2 Pages)

No.	Penetration Identification Number	Start Date	End Date	Depth (ft)	Number of Soil-Gas Samples
1	C4890	06/27/2005	07/12/2005	224	**10**
2	C4891	07/13/2005	07/25/2005	150	**7**
3	C4885	07/26/2005	08/03/2005	150	**7**

[1] Teflon is a trademark of E.I. du Pont de Nemours and Company, Wilmington, Delaware.

[2] Tedlar is a registered trademark of E. I. du Pont de Nemours and Company, Wilmington, Delaware.

Table B-1. Summary of Soil-Gas Penetrations and Samples. (2 Pages)

No.	Penetration Identification Number	Start Date	End Date	Depth (ft)	Number of Soil-Gas Samples
4	C4884	08/04/2005	08/10/2005	150	7
5	C4883	08/10/2005	08/15/2005	150	8
6	C4886	08/15/2005	08/19/2005	150	7

B3.1 PRODUCTIVITY ANALYSIS

For this project, ARA was active in the field for 33 days. Of this total, 5.3 days were allocated to equipment-related difficulties, unsafe weather conditions, and safety-related work stoppages. Of the remaining 27.7 working days, the equivalent of 6 days was allocated to time required for onsite Fluor Hanford support services (e.g., coordination, general safety, radiation safety, sampling handling). Based on these allocations, 21.7 days were devoted solely to penetrations. Six boreholes were completed in this time period, requiring an average of 3.6 days per boring (penetration productivity). Overall productivity, including all onsite support services, was 4.6 days per boring.

B3.2 OUTLOOK

For this project, the 7.3 cm (2.875-in.) EAPS performed well and was able to reach the desired depths. The 5.1 cm (2-in.) EAPS, which was the preferred system for this project, encountered several difficulties that shifted emphasis to use of the 7.3 cm (2.875-in.) EAPS.

The primary area for further development and improvement is the small-diameter drilling system. A review of our experience with this project has spawned initiatives along several fronts: investigation and implementation of a more powerful down-hole hammer; investigation and improvement of the wireline tool-locking mechanism when used with air-rotary drilling; and fabrication of new ring and center bits to improve drilling production rate and bit robustness. At this writing, we have completed an improved set of bits for testing.

B4.0 REFERENCES

Applied Research Associates, Inc., 2004, *Enhanced Access Penetration System (EAPS) Draft Final Technical Report*, Applied Research Associates, Inc., South Royalton, Vermont. Available on the Internet at: http://www.clu-in.org/download/char/enhanced_dp_evaluation_report.pdf

DOE/RL-2001-01, 2004, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit RI/FS Work Plan, Includes: 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

WAC 173-160-420, "Minimum Standards for Construction and Maintenance of Wells," "What are the General Construction Requirements for Resource Protection Wells?" *Washington Administrative Code*, as amended, Washington State Department of Ecology, Olympia, Washington.

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ATTACHMENT

ANALYSIS OF PERTURBATION AND RECOVERY OF AMBIENT CARBON TETRACHLORIDE CONCENTRATIONS CAUSED BY THE INTRODUCTION OF DRILLING AIR DURING ENHANCED ACCESS PENETRATION SYSTEM OPERATIONS

INTRODUCTION

The Enhanced Access Penetration System drilling system uses a significant volume of pressurized air to lift drill cuttings to the surface, thus presenting a relatively high-pressure source of atmospheric air to the formation proximate to the drill bit during cutting operations. A reasonable concern therefore arises as to whether or not significant displacement of ambient soil gas will occur in the vicinity of the drill tip during drilling, and what impact such displacement may have on attempts to analyze in situ concentrations of CCl_4 in soil gas.

The severity of perturbation to the system and how fast recovery to ambient concentrations occurs will depend on many factors that are nonlinearly interrelated. For example, the amount of air displaced, the shape and extent of the displacement zone, how much mixing and dispersion will occur at the displacement front, and what advection, dispersion, and chemical diffusion occur upon rebound all factor into the problem. To provide an accurate analysis of the phenomenon at hand, the significant loss mechanisms for injected air, as well as the significant recovery mechanisms for contaminant concentration, must be accounted for and analyzed. Excluding any air-loss mechanism or concentration recovery terms will result in an overestimation of perturbation or an underestimation of recovery, respectively. So any simplifying idealization of the problem is predisposed to conservatively estimate time to rebound.

The objectives of the first-order analysis herein presented are (a) to estimate the magnitude of the physical problem, (b) to estimate the effort required to execute a satisfactory theoretical analysis, and (c) to explore alternative and/or complementary methods of problem assessment that can be conducted during the field demonstration.

IDEALIZATION OF PERTURBATION

In the simplest idealization of the perturbation phenomenon, pressurized air is supplied from a point within an infinite porous medium (Figure Att-1). As a result, isobars of constant pressure form concentric spheres in the medium, and flow is directly away from the point of injection, equally in all directions.

In this idealization, the flow would progressively displace an increasing volume of ambient pore gas. The rate of advance of the displacement front away from the injection point can be calculated assuming incompressible flow and a spherically expanding perturbed region. The rate of advance of the displacement front for an injection of 4.2 m^3/min (150 ft^3/min) in a formation of 30 percent porosity is shown in Figure ATT-2.

Figure ATT-1. Idealization of Injection/Displacement Phenomenon.

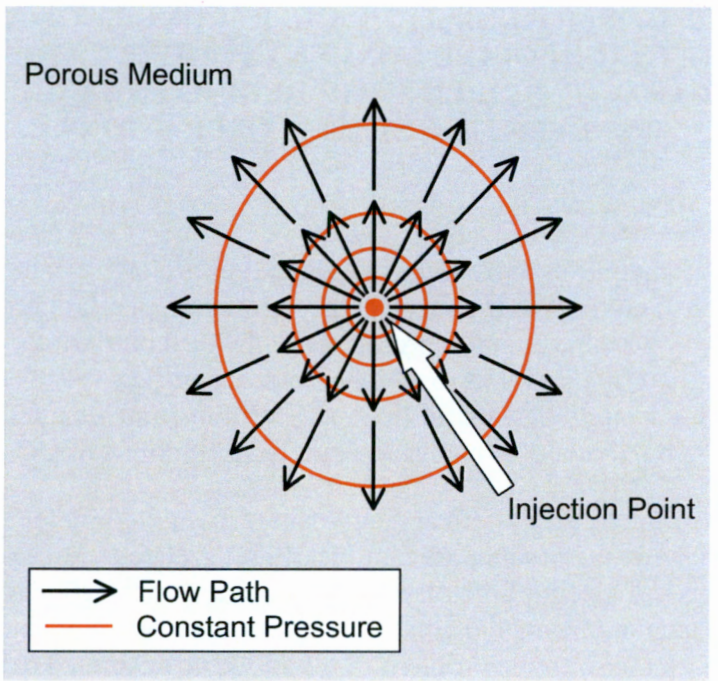
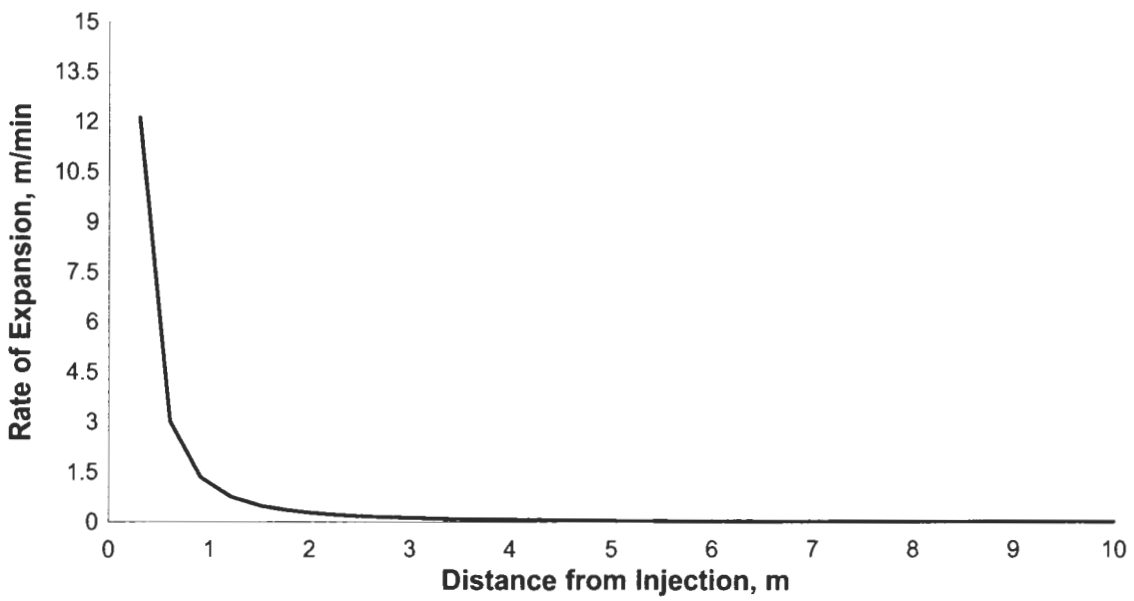


Figure ATT-2. Rate of Spherical Expansion of Perturbed Region as a Function of Distance from the Injection Point, Assuming No Dispersion and Incompressible Flow at 4.2 m^3/min (150 ft^3/min) into an Infinite Medium of 30 Percent Porosity.



In reality, once the applied pressure is removed (and presumably vented to ambient pressure), some mechanical rebound of the displacement would occur as elevated pressure is relieved by flow reversal through the supply point,[1] caused by the compressibility of air. In addition, by neglecting (1) mixing and dispersion of contaminant concentrations during air injection, (2) the influence of permeability contrasts in the subsurface, (3) boundaries such as the free surface, and (4) the influence of drill string/borehole geometry on air flow, the estimated size of the perturbed region is further exaggerated.

IDEALIZATION OF RECOVERY

The simplest idealization of the concentration rebound phenomenon restricts the consideration of possible recovery mechanisms solely to that of gaseous chemical diffusion. The analysis of this idealization employs the following simplifying assumptions to arrive at an upper limit[2] for estimating the rebound time.

- All contaminant in the pore gas between the drill bit and the displacement front (e.g., in the perturbed region) is essentially eliminated because of the injection of clean air.
- Rebound of ambient concentrations is entirely caused by gaseous chemical diffusion from outside the perturbed region.
- The domain is infinite and homogenous and the source is unlimited.[3]

This idealization is analogous to the introduction of a diffusion source at time zero into a domain of no prior concentration. This contaminant concentration versus location for several points in time following source introduction is depicted in Figure ATT-3.

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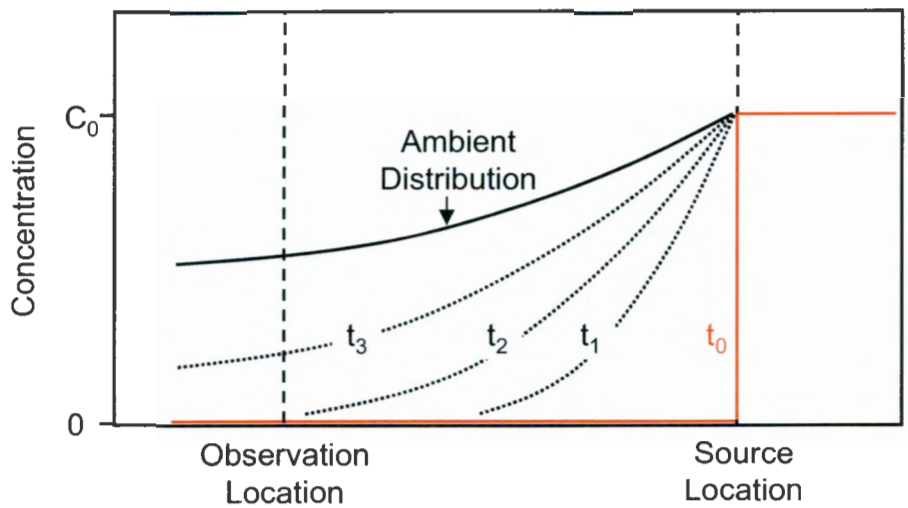
[1] This is analogous to compressing a spring and then allowing it to expand by removing the force against it. Some length of spring returns beyond the point to which the applied force was advanced.

[2] Advective phenomena typically predominate diffusion in contaminant transport through natural environmental settings. Therefore, neglecting advection should result in the most conservative estimate, hence the upper bound. Additionally, no data critical for estimating the contribution of advection were readily available within the current scope.

[3] The assumption of an unlimited source, although reducing the conservativeness of the assumptions, is appropriate for solution of the mathematical problem, and is relatively accurate given the magnitude of contaminant at the actual field site.

Figure ATT-3. Illustration of Chemical Diffusion from Time Zero to a Point Some Distance from a Constant Concentration Source.



This idealization was investigated for CCl_4 in a nonreactive porous medium as a means of estimating an upper limit on rebound time as a function of distance from the boundary of the perturbed region. The concentration in space and time $C(x,t)$ caused by diffusion from a source C_0 is described by

$$C = C_0 erfc\left(\frac{x}{2\sqrt{D\omega t}}\right)$$

where

$erfc()$	=	is the complementary error function
x	=	is distance from the source
D	=	is the diffusivity in air
ω	=	is a factor to account for tortuosity of the diffusion path in the porous medium
t	=	is time elapsed from time zero.

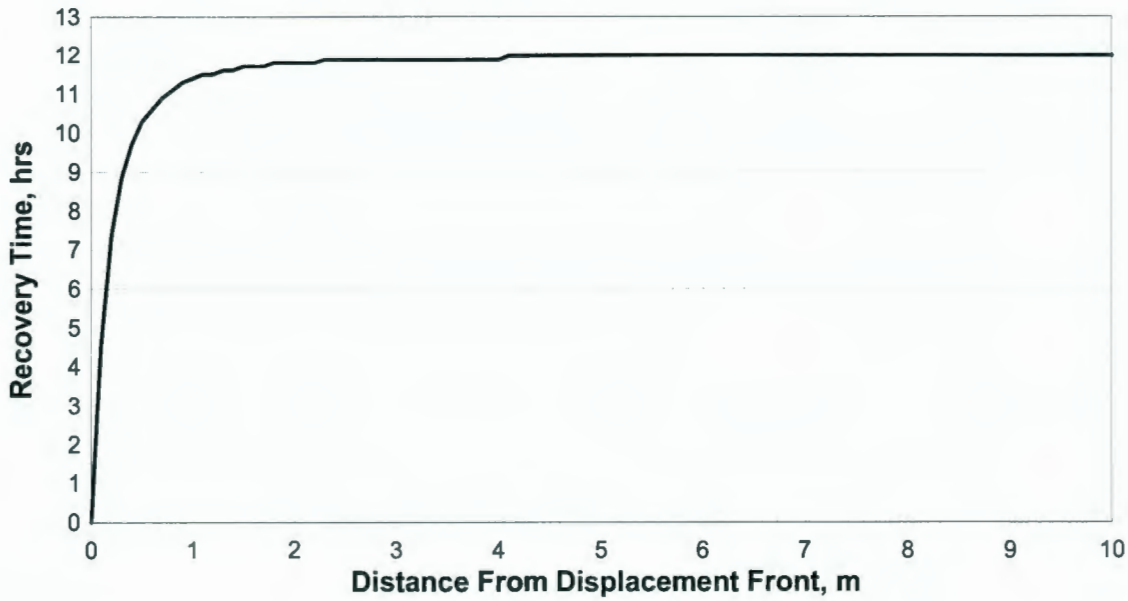
Because the denominator inside the error function is distance from the source, the source concentration in this idealization can never be attained at any observation point removed from the source. Therefore, as a practical consideration in this analysis, the ambient concentration at any distance from the source was defined as the concentration from diffusion over a reasonably[1] long period of acquiescence (e.g., 30 days), and recovery time was defined as the time to rebound to 95 percent of the ambient concentration.[2] Figure ATT-4 presents the results of this

[1] 30 days is considered a reasonably long time scale for diffusive transport, because transport likely also is affected by advective phenomena, such as thermal convection and barometric pumping, which are driven on a much shorter (e.g., diurnal) time scale.

[2] Because we defined ambient concentration as that attained after 30 days of diffusion, 100 percent recovery always would take 30 days at any distance. Given the simplifying assumptions employed, 95 percent recovery seems a reasonable metric.

analysis.[1] The plot in this figure shows rebound time versus distance from the source. As the figure shows, the rebound time asymptotically approaches 12 hours for large distances from the displacement front (e.g., large displaced volume of soil gas).[2] If we change the definition of ambient concentration to be that achieved after 365 days, then the recovery time to 95 percent of ambient instead asymptotically approaches 143 hours with increasing volume of displaced soil gas.

Figure ATT-4. Predicted Upper Limit of Rebound Time Versus Distance from the Displacement Front, Assuming Complete Elimination of Ambient Concentrations and Only Diffusive Transport Upon Rebound.



[1] Because the terms for time t and distance x in the diffusion equation are contained within a complementary error function *erfc()*, creation of the plot was based on numerical approximation of the positive real inverse of *erfc()*. In addition, the forward solution, itself, for determining ambient concentration required numerical approximation of *erfc()* using a Chebyshev polynomial.

[2] This is counter-intuitive, because one would expect the recovery time to increase without bound as distance increases. The asymptotic shape of the recovery is easily shown to be a result of the simplifying assumptions made in this idealization of the problem.

COMBINED PERTURBATION AND REBOUND

The logical next step in a simplified analysis of the problem is to combine estimates of idealized perturbation with idealized diffusive rebound. This analysis combines the following simplifying assumptions.

- Perturbation and rebound adequately are represented by the idealizations previously described.
- Half the 8.5 m^3/min (300 ft^3/min) of supplied air returns to the surface via the air handling system (e.g., 4.2 m^3/min [150 ft^3/min] is injected into the formation).
- The drill string advances at an average rate of 0.3 m/min (1 ft/min), including rod changes.
- The area of interest for measuring CCl_4 concentrations is the top of the Cold Creek unit caliche at 38 m bgs.
- Porosity during drill advance is 30 percent.
- Drilling only below 31 m bgs causes perturbation of concern (because of the mitigating effect of high-permeability deposits above 31 m).

Following these assumptions, by the time the drill reaches the top of the Cold Creek unit caliche at an assumed depth of 38 m bgs, approximately 23 minutes of perturbation will have occurred. According to the simplified idealizations, by this time, the spherical perturbed region will extend 4.3 m from the drill, and recovery will take approximately 12 hours.

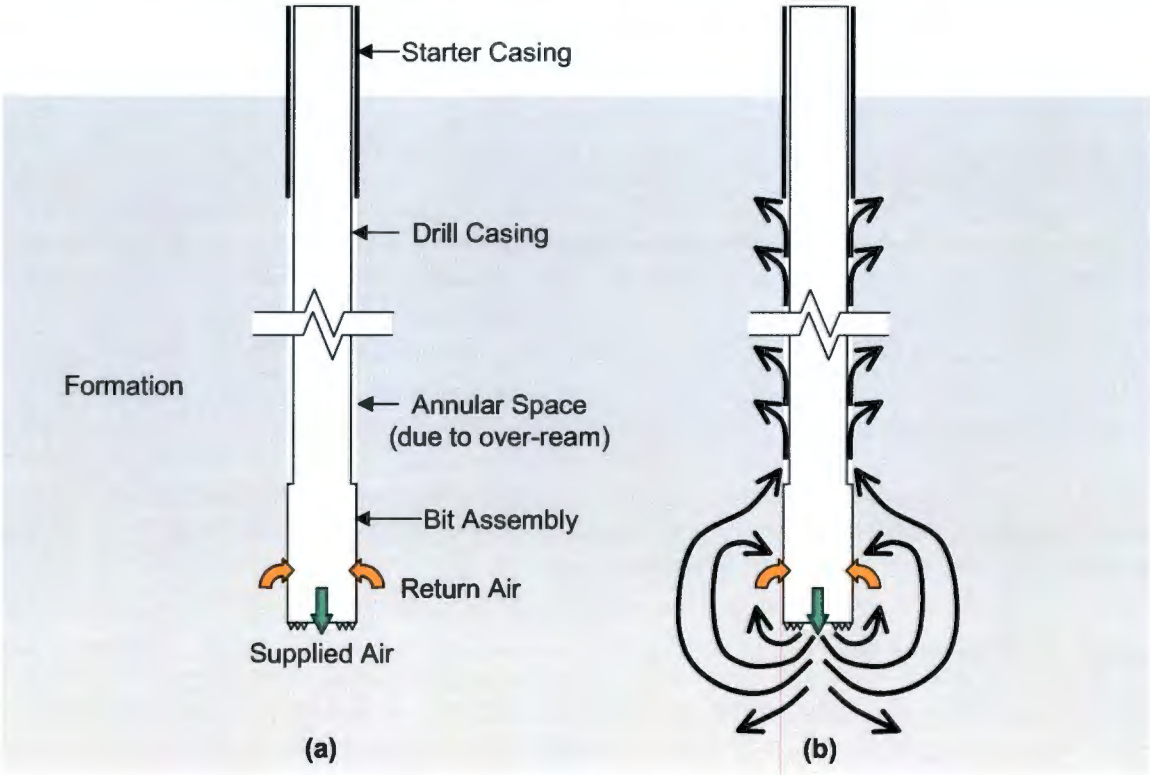
The above evaluation of the idealized processes occurring sequentially yields a conservative estimate of recovery time, even given the conservativeness of the idealization, because it fails to consider that diffusive rebound would occur simultaneous with the expansion of the perturbed region. A way to account for this would be to integrate the curve in Figure ATT-2 over time, incorporating an additional term that deducts from the perturbed region caused by diffusive rebound as perturbation is occurring. However, such an approach would require solution of the inverse complementary error function, expressed as a function of time and distance, and thus would necessarily rely on numerical integration to evaluate the integral. The level of effort at this point would be nearly comparable to finite-element numerical modeling of the entire problem, which also would better mitigate the effects of the simplifying assumptions.

IMPACT OF SIMPLIFICATION

The idealizations developed above to characterize perturbation and recovery of ambient concentrations as a result of air injection during drilling fail to account for several significant physical mechanisms, all of which have a mitigating effect on the recovery time. The most significant among these are the air-loss mechanisms that reduce the rate of expansion of the perturbed region in the direction of the sampled point.

Consider Figure ATT-5, which is a schematic representation of the EAPS drill string embedded in the subsurface. In Figure ATT-5(a), relevant features of the combined drill-string/borehole geometry are labeled, and in Figure ATT-5(b), potential pathways of air flow to the formation are indicated with arrows.

Figure ATT-5. Schematic of Enhanced Access Penetration System Drill String Embedded in the Subsurface, (a) With Features Labeled and (b) Showing Potential Air-Loss Pathways.



Apparent in Figure ATT-5 are three pathways for injected air to be lost from the system. Two obvious pathways include the return-air vents and the direct pathway to the formation. But a significant third pathway exists through the annular space. As in the idealization discussed above, a relatively spherical distribution of isobars will exist in the immediate vicinity of the bit. However, once these isobars extend beyond the top of the drill bit, the localized pressure buildup effectively is vented to the annular region around the drill casing, with relatively a large surface area against the formation. This effectively mitigates the perturbation below the bit by distributing it to regions that the EAPS already has penetrated.

A further mitigating deviation from the idealization occurs with respect to the assumption of homogenous permeability over an infinite domain. When the drill bit is in a relatively high permeability formation, above a relatively low permeability formation, the majority of the otherwise spherical induced flow will be confined to the higher permeability formation because of the permeability contrast. Therefore, when descending on Cold Creek unit caliche from above, the majority of air injected into the formation by the drilling operation will be dissipated into the overlying formation. In this same vein, the existence of an infinitely permeable layer

above ground surface (e.g., the atmosphere) also may direct air lost to the formation upward, further mitigating the amount of perturbation that occurs beneath the drill bit.

In addition to the influences of geometry and heterogeneity on perturbing air flow, unaccounted-for rebound mechanisms may further serve to mitigate the predicted conditions. One of the mechanisms previously mentioned is the compressibility of the injected air. The second mechanism comprises whatever advective processes may be occurring below the surface at the 200 West Area, as may reasonably be expected to exist because of variations in water table elevation, barometric pressure, and temperature that are known to occur (and also soil-vapor extraction operations). Third among these mechanisms is the potential for rebound to be driven by solid and/or liquid phase CCl_4 that would not be displaced or exhausted as easily as vapor by the introduction of drilling air.

CONCLUSIONS AND RECOMMENDATIONS

To accurately assess the impact of the subject phenomenon, the effects of several significant complicating mechanisms must be considered. Unfortunately, simplification of the problem using an idealized set of assumptions results in underestimation of air-loss mechanisms, concentration rebound mechanisms, and other impact-mitigating phenomena. Therefore, any simplification of the problem, as presented herein, is predisposed to result in conservative estimates of rebound time.

The most effective manner of rigorously evaluating all relevant and significant effects is via simulation using finite-element numerical modeling. However, such an undertaking is beyond the current scope. Therefore, a strong recommendation for the field investigation is to observe and characterize the rebound phenomenon in the field using the capabilities of the infrared photoacoustic spectrometer.

Because the air being injected as a result of drilling is dryer than the ambient subsurface soil gas, the water-vapor channel of the infrared photoacoustic spectrometer can provide an indication of rebound that is independent of the CCl_4 concentration.[1] By monitoring the water-vapor channel of the infrared photoacoustic spectrometer simultaneously with the CCl_4 channel, rebound times of each can be compared. The proximity of the sampling location to subsurface dense, nonaqueous-phase liquid may be discernible by the occurrence of accelerated rebound of the CCl_4, because this would indicate a relative dominance of diffusion over advection. Quantitative tests to assess the potential usefulness of rebound monitoring for this purpose, and to quasi-empirically evaluate the perturbation and required recovery time incurred by the introduction of drilling air, are therefore recommended.

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[1] In fact, perturbation and rebound on water-vapor concentrations already have been observed, but not analyzed, in previous Enhanced Access Penetration System field operations using the infrared photoacoustic spectrometer at the 200 West Area.

APPENDIX C

QUARTERLY LETTER REPORTS FOR THE 218-W-4C BURIAL GROUND, OCTOBER-DECEMBER 2003 AND JANUARY-MARCH 2004

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CONTENTS

Appendix C1. Burial Ground Sampling and Analysis Results for October – December 2003 (revised May 2004)..... C1-1

Appendix C2. Burial Ground Sampling and Analysis Results for January – March 2004... C2-1

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BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2003

SUMMARY

Step I of the sampling design in the sampling and analysis plan for the 218-W-4C Burial Ground was completed during the October – December 2003 quarter. Vapor samples were collected through existing vent risers in trenches T-01, T-04, T-07, T-20, and T-29 and analyzed for volatile organic compounds using field screening instruments. The highest concentrations were detected at the east end of trench T-04. Preliminary action levels are not applicable to these vapor samples. Other than incidental and unavoidable vapor releases to atmosphere associated with sampling at the vent risers, no contaminant releases to the environment were documented as a result of the vent riser vapor sampling.

Results for vapor samples submitted for laboratory analysis are anticipated to be received during the next quarter (January – March 2004) and will be provided in the next quarterly letter report. Based on the sampling design in the sampling and analysis plan for the 218-W-4C Burial Ground, Step II sampling is planned following retrieval of the retrievably stored waste.

1.0 INTRODUCTION

This quarterly letter report has been prepared in response to *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989) Settlement and Tentative Agreement Interim Milestone M-91-40, Requirement 2, paragraph 3. The sampling and analysis activities summarized in this quarterly letter report were conducted in accordance with DOE/RL-2003-48, *218-W-4C Burial Ground Sampling and Analysis Plan*, issued by the Washington State Department of Ecology on September 12, 2003 as an attachment to Skinnarland 2003, "Issuance of the Final 218-W-4C Sampling and Analysis Plan (SAP) in Conjunction with Administrative Order No. 03NWPKW-5494 Issued on April 30, 2003, by the Washington State Department of Ecology (Ecology) and Modified by Stipulation Approved on July 8, 2003, by the Washington State Pollution Control Hearings Board on July 8, 2003." This letter report covers the quarter from October through December 2003.

The 218-W-4C sampling and analysis plan (SAP) was developed to determine whether contaminants have been released to the vadose zone from retrievably stored waste[1] in the 218-W-4C Burial Ground in the 200 West Area of the Hanford Site. In the 218-W-4C Burial Ground, Trenches T-01, T-04, T-07, T-20, T-24, and T-29 contain suspect TRU[2] retrievable

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[1] Retrievably stored for purposes of the *Atomic Energy Act of 1954*.

[2] Transuranic (waste materials contaminated with 100 nCi/g of transuranic materials having half-lives longer than 20 years).

waste (Figure 1). The waste typically is contained in 208-L (55-gal) drums. A schematic cross section of a retrievable storage trench in the 218-W-4C Burial Ground is shown in Figure 2.

The 218-W-4C sampling design consists of three steps. Step I is vapor sampling through vent risers in the trenches before waste retrieval. Steps II and III are conducted following waste retrieval. Step II includes sampling the asphalt pad and adjacent soils. Step III involves assessing the data collected in Steps I and II, leading to potential characterization of the substrate soils beneath the asphalt pads.

The Step I sampling in the 218-W-4C Burial Ground was completed during the October – December 2003 quarter addressed by this letter report. As specified in the 218-W-4C SAP, the Step II and Step III sampling to characterize the substrate soils will be conducted when the asphalt pad in an entire trench has become accessible and sampling will not interfere with waste retrieval operations. The results of the Step I sampling will be used to focus the Step II sampling.

2.0 SAMPLING METHODOLOGY

Before waste retrieval began, 85 vent risers existed in trenches T-01, T-04, T-07, T-20, and T-29 in the 218-W-4C Burial Ground (Table 1). No vent risers existed in trench T-24. As stated in the SAP, sampling was limited to the existing vent risers that were accessible without posing health and safety risks to workers. During Step I, vapor samples were collected from 84 vent risers that generally were aligned with the centers of the engineered trenches.

Two types of vapor samples were collected. At each trench, vapor samples initially were collected from each riser and contained in Tedlar[1] bags for on-site analysis using a field-screening instrument. A vapor sample then was collected from the vent riser in that trench that had the highest carbon tetrachloride concentration, based on the field-screening results. This vapor sample was contained in a SUMMA[2] canister for laboratory analysis. A total of 91 vapor samples were collected. Of these, 84 samples were collected in Tedlar bags for field screening and 7 samples were collected in SUMMA canisters for laboratory analysis. The samples collected in SUMMA canisters include one from each trench, one duplicate, and one additional sample that was inadvertently collected from a vent riser that did not have the highest carbon tetrachloride concentration in that trench.

Vent riser sampling was initiated on October 15, 2003. Eighty-nine vapor samples were collected in Tedlar bags or SUMMA canisters between October 15 and October 22, 2003. The

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[1] Tedlar is a registered trademark of E. I. du Pont de Nemours and Company, Wilmington, Delaware.

[2] SUMMA is a trademark of Moletrics, Inc., Cleveland, Ohio.

last two samples (one Tedlar bag and one SUMMA canister) were collected between December 8 and December 10, 2003.

All but two of the vent risers were sampled between October 15 and October 22, 2003. The steep sides of trench T-20 at the locations of vent risers T20-01 and T20-07 precluded access by foot. A vapor sample was collected from vent riser T20-01 on December 8, 2003 using an aerial lift for access. However, a vapor sample could not be collected from vent riser T20-07 because of access limitations. The aerial lift could not be staged on the north side of the trench at this location because of uneven surface topography and was not staged on the south side of the trench because a road was being constructed adjacent to the trench for use in retrieval operations.

A sample location number (trench and riser) was established and recorded for each vent riser. The vent risers in each trench were numbered sequentially from east to west. If the vent riser was offset to the north or south of the center of the trench, a notation of "N" or "S" was added to the sample location number to indicate the direction of offset. For example, sample location "T1-06-N" signifies trench 1, vent riser 6, which is offset to the north of the trench centerline.

Before the vent riser cap was removed, the depth from the top of each vent riser to the ground surface was measured and recorded. After removing the vent riser cap, a 15.2-m- (50-ft-) long piece of TYGON[1] tubing was lowered to the bottom of the riser or until refusal. The tubing was 0.3-cm (0.125-in.) inside diameter and 0.6-cm (0.25-in.) outside diameter with a metal filter on the lower end. The tubing was marked at 0.3-m (1-ft) intervals so that depth from the top of the riser to the bottom could be measured. The depth-to-bottom from the top of the riser was typically 6.1 m (20 ft) (Table 2). The tubing then was pulled back approximately 0.2 m (0.5 ft) to lift the filter off of the bottom of the trench. A 5.08-cm (2-in.) diameter plastic disk was slid along the tubing to cover the top of the riser during purging and sampling. The vapor sampling method is shown schematically in Figure 2.

The sample tubing was connected to a sampling pump, which was used to pump vapor for one to two minutes to purge the tubing. Carbon tetrachloride concentrations at the outlet of the pump were monitored using a MIRAN SapphIRe Ambient Air Analyzer (MIRAN analyzer), an infrared detector calibrated to measure carbon tetrachloride. Purging then was continued until the concentration readings on the MIRAN analyzer stabilized or, at the discretion of the industrial hygienist, in the event that no organics were detected. A vapor sample then was collected in a 1 L Tedlar bag for analysis. Following sample collection, the sample tubing was removed from the riser and the cap was replaced.

Following sample collection, the filled Tedlar bags were stored in a clean cooler for transport to the onsite laboratory for analysis. The samples were analyzed using a field screening instrument within 6 hours of the collection time (Table 2).

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[1] TYGON is a trademark of Norton Performance Plastics Corporation, a Saint-Gobain Company, Akron, Ohio.

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2003

After the Tedlar bag samples from all accessible risers in a trench had been analyzed, a vapor sample was collected in a SUMMA canister from the vent riser with the highest carbon tetrachloride concentration, based on field screening results. The sampling methodology was similar to that used for collecting Tedlar bag samples. Following the 1 to 2 minute purge, the valve on the canister was opened for 1 minute to allow vapor to flow into the 6 L canister. The SUMMA canisters were transported to the laboratory for analysis.

The locations of the vent risers in the 218-W-4C Burial Ground trenches were surveyed on November 11, 2003. Coordinates were recorded using NAVD88, *North American Vertical Datum of 1988*, and the Washington State plane (south zone) in NAD83, *North American Datum of 1983*, with the 1991 adjustment for horizontal coordinates. The survey data will allow the locations of the vent risers to be established following waste (and vent riser) retrieval. The relative locations of the vent risers are shown on Figure 3.

3.0 ANALYTICAL RESULTS

During Step I sampling at the 218-W-4C Burial Ground, vapor samples were collected from inside the engineered trenches through vent risers. Most of the samples were collected near the base of the trench, which is typically approximately 5 m (16 ft) below the engineered surface overlying the trench (Table 2).

The samples were collected in Tedlar bags for field screening using a Photovac 10S Plus[1] gas chromatograph equipped with a photoionization detector (11.7 eV lamp). The gas chromatograph is configured to analyze eight volatile organic compounds: carbon tetrachloride, chloroform, methylene chloride, 1,1,1-trichloroethane (1,1,1-TCA), 1,1,2-trichloroethane (1,1,2-TCA), 1,1-dichloroethane (1,1-DCA), trichloroethylene (TCE), and tetrachloroethylene (PCE). Confirmatory analyses for carbon tetrachloride and chloroform were performed using the Innova[2] 1312 multi-gas analyzer to add a level of confidence to the gas chromatography data. The Innova multi-gas analyzer is configured to analyze only these two volatile organic compounds (VOC).

The practical quantitation limits used for the VOC analyses on the gas chromatograph were set at 0.25 parts per million by volume (p/mv) for 1,1-DCA and PCE, 0.20 p/mv for chloroform and carbon tetrachloride, 0.15 p/mv for 1,1,1-TCA, and 0.10 p/mv for methylene chloride, TCE, and 1,1,2-TCA. The Innova multi-gas analyzer has two carbon tetrachloride filters. Filter "A" is calibrated for concentrations exceeding 100 p/mv; filter "B" is calibrated for concentrations between 1 and 100 p/mv.

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[1] Photovac 10S Plus is a trademark of Photovac, Inc., Waltham, Massachusetts.

[2] Innova is a trademark of Innova AirTech Instruments A/S, Ballerup, Denmark

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2003

The results measured using the gas chromatograph and the Innova multi-gas analyzer field screening instruments for samples collected through 218-W-4C Burial Ground vent risers are provided in Table 3.

The confirmatory analyses on October 15 through October 20, 2003, showed good correlation between the gas chromatograph and the Innova multi-gas analyzer. During confirmatory analysis on October 21, 2003, an anomaly was discovered. Concentration data from the gas chromatograph for carbon tetrachloride and chloroform were consistently lower than concentration data from the Innova multi-gas analyzer. It is believed that the gas chromatograph detector lamp had degraded and was no longer reliable for these two compounds and that the Innova multi-gas analyzer data are more representative.

Before the Tedlar bag samples were analyzed each day, a method library of eight compounds was calibrated using commercially prepared calibration gas mixes at concentrations of 1.0 p/mv. Instrument performance was checked before and after sample analysis using a calibration check standard containing six of the eight target analytes. Comparison of the initial and final calibration check results indicates that all six VOCs show good recoveries on each day of analysis (Table 4). Good agreement between the calibration and calibration check results would indicate that the data generated from these analyses are reliable. However, because no independently prepared standards were available to check the calibration (i.e., the calibration check gas is made up from the calibration standards), these calibration checks can identify detector drift or failure but not gradual loss of instrument response. The Innova data indicate that the carbon tetrachloride and chloroform results from the gas chromatograph were unrepresentative (i.e., concentrations were too low) on October 21, 2003, and subsequent days. The gas chromatograph lamp potentially was unreliable for the other VOCs as well. Although the gas chromatograph data on October 21 and October 22 may be unrepresentative, a positive detection of a compound still indicates that it is present in the sample. As a result, the gas chromatograph data still can be used to guide the Step II sampling, which was the basis for the Step I sampling in the sampling design. Affected data are identified in Table 3.

The analyses of the SUMMA canister samples potentially can be used to check the gas chromatograph performance. The SUMMA canister samples for laboratory analysis were collected from vent risers T1-04 and T29-04-N on October 21, 2003, and from vent risers T29-01-S, T4-04, and T7-06 on October 22, 2003. A duplicate SUMMA canister sample was collected from vent riser T4-04 on October 22, 2003. (A SUMMA canister sample was collected from vent riser T29-04-N on October 21, 2003. However, the maximum carbon tetrachloride concentration in trench T-29 had not been detected at this vent riser, so a second SUMMA canister sample was collected in trench T-29 from vent riser T29-01-S on October 22, 2003 to correct this unintentional mistake. Both of these SUMMA canister samples were submitted for laboratory analysis.) The SUMMA canister sample for laboratory analysis was collected from vent riser T20-03 on December 10, 2003. The results of the SUMMA canister samples were not available by December 31, 2003 and will be included in a subsequent quarterly report.

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2003

The maximum concentrations of VOCs detected in each trench are summarized in Table 1. For each of these eight VOCs, the highest concentration was detected at the east end of trench T-04 (Table 3).

4.0 QUALITY CONTROL

For vent riser vapor samples collected either in Tedlar bags or SUMMA canisters, field quality control consisted of duplicate samples and equipment blank samples. For vent riser vapor samples collected in Tedlar bags, one duplicate sample was analyzed on each day of sampling (Table 3). As a result, one field duplicate was analyzed for every 20 samples, as required, with the exception of one day when 25 samples were collected. The duplicate samples were collected to evaluate the performance of the analytical method by comparing two analyses of the vapor concentration in one Tedlar bag. Of the seven sample-duplicate pairs analyzed using the gas chromatograph, two pairs had no detectable VOCs in either the sample or the duplicate. For the five pairs with detections of at least one VOC in the sample and duplicate, the relative percent difference (RPD) was calculated for each pair of VOC results according to the formula:

$$RPD = \frac{(C_1 - C_2)x100}{(C_1 + C_2)/2}$$

where:

C_1 = the larger of the two observed values

C_2 = the smaller of the two observed values.

The maximum RPD was 44 percent. In the 20 other VOC pairs, the RPD ranged from 0 to 12 percent (average 4 percent). The RPD was calculated only for VOC pairs in which both the sample and the duplicate result were unqualified (i.e., no data flags). With the exception of one VOC pair, these data met the required precision of 25 percent. These calculations indicate that the gas chromatograph analytical method produced repeatable measurements.

Of the four sample-duplicate pairs analyzed using the Innova multi-gas analyzer, all four pairs had detections of at least one VOC in the sample and duplicate. The maximum RPD was 29 percent. In the five other VOC pairs, the RPD ranged from 0 to 1 percent. With the exception of one VOC pair, these data met the required precision of 25 percent.

For the vent riser vapor samples collected in SUMMA canisters, one duplicate sample was collected from vent riser T4-04 in a separate SUMMA canister. Results are not yet available.

The purpose of collecting equipment blanks is to verify the adequacy of sampling equipment decontamination procedures. Because no Tedlar bags were decontaminated and reused during

vent riser sampling, equipment blanks were not required. The SUMMA canisters are analyzed for cleanliness at the laboratory.

As discussed above, a gas calibration check standard containing six of the target VOCs was analyzed each day using the gas chromatograph (Table 4). The concentration of each VOC in the calibration check standard was 1.0 p/mv. The pairs of standard and measured VOC concentrations were used to evaluate the accuracy of the analyses conducted using the gas chromatograph. The percent recovery (%R) was calculated according to the formula:

$$\%R = 100x(C_m / C_s)$$

where

C_m = the measured concentration of carbon tetrachloride

C_s = is the standard.

The maximum %R was 105 percent and the minimum was 76 percent. These calculations indicate that the gas chromatograph analyses of the VOC concentrations were accurate within 25 percent, as required. These results indicate good recovery.

A gas calibration check standard of known carbon tetrachloride concentration was analyzed using the Innova multi-gas analyzer each day (Table 4). A gas standard concentration of 25.5 p/mv was used for the low-concentration "B" filter. A gas standard concentration of 200 p/mv was used for the high-concentration "A" filter. The pairs of standard and measured carbon tetrachloride concentrations for the low-concentration filter were used to evaluate the accuracy of the carbon tetrachloride analyses conducted using the Innova multi-gas analyzer. The maximum %R was 95 percent and the minimum was 89 percent. These calculations indicate that the Innova analyses of the carbon tetrachloride concentrations were accurate within 11 percent, meeting the requirement of 25 percent. These results indicate good recovery.

A blank sample of certified clean air was analyzed each day using the gas chromatograph. No VOCs were detected in the blanks (Table 5). Blank samples also were analyzed each day using the Innova multi-gas analyzer. With the exception of one detection of chloroform in one blank, the analytical results for the blank samples were all non-detect for carbon tetrachloride and chloroform (Table 5).

No holding times were exceeded during collection and field screening of vent riser vapor samples, with the exception of the duplicate sample for vent riser T4-04. This sample was analyzed within 8 hours following sample collection, which exceeded the 6-hour holding time.

Data validation of the field screening analytical results was performed at level C to ensure that the data are usable (BHI-01435, *Data Validation Procedure for Chemical Analysis*).

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5.0 HEALTH AND SAFETY MONITORING AND RADIOLOGICAL FIELD SCREENING

Health and safety monitoring was conducted by industrial hygienists during the Step I sampling activities at the 218-W-4C Burial Ground. Before they removed the cap from each vent riser, the industrial hygienists would screen for carbon tetrachloride using a MIRAN analyzer and for combustible gases. (Note: Combustible gases were monitored to test the environment for intrinsic safeness for both equipment selection and breathing zone exposure.) The industrial hygienists surveyed for carbon tetrachloride again at the top of the riser following removal of the vent riser cap. Carbon tetrachloride concentrations were detected at 56 vent risers using the MIRAN analyzer (Table 2). The radiological control technician then surveyed for radiological contamination. After each riser was surveyed and monitored for entry, a vapor sample was collected for analysis. During the sampling activities, the industrial hygienists performed continuous monitoring in the breathing zone and point source for carbon tetrachloride. Controls put in place to prevent exposure included restricted access to limit personnel entry to only those designated to perform the work. A vapor and gas barrier was placed at the top of the vent riser to prevent bypass during vapor sampling.

After the vent riser sample was collected, the radiological control technician wiped the tubing and filter with a cloth as it was retrieved to monitor for potential radiological contamination. Radiological field screening detected no radiological contamination at the vent risers in the 218-W-4C Burial Ground.

6.0 COMPARISON TO REGULATORY REQUIREMENTS

As noted in CP-16886, *Data Quality Objectives Summary Report for the 218-W-4C Burial Ground Contaminant Release Investigation*, preliminary action levels are not applicable to VOC vapor samples.

7.0 DOCUMENTED CONTAMINANT RELEASES TO THE ENVIRONMENT

Other than incidental and unavoidable vapor releases to atmosphere associated with sampling at the vent risers, no contaminant releases to the environment were documented as a result of the vent riser vapor sampling. The vent riser vapor samples were collected from within the engineered trench. The Step II and Step III characterization of the asphalt pad and vadose zone is designed to evaluate whether contaminants within the engineered trench were released to the environment.

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2003

8.0 PLANNED AND/OR SCHEDULED ADDITIONAL WORK

The field work associated with the Step I sampling at the 218-W-4C Burial Ground was completed during this quarter (October – December 2003). The analytical results of the SUMMA canister samples are anticipated to be provided during the next quarter (January – March 2004). These results will be evaluated and reported in the next quarterly report.

Based on the sampling design for the 218-W-4C Burial Ground, Step II sampling is planned following completion of Step I sampling and retrieval of the suspect TRU waste. The Step II characterization will be scheduled when the asphalt pad in an entire trench has become accessible and sampling will not interfere with waste retrieval operations.

9.0 REFERENCES

Atomic Energy Act of 1954, 42 USC 2011, et seq.

BHI-01435, 2000, *Data Validation for Chemical Analysis*, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

CP-16886, 2003, *Data Quality Objectives Summary Report for the 218-W-4C Burial Ground Contaminant Release Investigation*, Rev. 0, Fluor Hanford, Inc., Richland, Washington.

DOE/RL-2003-48, 2003, *218-W-4C Burial Ground Sampling and Analysis Plan*, Rev. 0, U.S. Department of Energy, Richland, Operations Office, Richland, Washington. Issued as an attachment to the Skinnarland letter listed below.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington, as amended.

NAD83, 1991, *North American Datum of 1983*, National Geodetic Survey, Federal Geodetic Control Committee, Silver Spring, Maryland.

NAVD88, 1988, *North American Vertical Datum of 1988*, National Geodetic Survey, Federal Geodetic Control Committee, Silver Spring, Maryland.

Skinnarland, R., 2003, "Issuance of the Final 218-W-4C Sampling and Analysis Plan (SAP) in Conjunction with Administrative Order No. 03NWPKW-5494 Issued on April 30, 2003, by the Washington State Department of Ecology (Ecology) and Modified by Stipulation Approved on July 8, 2003, by the Washington State Pollution Control Hearings Board on July 8, 2003," (letter to K. A. Klein, U. S. Department of Energy, Richland Operations Office), Washington State Department of Ecology, Olympia, Washington, September 12. Attachment is DOE/RL-2003-48 listed above.

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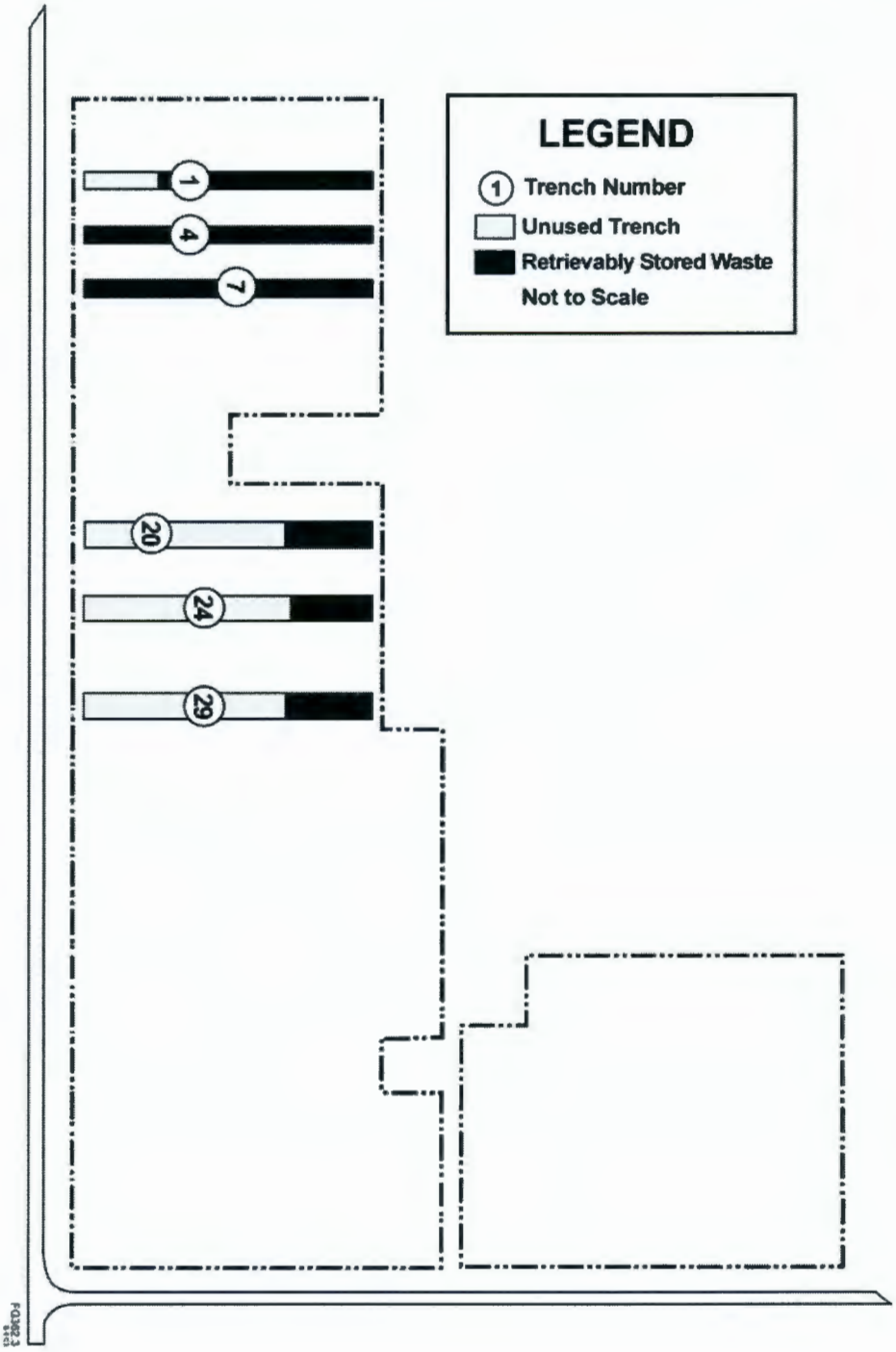
Figure 1. Locations of Retrievably Stored Waste Trenches at the 218-W-4C Burial Ground.



BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2003

Figure 2. Schematic View of 218-W-4C Burial Ground Trench and Vent Riser Sampling Method.

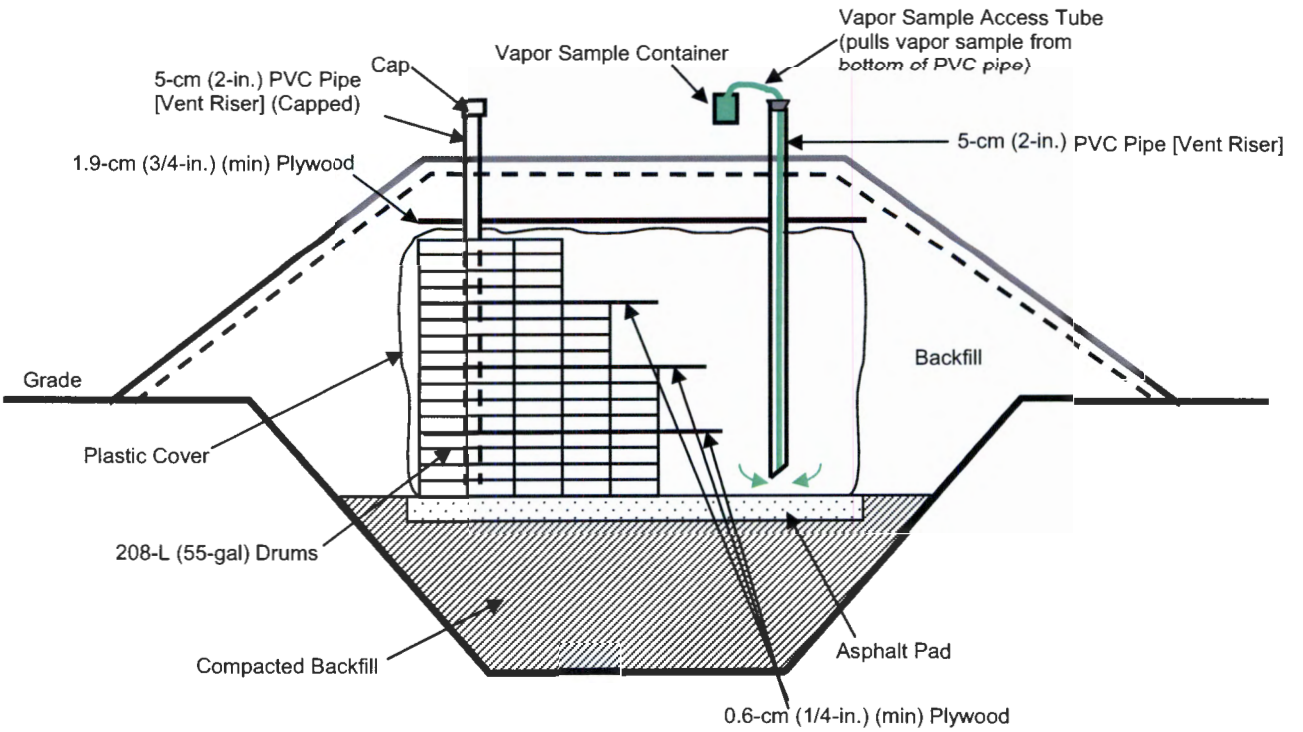


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Figure 3. Locations of Vent Risers in 218-W-4C Burial Ground.

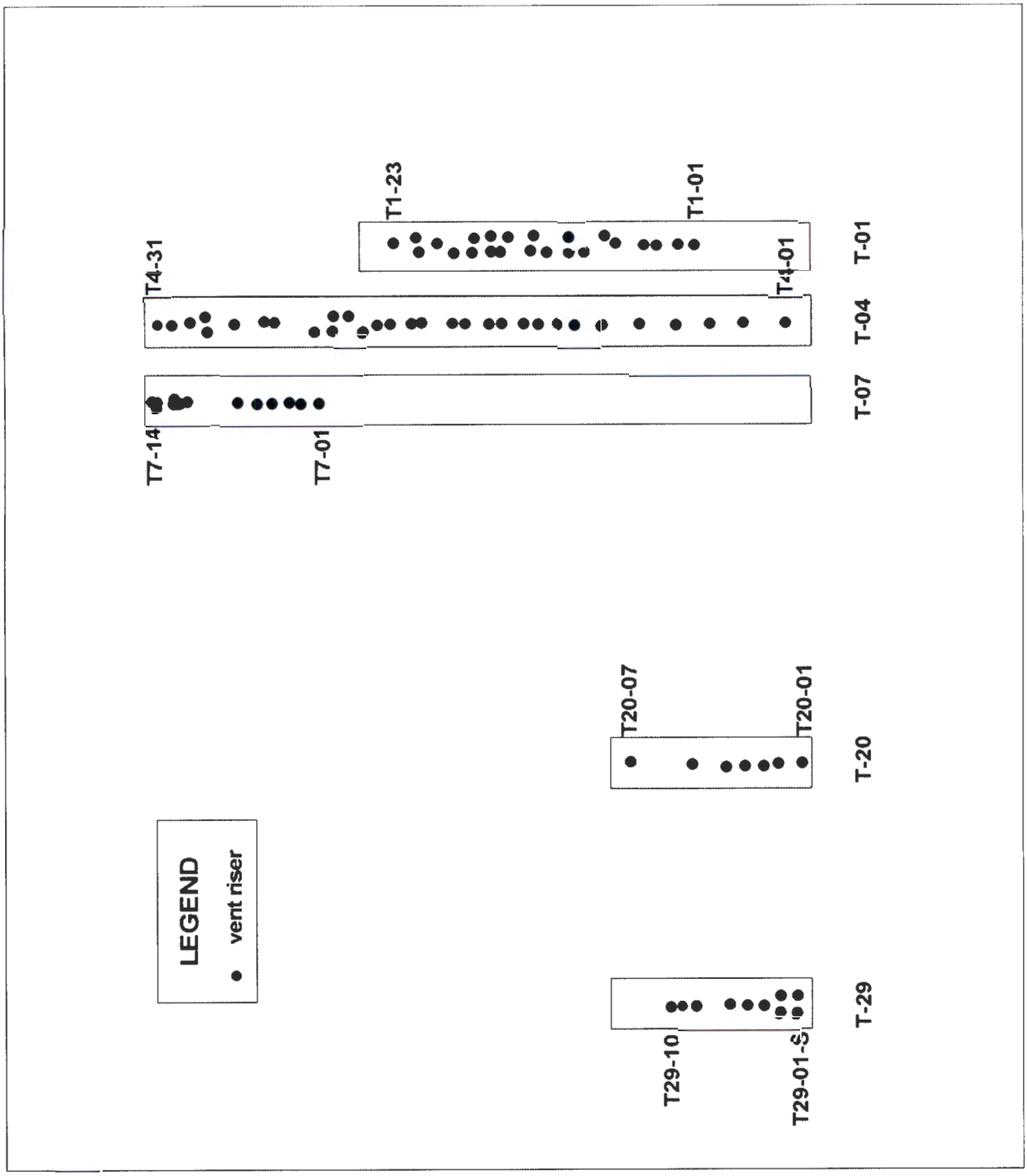

Table 1. Summary of 218-W-4C Burial Ground Step I Sampling.

Trench	# of Vent Risers	# of Vent Risers Sampled for Field Screening	# of SUMMA Canister Samples Collected[a]	Maximum Concentrations in Vent Riser Samples, Based on Field Screening							
				DCM (p/mv)	1,1-DCA (p/mv)	TCM (p/mv)	1,1,1-TCA (p/mv)	CCl_4 (p/mv)	TCE (p/mv)	1,1,2 TCA (p/mv)	PCE (p/mv)
T-01	23	23	1	0.82	0.45	3.03	4.28	0.170j	1.30	< 0.10	5.50
T-04	31	31	2	4.71x	28.1ex	283	2,337ex	668	25.5ex	0.98x	1,717ex
T-07	14	14	1	0.81x	< 0.25x	42.4	1.08x	13.5	1.56x	0.031jx	47.3ex
T-20	7	6	1	< 0.10x	< 0.25x	4.32	1.00x	33.1	< 0.10x	< 0.10x	8.00x
T-29	10	10	2	< 0.10	< 0.25	3.37	1.52	0.62	< 0.10	< 0.10	< 0.25

[a] A duplicate SUMMA canister sample was collected from trench T-04. A second SUMMA canister sample was collected from trench T-29 because the first sample was not collected from the vent riser in trench T-29 with the highest carbon tetrachloride concentration, as required by the sampling design.

e = exceeds calibration range.
j = value less than practical quantitation limit.
p/mv = parts per million by volume.
1,1-DCA = 1,1-dichloroethane.
1,1,1-TCA = 1,1,1-trichloroethane.
1,1,2-TCA = 1,1,2-trichloroethane.
CCl_4 = carbon tetrachloride.
DCM = dichloromethane (methylene chloride).
PCE = tetrachloroethylene.
TCE = trichloroethylene.
TCM = trichloromethane (chloroform).
x = value is suspect-low because of gas chromatograph lamp degradation. However, a positive detection indicates the presence of the compound in the sample.

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Table 2. Field Measurements for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (4 Pages)

Sample Identifier	Sample Depth		Carbon Tetrachloride Concentration[a] (p/mv)	HEIS Number	Sample Date	Sample Time	Analysis Date	Analysis Time
	Below Top of Riser (m)	Below Surface (m)						
T1-01	6.1	5.2	NR	B17T85	10/16/2003	11:11	10/16/2003	12:21
T1-02	6.1	5.2	0	B17T86	10/16/2003	11:03	10/16/2003	12:36
T1-02 Duplicate	6.1	5.2	0	B17TC0	10/16/2003	11:03	10/16/2003	14:23
T1-03	3.0	2.0	0	B17T87	10/16/2003	10:54	10/16/2003	12:45
T1-04	3.0	1.9	0	B17T88	10/16/2003	10:44	10/16/2003	12:52
T1-05	6.1	5.0	0	B17T89	10/16/2003	10:35	10/16/2003	12:30
T1-06-N	6.1	4.9	0	B17T90	10/16/2003	10:26	10/16/2003	12:58
T1-07-N	6.1	4.7	0	B17T91	10/16/2003	10:16	10/16/2003	13:08
T1-08-S	6.1	4.6	0	B17T92	10/16/2003	10:07	10/16/2003	13:14
T1-09-S	6.1	4.8	0	B17T93	10/16/2003	9:58	10/16/2003	13:30
T1-10-S	6.1	5.2	0	B17T94	10/16/2003	9:50	10/16/2003	13:37
T1-11-S	4.3	4.2	0	B17T95	10/16/2003	9:43	10/16/2003	13:44
T1-12-N	6.1	4.8	0	B17T96	10/16/2003	9:35	10/16/2003	13:50
T1-13-N	6.1	5.1	0	B17T97	10/16/2003	9:24	10/16/2003	13:58
T1-14-S	6.1	5.3	0	B17T98	10/16/2003	9:15	10/16/2003	14:04
T1-15-S	6.1	5.4	0	B17TB8	10/16/2003	9:07	10/16/2003	14:10
T1-16-N	5.2	4.3	0	B17TB9	10/16/2003	8:59	10/16/2003	14:16
T1-17-N	4.3	3.7	0.15	B17TB0	10/15/2003	14:54	10/15/2003	16:04
T1-18-S	6.1	5.4	0.1	B17TB2	10/15/2003	14:46	10/15/2003	15:53
T1-18-S Duplicate	6.1	5.4	0.1	B17TB1	10/15/2003	14:46	10/15/2003	15:58
T1-19	6.1	5.4	0	B17TB3	10/15/2003	14:38	10/15/2003	15:48
T1-20	6.1	5.5	0	B17TB4	10/15/2003	14:25	10/15/2003	15:42
T1-21-S	6.1	5.2	0.4	B17TB5	10/15/2003	13:03	10/15/2003	15:37
T1-22-N	6.1	5.1	0	B17TB6	10/15/2003	12:55	10/15/2003	15:31
T1-23	6.1	4.0	0	B17TB7	10/15/2003	13:30	10/15/2003	15:26
T4-01	6.1	5.9	1.01	B17TJ3	10/21/2003	9:59	10/21/2003	14:20
T4-02	6.1	5.7	12.5	B17TJ4	10/21/2003	9:53	10/21/2003	14:07
T4-03	6.1	5.2	5.2	B17TJ5	10/21/2003	9:45	10/21/2003	13:59

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Table 2. Field Measurements for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (4 Pages)

Sample Identifier	Sample Depth		Carbon Tetrachloride Concentration[a] (p/mv)	HEIS Number	Sample Date	Sample Time	Analysis Date	Analysis Time
	Below Top of Riser (m)	Below Surface (m)						
T4-04	6.1	5.1	16.0	B17TJ6	10/21/2003	9:38	10/21/2003	13:42
T4-04 Duplicate	6.1	5.1	16.0	B17V84	10/21/2003	9:38	10/21/2003	17:07
T4-05	6.1	5.2	0.2	B17TJ7	10/21/2003	9:15	10/21/2003	13:36
T4-06	5.8	5.0	0.33	B17TJ8	10/21/2003	9:08	10/21/2003	13:26
T4-07	6.1	5.4	0.2	B17TJ9	10/21/2003	8:56	10/21/2003	13:11
T4-08	6.1	5.3	1.8	B17TK0	10/21/2003	8:50	10/21/2003	12:57
T4-09	4.6	4.2	0.22	B17TK1	10/21/2003	8:43	10/21/2003	13:18
T4-10	7.6	6.8	0.16	B17TK2	10/21/2003	8:37	10/21/2003	13:03
T4-11	6.1	5.3	1.3	B17TF4	10/20/2003	11:13	10/20/2003	12:35
T4-12	6.1	5.4	1.2	B17TF5	10/20/2003	11:07	10/20/2003	12:43
T4-13	6.1	5.2	0.8	B17TF6	10/20/2003	10:57	10/20/2003	12:50
T4-14	6.1	5.5	0.8	B17TF7	10/20/2003	10:49	10/20/2003	12:56
T4-15	4.3	3.7	0.12	B17TF8	10/20/2003	10:44	10/20/2003	13:04
T4-16	6.1	5.5	1.36	B17TF9	10/20/2003	10:36	10/20/2003	13:13
T4-17	6.1	5.3	0.95	B17TH0	10/20/2003	10:30	10/20/2003	13:20
T4-18	6.1	5.3	0.6	B17TH1	10/20/2003	10:25	10/20/2003	13:33
T4-19-S	6.1	5.2	0.04	B17TH2	10/20/2003	10:18	10/20/2003	13:40
T4-20-N	6.1	5.6	0.13	B17TH3	10/20/2003	9:58	10/20/2003	13:48
T4-21-N	6.1	5.6	0.05	B17TH4	10/20/2003	9:52	10/20/2003	13:55
T4-22-S	6.1	5.3	0.12	B17TH5	10/20/2003	9:45	10/20/2003	14:02
T4-23-S	6.1	5.3	0.05	B17TH6	10/20/2003	9:36	10/20/2003	14:16
T4-24	6.1	5.4	0.4	B17TH7	10/20/2003	9:28	10/20/2003	14:24
T4-25	6.1	5.5	1.4	B17TH8	10/20/2003	9:19	10/20/2003	14:31
T4-25 Duplicate	6.1	5.5	1.4	B17TH9	10/20/2003	9:19	10/20/2003	14:42
T4-26	6.1	5.3	0.08	B17TD4	10/19/2003	13:17	10/19/2003	14:39
T4-26 Duplicate	6.1	5.3	0.08	B17TF0	10/19/2003	13:17	10/19/2003	15:30
T4-27-S	6.1	5.4	0.2	B17TD5	10/19/2003	13:09	10/19/2003	14:46
T4-28-N	6.1	5.6	0.4	B17TD6	10/19/2003	13:00	10/19/2003	14:55

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Table 2. Field Measurements for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (4 Pages)

Sample Identifier	Sample Depth		Carbon Tetrachloride Concentration[a] (p/mv)	HEIS Number	Sample Date	Sample Time	Analysis Date	Analysis Time
	Below Top of Riser (m)	Below Surface (m)						
T4-29	6.1	5.5	1.8	B17TD7	10/19/2003	12:51	10/19/2003	15:06
T4-30	6.1	5.7	1.4	B17TD8	10/19/2003	12:41	10/19/2003	15:14
T4-31	6.1	5.4	1.7	B17TD9	10/19/2003	12:33	10/19/2003	15:23
T7-01	6.1	4.7	2.0	B17V61	10/21/2003	14:17	10/21/2003	16:17
T7-02	6.4	4.8	2.0	B17V62	10/21/2003	14:12	10/21/2003	16:10
T7-03	6.1	4.3	2.3	B17V63	10/21/2003	14:06	10/21/2003	15:56
T7-04	6.1	4.4	2.0	B17V64	10/21/2003	14:02	10/21/2003	16:48
T7-05	6.1	4.5	1.0	B17V65	10/21/2003	13:56	10/21/2003	15:34
T7-06	5.9	4.6	0	B17V66	10/21/2003	13:51	10/21/2003	16:41
T7-07	6.1	4.7	7.0	B17V67	10/21/2003	13:41	10/21/2003	15:41
T7-08	6.1	5.2	0.5	B17V68	10/21/2003	13:35	10/21/2003	16:24
T7-09-S	6.1	4.4	1.0	B17V69	10/21/2003	13:29	10/21/2003	16:03
T7-10	6.1	5.0	0	B17V70	10/21/2003	13:23	10/21/2003	15:11
T7-11-N	6.1	4.6	0.13	B17V71	10/21/2003	13:18	10/21/2003	16:57
T7-12	6.1	5.3	0.9	B17V72	10/21/2003	13:11	10/21/2003	15:19
T7-13	5.2	4.9	0	B17V73	10/21/2003	12:54	10/21/2003	15:48
T7-14-S	5.2	4.9	0	B17V74	10/21/2003	12:38	10/21/2003	16:32
T20-01	6.1	4.4	2.0	B186J3	12/8/2003	10:10	12/8/2003	10:21
T20-01 Duplicate	6.1	4.4	2.0	B186J4	12/8/2003	10:10	12/8/2003	10:23
T20-02	4.6	3.9	0.3	B17V79	10/22/2003	9:31	10/22/2003	12:28
T20-03	4.6	3.7	0.85	B17V80	10/22/2003	9:25	10/22/2003	12:35
T20-03 Duplicate	4.6	3.7	0.85	B17V81	10/22/2003	9:25	10/22/2003	12:45
T20-04	4.6	3.9	0.55	B17V82	10/22/2003	9:18	10/22/2003	12:53
T20-05	4.6	4.0	0.85	B17V83	10/22/2003	9:12	10/22/2003	13:02
T20-06	4.6	3.7	1.0	B17V75	10/21/2003	14:39	10/21/2003	15:26
T29-01-S	3.7	2.7	0.19	B17TC8	10/19/2003	10:15	10/19/2003	13:53
T29-02-S	2.7	1.8	0	B17TC9	10/19/2003	10:07	10/19/2003	14:00
T29-03-N	3.4	2.4	0.13	B17TD0	10/19/2003	10:01	10/19/2003	14:07
T29-04-N	3.7	2.7	0.16	B17TD1	10/19/2003	9:39	10/19/2003	14:14

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2003

Table 2. Field Measurements for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (4 Pages)

Sample Identifier	Sample Depth		Carbon Tetrachloride Concentration[a] (p/mv)	HEIS Number	Sample Date	Sample Time	Analysis Date	Analysis Time
	Below Top of Riser (m)	Below Surface (m)						
T29-05	4.0	3.0	0.17	B17TD2	10/19/2003	9:31	10/19/2003	14:20
T29-06	4.3	3.7	0.12	B17TD3	10/19/2003	9:23	10/19/2003	14:25
T29-07	4.3	3.8	0.03	B17TC1	10/16/2003	14:34	10/16/2003	15:16
T29-08	4.9	4.2	0	B17TC2	10/16/2003	14:23	10/16/2003	15:23
T29-09	4.3	4.2	0	B17TC3	10/16/2003	14:14	10/16/2003	15:29
T29-10	4.3	3.7	0	B17TC4	10/16/2003	13:51	10/16/2003	15:35

[a] Measured at top of vent riser using MIRAN Analyzer.
HEIS = Hanford Environmental Information System.
MIRAN = MIRAN is a registered trademarks of Thermo Electron Corporation, Franklin, Massachusetts.
NR = Not recorded.
p/mv = parts per million by volume.

Table 3. Field-Screening Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (5 Pages)

Sample Identifier	HEIS Number	Sample Date	Sample Time	Photovac 10S Plus Gas Chromatograph								Innova Multi-gas Analyzer			
				DCM (p/mv)	1,1-DCA (p/mv)	TCM (p/mv)	1,1,1-TCA (p/mv)	CCl_4 (p/mv)	TCE (p/mv)	1,1,2 TCA (p/mv)	PCE (p/mv)	CCl_4 "A" (p/mv)	CCl_4 "B" (p/mv)	TCM (p/mv)	Water Vapor (p/mv)
T1-01	B17T85	10/16/2003	11:11	0.82	0.44	0.120j	4.28	0.170j	1.30	<0.10	5.50	---	---	---	---
T1-02	B17T86	10/16/2003	11:03	0.62	0.36	0.089j	3.64	0.127j	0.92	<0.10	3.23	---	<1.0	1.20	9,370
T1-02 Duplicate	B17TC0	10/16/2003	11:03	0.64	0.38	0.092j	3.79	0.041j	0.95	<0.10	3.26	---	<1.0	1.60	9,310
T1-03	B17T87	10/16/2003	10:54	0.001j	0.021j	<0.20	<0.15	<0.20	<0.10	<0.10	0.087j	---	<1.0	2.83	9,310
T1-04	B17T88	10/16/2003	10:44	0.079j	0.45	<0.20	<0.15	0.24	<0.10	<0.10	0.089j	---	---	---	---
T1-05	B17T89	10/16/2003	10:35	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	---	---	---
T1-06-N	B17T90	10/16/2003	10:26	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	0.055j	---	<1.0	1.03	8,650
T1-07-N	B17T91	10/16/2003	10:16	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	<1.0	8,580
T1-08-S	B17T92	10/16/2003	10:07	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	<1.0	8,530
T1-09-S	B17T93	10/16/2003	9:58	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	0.036j	---	<1.0	<1.0	8,520
T1-10-S	B17T94	10/16/2003	9:50	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	<1.0	8,390
T1-11-S	B17T95	10/16/2003	9:43	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	<1.0	8,330
T1-12-N	B17T96	10/16/2003	9:35	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	<1.0	8,340
T1-13-N	B17T97	10/16/2003	9:24	<0.10	<0.25	<0.20	0.25	<0.20	<0.10	<0.10	<0.25	---	<1.0	1.03	8,280
T1-14-S	B17T98	10/16/2003	9:15	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	<1.0	8,240
T1-15-S	B17TB8	10/16/2003	9:07	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	<1.0	8,260
T1-16-N	B17TB9	10/16/2003	8:59	<0.10	<0.25	<0.20	0.31	<0.20	<0.10	<0.10	<0.25	---	<1.0	<1.0	8,300
T1-17-N	B17TB0	10/15/2003	14:54	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	2.13	9,120
T1-18-S	B17TB2	10/15/2003	14:46	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	3.03	9,360
T1-18-S Duplicate	B17TB1	10/15/2003	14:46	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	---	---	---
T1-19	B17TB3	10/15/2003	14:38	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	2.63	9,140
T1-20	B17TB4	10/15/2003	14:25	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	2.45	9,020

Table 3. Field-Screening Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (5 Pages)

Sample Identifier	HEIS Number	Sample Date	Sample Time	Photovac 10S Plus Gas Chromatograph								Innova Multi-gas Analyzer			
				DCM (p/mv)	1,1-DCA (p/mv)	TCM (p/mv)	1,1,1-TCA (p/mv)	CCl_4 (p/mv)	TCE (p/mv)	1,1,2 TCA (p/mv)	PCE (p/mv)	CCl_4 "A" (p/mv)	CCl_4 "B" (p/mv)	TCM (p/mv)	Water Vapor (p/mv)
T1-21-S	B17TB5	10/15/2003	13:03	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	2.94	8,670
T1-22-N	B17TB6	10/15/2003	12:55	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	<1.0	11,500
T1-23	B17TB7	10/15/2003	13:30	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	---	---	---
T4-01	B17TJ3	10/21/2003	9:59	0.39x	28.1ex	2.58x	2337ex	15.5*x	0.93x	0.45x	121ex	---	25.3	30.4	16,600
T4-02	B17TJ4	10/21/2003	9:53	0.42x	17.0x	2.05x	1772ex	6.43*x	1.42x	0.98x	186ex	---	30.2	25.8	15,400
T4-03	B17TJ5	10/21/2003	9:45	1.67x	22.2x	5.51x	2022ex	33.1*x	4.17x	0.020jx	491ex	114	---	46.8	14,800
T4-04	B17TJ6	10/21/2003	9:38	4.71x	2.88x	7.50x	985ex	0.349*x	15.2x	0.19x	1717ex	668	---	125	15,600
T4-04 Duplicate	B17V84	10/21/2003	9:38	4.22x	2.78x	7.27x	1081ex	0.310*x	25.5ex	0.12x	1392ex	664	---	125	15,400
T4-05	B17TJ7	10/21/2003	9:15	<0.10x	<0.25x	<0.20x	1.37x	19.8x	<0.10x	<0.10x	6.21x	---	20.5	4.72	12,400
T4-06	B17TJ8	10/21/2003	9:08	0.21x	2.20x	<0.20x	785ex	0.563*x	0.58x	0.056jx	98ex	---	19.6	14.0	14,200
T4-07	B17TJ9	10/21/2003	8:56	<0.10x	<0.25x	<0.20x	0.39x	3.03x	<0.10x	<0.10x	<0.25x	---	3.10	283	12,500
T4-08	B17TK0	10/21/2003	8:50	<0.10x	1.05x	<0.20x	0.67x	1.07x	0.23x	<0.10x	0.51x	---	1.72	2.99	12,200
T4-09	B17TK1	10/21/2003	8:43	0.24x	0.63x	0.48x	3.57x	5.13x	0.23x	0.046jx	3.68x	---	5.42	41.1	14,000
T4-10	B17TK2	10/21/2003	8:37	<0.10x	0.31x	0.34x	2.56x	2.90x	0.11x	0.029jx	2.06x	---	3.01	23.4	13,400
T4-11	B17TF4	10/20/2003	11:13	0.58	0.85	<0.20	12.8	0.46	0.14	<0.10	1.24	---	<1.0	6.43	10,200
T4-12	B17TF5	10/20/2003	11:07	0.58	0.84	<0.20	12.6	0.43	0.11	<0.10	1.07	---	<1.0	5.74	10,300
T4-13	B17TF6	10/20/2003	10:57	0.31	0.024j	<0.20	2.49	0.31	0.15	<0.10	0.138j	---	<1.0	5.36	11,400
T4-14	B17TF7	10/20/2003	10:49	0.44	0.131j	<0.20	2.46	0.29	0.14	<0.10	<0.25	---	<1.0	5.94	11,200
T4-15	B17TF8	10/20/2003	10:44	<0.10	0.004j	0.28	2.32	1.31	0.001j	<0.10	0.037j	---	1.48	6.48	11,000
T4-16	B17TF9	10/20/2003	10:36	0.13	0.34	<0.20	2.36	1.56	0.14	0.077j	0.057j	---	1.87	6.89	10,800
T4-17	B17TH0	10/20/2003	10:30	<0.10	<0.25	<0.20	1.29	0.92	0.052j	<0.10	0.050j	---	1.30	7.14	10,600
T4-18	B17TH1	10/20/2003	10:25	<0.10	0.004j	0.34	1.77	1.71	0.11	<0.10	0.047j	---	2.30	7.36	11,200
T4-19-S	B17TH2	10/20/2003	10:18	<0.10	<0.25	0.27	1.59	1.37	0.080j	<0.10	0.034j	---	2.40	6.54	10,900

Table 3. Field-Screening Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (5 Pages)

Sample Identifier	HEIS Number	Sample Date	Sample Time	Photovac 10S Plus Gas Chromatograph								Innova Multi-gas Analyzer			
				DCM (p/mv)	1,1-DCA (p/mv)	TCM (p/mv)	1,1,1-TCA (p/mv)	CCl_4 (p/mv)	TCE (p/mv)	1,1,2 TCA (p/mv)	PCE (p/mv)	CCl_4 "A" (p/mv)	CCl_4 "B" (p/mv)	TCM (p/mv)	Water Vapor (p/mv)
T4-20-N	B17TH3	10/20/2003	9:58	<0.10	0.004j	<0.20	1.45	1.13	0.052j	<0.10	0.031j	---	2.10	5.76	10,800
T4-21-N	B17TH4	10/20/2003	9:52	<0.10	<0.25	0.31	1.76	1.61	0.081j	<0.10	0.060j	---	2.50	5.84	10,200
T4-22-S	B17TH5	10/20/2003	9:45	<0.10	<0.25	<0.20	0.95	0.69	0.04	<0.10	<0.25	---	1.30	7.13	11,000
T4-23-S	B17TH6	10/20/2003	9:36	0.038j	0.022j	0.40	1.95	1.93	0.10	<0.10	0.048j	---	2.60	7.61	11,300
T4-24	B17TH7	10/20/2003	9:28	0.53	<0.25	0.35	1.70	1.92	0.10	<0.10	0.045j	---	2.60	6.36	11,200
T4-25	B17TH8	10/20/2003	9:19	0.23	<0.25	0.46	2.39	2.29	0.12	<0.10	0.062j	---	3.50	5.43	11,800
T4-25 Duplicate	B17TH9	10/20/2003	9:19	0.23	0.007j	0.47	2.33	2.16	0.13	<0.10	0.082j	---	---	---	---
T4-26	B17TD4	10/19/2003	13:17	0.41	0.105j	0.57	2.97	3.19	0.12	<0.10	0.059j	---	3.27	6.99	11,700
T4-26 Duplicate	B17TF0	10/19/2003	13:17	0.38	0.098j	0.57	2.97	3.18	0.12	<0.10	0.051j	---	---	---	---
T4-27-S	B17TD5	10/19/2003	13:09	1.00	0.31	<0.20	1.38	2.05	0.51	<0.10	0.35	---	2.53	5.21	11,400
T4-28-N	B17TD6	10/19/2003	13:00	1.00	<0.25	0.55	2.86	3.09	0.11	<0.10	0.059j	---	3.15	7.41	11,200
T4-29	B17TD7	10/19/2003	12:51	1.50	0.097j	0.55	3.53	3.08	0.11	<0.10	0.069j	---	3.13	7.15	11,100
T4-30	B17TD8	10/19/2003	12:41	1.42	0.084j	0.55	3.22	2.96	0.11	<0.10	0.079j	---	3.11	6.93	10,000
T4-31	B17TD9	10/19/2003	12:33	1.53	0.075j	0.53	3.42	3.03	0.11	<0.10	0.057j	---	3.15	7.30	10,900
T7-01	B17V61	10/21/2003	14:17	<0.10x	<0.25x	0.109jx	0.39x	1.84x	<0.10x	<0.10x	7.78x	---	12.1	3.55	14,400
T7-02	B17V62	10/21/2003	14:12	<0.10x	<0.25x	<0.20x	0.17x	1.88x	1.56x	<0.10x	7.99x	---	12.0	3.89	14,400
T7-03	B17V63	10/21/2003	14:06	<0.10x	<0.25x	0.128jx	0.42x	1.84x	<0.10x	<0.10x	8.74x	---	12.1	3.59	14,000
T7-04	B17V64	10/21/2003	14:02	<0.10x	<0.25x	<0.20x	<0.15x	<0.20x	<0.10x	<0.10x	<0.25x	---	12.2	3.71	13,300
T7-05	B17V65	10/21/2003	13:56	<0.10x	<0.25x	0.123jx	0.70x	1.85x	<0.10x	<0.10x	10.9x	---	12.5	4.28	13,100
T7-06	B17V66	10/21/2003	13:51	<0.10x	<0.25x	<0.20x	0.45x	1.20x	<0.10x	<0.10x	7.57x	---	13.5	3.77	12,700
T7-07	B17V67	10/21/2003	13:41	0.22x	<0.25x	1.54x	0.75x	6.43x	0.177jx	<0.10x	12.7x	---	10.7	42.4	13,100
T7-08	B17V68	10/21/2003	13:35	<0.10x	<0.25x	<0.20x	<0.15x	<0.20x	<0.10x	<0.10x	<0.25x	---	5.98	9.12	13,200

Table 3. Field-Screening Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (5 Pages)

Sample Identifier	HEIS Number	Sample Date	Sample Time	Photovac 10S Plus Gas Chromatograph								Innova Multi-gas Analyzer			
				DCM (p/mv)	1,1-DCA (p/mv)	TCM (p/mv)	1,1,1-TCA (p/mv)	CCl_4 (p/mv)	TCE (p/mv)	1,1,2 TCA (p/mv)	PCE (p/mv)	CCl_4 "A" (p/mv)	CCl_4 "B" (p/mv)	TCM (p/mv)	Water Vapor (p/mv)
T7-09-S	B17V69	10/21/2003	13:29	0.81x	<0.25x	<0.20x	0.55x	1.54x	0.170jx	<0.10x	15.9x	---	3.05	7.28	13,000
T7-10	B17V70	10/21/2003	13:23	0.53x	<0.25x	<0.20x	0.68x	1.89x	0.087jx	<0.10x	18.8x	---	3.79	6.68	13,100
T7-11-N	B17V71	10/21/2003	13:18	<0.10x	<0.25x	<0.20x	<0.15x	<0.20x	<0.10x	<0.10x	<0.25x	---	10.9	14.2	12,900
T7-12	B17V72	10/21/2003	13:11	0.54x	<0.25x	<0.20x	1.05x	0.87x	0.082jx	<0.10x	28.7ex	---	4.17	4.76	11,600
T7-13	B17V73	10/21/2003	12:54	0.52x	<0.25x	<0.20x	1.00x	0.96x	0.99x	<0.10x	32.8ex	---	4.77	5.64	12,700
T7-14-S	B17V74	10/21/2003	12:38	0.19x	<0.25x	<0.20x	1.08x	0.38x	0.070jx	0.031jx	47.3ex	---	6.29	4.51	12,500
T20-01	B186J3	12/8/2003	10:10	NA	NA	NA	NA	NA	NA	NA	NA	---	9.43	<1.0	7,030
T20-01 Duplicate	B186J4	12/8/2003	10:10	NA	NA	NA	NA	NA	NA	NA	NA	---	9.48	<1.0	7,290
T20-02	B17V79	10/22/2003	9:31	<0.10x	<0.25x	<0.20x	<0.15x	0.135jx	<0.10x	<0.10x	3.55x	---	27.0	3.87	12,200
T20-03	B17V80	10/22/2003	9:25	<0.10x	<0.25x	<0.20x	0.26x	0.092jx	<0.10x	<0.10x	4.24x	---	33.1	4.32	12,100
T20-03 Duplicate	B17V81	10/22/2003	9:25	<0.10x	<0.25x	<0.20x	0.23x	0.180jx	<0.10x	<0.10x	4.33x	---	32.9	4.28	12,100
T20-04	B17V82	10/22/2003	9:18	<0.10x	<0.25x	<0.20x	0.38x	0.093jx	<0.10x	<0.10x	5.20x	---	32.7	4.31	12,300
T20-05	B17V83	10/22/2003	9:12	<0.10x	<0.25x	<0.20x	0.16x	0.098jx	<0.10x	<0.10x	8.00x	---	31.5	4.31	12,200
T20-06	B17V75	10/21/2003	14:39	<0.10x	<0.25x	<0.20x	1.00x	0.065jx	<0.10x	<0.10x	7.57x	---	21.2	4.03	15,300
T20-07	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	---	NS	NS	NS
T29-01-S	B17TC8	10/19/2003	10:15	<0.10	<0.25	<0.20	1.52	0.62	<0.10	<0.10	<0.25	---	<1.0	3.37	9,630
T29-02-S	B17TC9	10/19/2003	10:07	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	1.89	9,380
T29-03-N	B17TD0	10/19/2003	10:01	<0.10	<0.25	<0.20	1.36	0.56	<0.10	<0.10	<0.25	---	<1.0	3.2	9,590
T29-04-N	B17TD1	10/19/2003	9:39	<0.10	<0.25	<0.20	1.42	0.58	<0.10	<0.10	<0.25	---	<1.0	2.95	9,590
T29-05	B17TD2	10/19/2003	9:31	<0.10	<0.25	<0.20	1.20	0.47	<0.10	<0.10	<0.25	---	<1.0	2.66	9,730
T29-06	B17TD3	10/19/2003	9:23	<0.10	<0.25	<0.20	0.25	0.52	<0.10	<0.10	<0.25	---	<1.0	2.14	9,660
T29-07	B17TC1	10/16/2003	14:34	<0.10	<0.25	<0.20	<0.15	0.28	<0.10	<0.10	<0.25	---	<1.0	<1.0	11,200

Table 3. Field-Screening Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (5 Pages)

Sample Identifier	HEIS Number	Sample Date	Sample Time	Photovac 10S Plus Gas Chromatograph								Innova Multi-gas Analyzer			
				DCM (p/mv)	1,1-DCA (p/mv)	TCM (p/mv)	1,1,1-TCA (p/mv)	CCl_4 (p/mv)	TCE (p/mv)	1,1,2 TCA (p/mv)	PCE (p/mv)	CCl_4 "A" (p/mv)	CCl_4 "B" (p/mv)	TCM (p/mv)	Water Vapor (p/mv)
T29-08	B17TC2	10/16/2003	14:23	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	1.06	11,300
T29-09	B17TC3	10/16/2003	14:14	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	1.14	11,000
T29-10	B17TC4	10/16/2003	13:51	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	---	<1.0	1.08	10,100

* = unable to quantify due to large 1,1,1-TCA peak.
"A" = carbon tetrachloride filter calibrated for concentrations exceeding 100 p/mv.
"B" = carbon tetrachloride filter calibrated for concentrations between 1 and 100 p/mv.
CCl_4 = carbon tetrachloride.
DCM = dichloromethane (methylene chloride).
e = value exceeds calibration range.
j = value less than practical quantitation limit.
HEIS = Hanford Environmental Information System.
Innova = a trademark of Innova AirTech Instruments A/S, Ballerup, Denmark.
NA = not analyzed.
NS = not sampled.
p/mv = parts per million by volume.
PCE = tetrachloroethylene.
Photovac 10S Plus = a trademark of Photovac, Inc., Waltham, Massachusetts.
TCE = trichloroethylene.
TCM = trichloromethane (chloroform).
x = value is suspect-low because of gas chromatograph lamp degradation. However, a positive detection indicates the presence of the compound in the sample.
1,1-DCA = 1,1-dichloroethane.
1,1,1-TCA = 1,1,1-trichloroethane.
1,1,2-TCA = 1,1,2-trichloroethane.

Table 4. Field-Screening Results for Calibration Standards. (2 Pages)

Analysis Type	HEIS Number	Analysis Date	Analysis Time	Photovac 10S Gas Chromatograph								Innova Multi-gas Analyzer			
				DCM (p/mv)	1,1-DCA (p/mv)	TCM (p/mv)	1,1,1-TCA (p/mv)	CCl_4 (p/mv)	TCE (p/mv)	1,1,2 TCA (p/mv)	PCE (p/mv)	CCl_4 "A" (p/mv)	CCl_4 "B" (p/mv)	TCM (p/mv)	Water Vapor (p/mv)
Calibration Standard	B17TK8	10/15/2003	15:05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	NA	25.5	< 1.0	NA
Calibration Check	B17T99	10/15/2003	15:11	NA	0.97	0.99	0.97	0.94	1.00	NA	1.05	NA	23.0	<1.0	10,100
Calibration Check	B17T99	10/15/2003	16:09	NA	0.98	0.96	0.95	0.97	1.01	NA	1.04	NA	NA	NA	NA
Calibration Standard	B17KT5	10/16/2003	10:08	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	NA	25.5	< 1.0	NA
Calibration Check	B17KT4	10/16/2003	12:06	NA	0.97	0.96	0.96	0.96	1.03	NA	1.10	NA	22.8	<1.0	9,500
Calibration Check	B17KT4	10/16/2003	13:20	NA	0.96	0.95	0.95	0.87	1.03	NA	1.10	NA	NA	NA	NA
Calibration Check	B17KT4	10/16/2003	15:07	NA	0.95	0.92	0.90	0.86	1.02	NA	1.13	NA	NA	NA	NA
Calibration Check	B17KT4	10/16/2003	15:42	NA	0.93	0.94	0.95	0.87	1.02	NA	1.07	NA	NA	NA	NA
Calibration Standard	B17TC5	10/19/2003	13:19	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	NA	25.5	< 1.0	NA
Calibration Check	B17TC6	10/19/2003	13:39	NA	0.94	0.87	0.82	0.95	0.94	NA	0.98	NA	23.2	<1.0	9,800
Calibration Check	B17TC6	10/19/2003	14:31	NA	0.91	0.86	0.86	0.95	0.94	NA	1.01	NA	NA	NA	NA
Calibration Check	B17TC6	10/19/2003	15:49	NA	0.87	0.83	0.80	0.87	0.97	NA	1.00	NA	NA	NA	NA
Calibration Standard	B17TF1	10/20/2003	12:10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	NA	25.5	< 1.0	NA
Calibration Check	B17TF2	10/20/2003	12:22	NA	0.92	1.02	1.02	0.99	1.05	NA	0.98	NA	23.1	<1.0	10,200

Table 4. Field-Screening Results for Calibration Standards. (2 Pages)

Analysis Type	HEIS Number	Analysis Date	Analysis Time	Photovac 10S Gas Chromatograph								Innova Multi-gas Analyzer			
				DCM (p/mv)	1,1-DCA (p/mv)	TCM (p/mv)	1,1,1-TCA (p/mv)	CCl_4 (p/mv)	TCE (p/mv)	1,1,2 TCA (p/mv)	PCE (p/mv)	CCl_4 "A" (p/mv)	CCl_4 "B" (p/mv)	TCM (p/mv)	Water Vapor (p/mv)
Calibration Check	B17TF2	10/20/2003	13:26	NA	0.85	0.88	0.86	0.82	0.98	NA	0.97	NA	NA	NA	NA
Calibration Check	B17TF2	10/20/2003	14:49	NA	0.80	0.78	0.80	0.76	0.96	NA	0.10	NA	NA	NA	NA
Calibration Standard	B17TJ0	10/21/2003	12:40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	200.0	25.5	< 1.0	NA
Calibration Check	B17TJ1	10/21/2003	12:49	NA	0.92	1.02	1.02	0.99	1.05	NA	0.98	198.0	24.1	<1.0	8,840
Calibration Check	B17TJ1	10/21/2003	15:00	NA	0.90	0.98	0.96	0.98	1.03	NA	0.96	NA	NA	NA	NA
Calibration Check	B17TJ1	10/21/2003	17:07	NA	0.81	0.79	0.83	0.79	0.95	NA	0.95	197	24.3	<1.0	9,000
Calibration Standard	B17V76	10/22/2003	11:59	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	NA	25.5	< 1.0	NA
Calibration Check	B17V77	10/22/2003	12:14	NA	0.92	1.02	1.02	0.99	1.05	NA	0.98	NA	24.3	<1.0	9,000
Calibration Check	B17V77	10/22/2003	13:09	NA	0.96	0.95	1.01	1.02	1.05	NA	1.02	NA	24.3	<1.0	9,100
Calibration Standard	B18JV1	12/8/2003	10:25	NA	NA	NA	NA	NA	NA	NA	NA	NA	25.5	< 1.0	NA
Calibration Check	B18JV1	12/8/2003	10:25	NA	NA	NA	NA	NA	NA	NA	NA	NA	23.8	< 1.0	9,400

"A" = carbon tetrachloride filter calibrated for concentrations exceeding 100 p/mv.
"B" = carbon tetrachloride filter calibrated for concentrations between 1 and 100 p/mv.
CCl_4 = carbon tetrachloride.
DCM = dichloromethane (methylene chloride).
HEIS = *Hanford Environmental Information System.*
Innova = a trademark of Innova AirTech Instruments A/S, Ballerup, Denmark.
NA = not analyzed.
NS = not sampled.
p/mv = parts per million by volume.
PCE = tetrachloroethylene.
Photovac 10S Plus = a trademark of Photovac, Inc., Waltham, Massachusetts.
TCE = trichloroethylene.
TCM = trichloromethane (chloroform).
1,1-DCA = 1,1-dichloroethane.
1,1,1-TCA = 1,1,1-trichloroethane.
1,1,2-TCA = 1,1,2-trichloroethane.

Table 5. Field-Screening Results for Blank Samples.

Quality Control Gas	HEIS Number	Analysis Date	Analysis Time	Photovac 10S Gas Chromatograph								Innova Multi-gas Analyzer			
				DCM (p/mv)	1,1-DCA (p/mv)	TCM (p/mv)	1,1,1-TCA (p/mv)	CCl_4 (p/mv)	TCE (p/mv)	1,1,2 TCA (p/mv)	PCE (p/mv)	CCl_4 "A" (p/mv)	CCl_4 "B" (p/mv)	TCM (p/mv)	Water Vapor (p/mv)
Certified Clean Air	B17KT7	10/15/2003	15:20	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	NA	<1.0	<1.0	7,760
Certified Clean Air	B17KT3	10/16/2003	12:15	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	NA	<1.0	<1.0	9,000
Certified Clean Air	B17TC7	10/19/2003	13:46	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	NA	<1.0	<1.0	7,800
Certified Clean Air	B17TF3	10/20/2003	12:29	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	NA	<1.0	<1.0	8,200
Certified Clean Air	B17TJ2	10/21/2003	12:57	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	NA	<1.0	<1.0	7,800
Certified Clean Air	B17V78	10/22/2003	12:21	<0.10	<0.25	<0.20	<0.15	<0.20	<0.10	<0.10	<0.25	NA	<1.0	1.25	15,000
Certified Clean Air	B18JV0	12/8/2003	10:19	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1.0	<1.0	7,800

"A" = carbon tetrachloride filter calibrated for concentrations exceeding 100 p/mv.
"B" = carbon tetrachloride filter calibrated for concentrations between 1 and 100 p/mv.
CCl_4 = carbon tetrachloride.
DCM = dichloromethane (methylene chloride).
HEIS = *Hanford Environmental Information System.*
Innova = a trademark of Innova AirTech Instruments A/S, Ballerup, Denmark.
NA = not analyzed.
p/mv = parts per million by volume.
PCE = tetrachloroethylene.
Photovac 10S Plus = a trademark of Photovac, Inc., Waltham, Massachusetts.
TCE = trichloroethylene.
TCM = trichloromethane (chloroform).
1,1-DCA = 1,1-dichloroethane.
1,1,1-TCA = 1,1,1-trichloroethane.
1,1,2-TCA = 1,1,2-trichloroethane.

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BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR JANUARY – MARCH 2004

SUMMARY

Step I of the sampling design in the sampling and analysis plan for the 218-W-4C Burial Ground has been completed. Vapor samples were collected through existing vent risers in trenches T-01, T-04, T-07, T-20, and T-29 and analyzed for volatile organic compounds (VOC) using field screening instruments during the October – December 2003 quarter. Results for vapor samples submitted for laboratory analysis were received during this quarter (January – March 2004) and are provided in this quarterly letter report. Preliminary action levels are not applicable to these vapor samples. Other than incidental and unavoidable vapor releases to atmosphere associated with sampling at the vent risers, no contaminant releases to the environment were documented as a result of the vent riser vapor sampling.

Based on the sampling design in the sampling and analysis plan for the 218-W-4C Burial Ground, Step II sampling is planned following retrieval of the retrievably stored waste.

1.0 INTRODUCTION

This quarterly letter report has been prepared in response to *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989) Settlement and Tentative Agreement Interim Milestone M-91-40, Requirement 2, paragraph 3. The sampling and analysis activities summarized in this quarterly letter report were conducted in accordance with DOE/RL-2003-48, *218-W-4C Burial Ground Sampling and Analysis Plan*, issued by the Washington State Department of Ecology on September 12, 2003 as an attachment to Skinnarland 2003, "Issuance of the Final 218-W-4C Sampling and Analysis Plan (SAP) in Conjunction with Administrative Order No. 03NWPKW-5494 Issued on April 30, 2003, by the Washington State Department of Ecology (Ecology) and Modified by Stipulation Approved on July 8, 2003, by the Washington State Pollution Control Hearings Board on July 8, 2003." This letter report covers the quarter from January 2004 through March 2004.

The 218-W-4C sampling and analysis plan (SAP) was developed to determine whether contaminants have been released to the vadose zone from retrievably stored waste[1] in the 218-W-4C Burial Ground in the 200 West Area of the Hanford Site. In the 218-W-4C Burial Ground, Trenches T-01, T-04, T-07, T-20, T-24, and T-29 contain suspect TRU[2] retrievable waste (Figure 1). The waste typically is contained in 208-L (55-gal) drums. A schematic cross section of a retrievable storage trench in the 218-W-4C Burial Ground is shown in Figure 2.

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[1] Retrievably stored for purposes of the *Atomic Energy Act of 1954*.

[2] Transuranic (waste materials contaminated with 100 nCi/g of transuranic materials having half-lives longer than 20 years).

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR JANUARY – MARCH 2004

The 218-W-4C sampling design consists of three steps. Step I is vapor sampling through vent risers in the trenches before waste retrieval. Steps II and III are conducted following waste retrieval. Step II includes sampling the asphalt pad and adjacent soils. Step III involves assessing the data collected in Steps I and II, leading to potential characterization of the substrate soils beneath the asphalt pads.

The Step I sampling in the 218-W-4C Burial Ground and the field screening analysis of the samples were completed during the October – December 2003 quarter and were described in the letter report for October – December 2003 (FH-0400144, "Transmittal of the Burial Ground Sampling and Analysis Results for October-December 2003"). Laboratory analysis of the Step I samples was completed during the January – March 2004 quarter and is described in this quarterly letter report. As specified in the 218-W-4C SAP, the Step II and Step III sampling to characterize the substrate soils will be conducted when the asphalt pad in an entire trench has become accessible and sampling will not interfere with waste retrieval operations. The results of the Step I sampling will be used to focus the Step II sampling.

2.0 SAMPLING METHODOLOGY

During Step I, vapor samples were collected from 84 vent risers that generally were aligned with the centers of engineered trenches T-01, T-04, T-07, T-20, and T-29 in the 218-W-4C Burial Ground. No vent risers existed in trench T-24. Two types of vapor samples were collected. At each trench, vapor samples initially were collected from each riser and contained in Tedlar[1] bags for on-site analysis using a field-screening instrument. A vapor sample then was collected from the vent riser in that trench that had the highest carbon tetrachloride concentration, based on the field-screening results. This vapor sample was contained in a SUMMA[2] canister for laboratory analysis. A total of 91 vapor samples were collected. Of these, 84 samples were collected in Tedlar bags for field screening and 7 samples were collected in SUMMA canisters for laboratory analysis. The samples collected in SUMMA canisters include one from each trench with vent risers, one duplicate, and one additional sample that was inadvertently collected from a vent riser that did not have the highest carbon tetrachloride concentration in that trench.

Vent riser sampling was initiated on October 15, 2003. The SUMMA canister samples for laboratory analysis were collected from vent risers T1-04 and T29-04-N on October 21, 2003, and from vent risers T29-01-S, T4-04, and T7-06 on October 22, 2003. A duplicate SUMMA canister sample was collected from vent riser T4-04 on October 22, 2003. (A SUMMA canister sample was collected from vent riser T29-04-N on October 21, 2003. However, the maximum carbon tetrachloride concentration in trench T-29 had not been detected at this vent riser, so a

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[1] Tedlar is a registered trademark of E. I. du Pont de Nemours and Company, Wilmington, Delaware.

[2] SUMMA is a trademark of Moletrics, Inc., Cleveland, Ohio.

second SUMMA canister sample was collected in trench T-29 from vent riser T29-01-S on October 22, 2003, to correct this unintentional mistake. Both of these SUMMA canister samples were submitted for laboratory analysis.) The SUMMA canister sample for laboratory analysis was collected from vent riser T20-03 on December 10, 2003, following use of an aerial lift to collect the last Tedlar bag sample in trench T-20 (FH-0400144).

A sample location number (trench and riser) was established and recorded for each vent riser. The vent risers in each trench were numbered sequentially from east to west. If the vent riser was offset to the north or south of the center of the trench, a notation of "N" or "S" was added to the sample location number to indicate the direction of offset. For example, sample location "T1-06-N" signifies trench 1, vent riser 6, which is offset to the north of the trench centerline. The relative locations of the vent risers are shown on Figure 3.

After the vent riser cap was removed, a 15.2-m- (50-ft-) long piece of TYGON[1] tubing was lowered to the bottom of the riser or until refusal. The tubing was 0.3-cm (0.125-in.) inside diameter and 0.6-cm (0.25-in.) outside diameter with a metal filter on the lower end. The tubing then was pulled back approximately 0.2 m (0.5 ft) to lift the filter off of the bottom of the trench. A 5.08-cm- (2-in.-) diameter plastic disk was slid along the tubing to cover the top of the riser during purging and sampling. The vapor sampling method is shown schematically in Figure 2.

The sample tubing was connected to a sampling pump, which was used to pump vapor for one to two minutes to purge the tubing. Carbon tetrachloride concentrations at the outlet of the pump were monitored using a MIRAN SapphIRe Ambient Air Analyzer[2] (MIRAN analyzer), an infrared detector calibrated to measure carbon tetrachloride. Purging then was continued until the concentration readings on the MIRAN analyzer stabilized or at the discretion of the industrial hygienist in the event that no organics were detected. A vapor sample then was collected in a 1-L Tedlar bag for analysis. Following sample collection, the sample tubing was removed from the riser and the cap was replaced.

After the Tedlar bag samples from all accessible risers in a trench had been analyzed, a vapor sample was collected in a SUMMA canister from the vent riser with the highest carbon tetrachloride concentration, based on field screening results. The sampling methodology was similar to that used for collecting Tedlar bag samples. Following the 1- to 2-minute purge, the valve on the canister was opened for 1 minute to allow vapor to flow into the 6-L canister. The SUMMA canisters were transported to the laboratory for analysis.

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[1] TYGON is a trademark of Norton Performance Plastics Corporation, a Saint-Gobain Company, Akron, Ohio.

[2] MIRAN and the SapphIRe Ambient Air Analyzer are registered trademarks of Thermo Electron Corporation, Franklin, Massachusetts.

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR JANUARY – MARCH 2004

3.0 ANALYTICAL RESULTS

During Step I sampling at the 218-W-4C Burial Ground, vapor samples were collected from inside the engineered trenches through vent risers. Most of the samples were collected near the base of the trench, which is typically approximately 5 m (16 ft) below the engineered surface overlying the trench (FH-0400144).

The SUMMA canister samples were analyzed in the laboratory for VOCs, using a gas chromatograph/mass spectrometer according to a modified EPA Method TO-15 (EPA/625/R-96/010b, *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*). Results for the detected analytes, including tentatively identified compounds, are summarized in Table 1. Results for all analytes are provided in Table 2.

The sample and duplicate sample from vent riser T4-04 required multiple dilutions to bring the tetrachloroethylene (PCE) into calibration range. The very high concentration of PCE in the initial lower dilutions of these samples saturated the instrument detector, requiring the laboratory to recondition the mass spectrometer detector. The samples then were analyzed at higher dilutions. Only one other compound (1-butanol) also was detected at the high dilution level in the T4-04 sample (sample B17TL2), and no other compounds were detected at the high dilution level in the T4-04 duplicate sample (sample B17TL3).

The chromatograms from analyses of these T4-04 samples at lower dilutions were used to identify the presence of additional analytes. The concentrations of these additional analytes cannot be quantified, because the internal standard recovery was low as a result of the detector saturation, caused by the high PCE concentrations. However, the relative concentrations of these additional analytes can be evaluated. At low dilutions, the PCE saturation of the instrument detector masked the instrument response for analytes with retention times similar to that for PCE.

In the sample from vent riser T4-04 (sample B17TL2), the following ten analytes were detected at a lower dilution (approximately in order of relatively decreasing concentration based on peak heights) in addition to PCE and 1-butanol: 1,1,1-trichloroethane (1,1,1-TCA) (as a tentatively identified compound), trichloroethene (TCE), 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)[1], chloroform, methylene chloride, methyl chloride, trichloromonofluoromethane (Freon 11), carbon tetrachloride, 1,1-dichloroethane (1,1-DCA) (as a tentatively identified compound), and n-butane. Approximately 25 VOCs were detected with relative concentrations lower than the concentrations of these ten.

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[1] Freon is a trademark of E. I. du Pont de Nemours and Company, Wilmington, Delaware.

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR JANUARY – MARCH 2004

In the duplicate sample from vent riser T4-04 (sample B17TL3), the following ten analytes were detected at a lower dilution (approximately in order of relatively decreasing concentration based on peak heights) in addition to PCE: 1,1,1-TCA (as a tentatively identified compound), TCE, chloroform, 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113), methylene chloride, carbon tetrachloride, methyl chloride, trichloromonofluoromethane (Freon 11), 1,1-DCA (as a tentatively identified compound), and 1,2-DCA. Approximately 25 VOCs were detected with relative concentrations lower than the concentrations of these ten. The compounds detected in the analysis of this duplicate sample could have been affected by residual contaminants in the analytical equipment remaining from analysis of the previous high concentration sample from vent riser T4-04.

For all of the vent riser samples, the highest concentration of PCE (14,000,000 ppbv) was detected in the sample from vent riser T4-04 (Table 1). Because of the high dilution of this sample, concentrations for the other analytes present could not be quantified, and this comparison among vent riser results cannot be made for the other analytes present.

As described in the quarterly report for October – December 2003 (FH-0400144), the Tedlar bag samples were analyzed using a Photovac 10S Plus[1] gas chromatograph equipped with a photoionization detector (11.7 eV lamp). The gas chromatograph was configured to analyze eight VOCs: carbon tetrachloride, chloroform, methylene chloride, 1,1,1-TCA, 1,1,2-TCA, 1,1-DCA, TCE, and PCE.

Table 3 provides the laboratory results for the same eight VOCs that were analyzed during field screening of the Tedlar bag samples. Table 3 includes only the samples from the vent riser in each trench with the maximum carbon tetrachloride concentration, based on field screening. Table 4 provides the field screening results for the Tedlar bag samples collected from the same vent risers that the SUMMA canister samples were collected from. (Note: In the quarterly letter report for October – December 2003 [FH-0400144], a similar table provided the maximum concentration for each of the eight VOCs in all of the vent riser samples from each trench, based on field screening. Table 4 in this quarterly letter report provides the concentration for each of these eight VOCs in a single vent riser sample, based on field screening.)

The laboratory results and field screening results generally agree. The highest concentration of PCE was detected in the Tedlar bag and SUMMA canister samples from vent riser T4-04. All seven of the other VOCs detected during field screening of the Tedlar bag sample from vent riser T4-04 also were detected during laboratory analysis of the SUMMA canister from vent riser T4-04. Carbon tetrachloride was detected in all of the SUMMA canister samples and all of the corresponding Tedlar bag samples. For the eight VOCs analyzed in the five SUMMA canister and corresponding Tedlar bag samples from the vent riser in each trench that had the maximum carbon tetrachloride concentration, based on field screening (40 sampling results for each), the

[1] Photovac 10S Plus is a trademark of Photovac, Inc., Waltham, Massachusetts.

laboratory and field screening analyses agreed in terms of detection or nondetection of each analyte in 85 percent of the 40 sample results for each sampling and analytical method.

During the field screening using the gas chromatograph, confirmatory analyses for carbon tetrachloride and chloroform were performed using the Innova[1] 1312 multi-gas analyzer to add a level of confidence to the gas chromatography data. As noted in the quarterly report for October – December 2003 (FH-0400144), the confirmatory analyses on October 15 through October 20, 2003, showed good correlation between the gas chromatograph and the Innova multi-gas analyzer. On October 21 and October 22, 2003, however, concentration data from the gas chromatograph for carbon tetrachloride and chloroform were consistently lower than concentration data from the Innova multi-gas analyzer. It was believed that the gas chromatograph detector lamp had degraded and was no longer reliable for these two compounds and that the Innova multi-gas analyzer data were more representative.

As explained in the quarterly report for October – December 2003, no independently prepared standards were available to check the calibration of the gas chromatograph to evaluate whether the gas chromatograph lamp was unreliable for the other VOCs as well. It was suggested that the analyses of the SUMMA canister samples potentially could be used to check the gas chromatograph performance (FH-0400144).

Field screening of vent riser samples T4-04, T7-06, and T20-03 was potentially affected by the degraded gas chromatograph lamp. The laboratory analysis of the sample from vent riser T4-04 cannot be used to evaluate the field screening data because only one analyte (PCE) could be quantified. The laboratory and field screening analyses of the samples from vent riser T7-06 are in general agreement. The laboratory analysis of the sample from vent riser T20-03 detected fewer compounds than the field screening analysis.

These few laboratory analyses cannot be used to evaluate the field screening gas chromatograph performance quantitatively. However, as noted in the quarterly report for October – December 2003, a positive detection of a compound still indicates that it is present in the sample. As a result, the field screening gas chromatograph data still can be used to guide the Step II sampling, which was the basis for the Step I sampling in the sampling design.

4.0 QUALITY CONTROL

For vent riser vapor samples collected in SUMMA canisters, the field quality control consisted of duplicate samples and equipment blank samples. As specified in the SAP (DOE/RL-2003-48), one duplicate SUMMA canister sample was collected during vent riser sampling. The duplicate was collected from vent riser T4-04, based on field screening data that

[1] Innova is a trademark of Innova AirTech Instruments A/S, Ballerup, Denmark.

indicated a high likelihood that the sample would contain contaminated vapor. The only VOC detected at the high dilution level necessary for analysis of the sample and duplicate sample was PCE. For this single analyte detected in both the sample and duplicate, the relative percent difference (RPD) was calculated according to the formula:

$$RPD = \frac{(C_1 - C_2)x100}{(C_1 + C_2)/2}$$

where:

C_1 = the larger of the two observed values

C_2 = the smaller of the two observed values.

The RPD was 77 percent. This RPD is not within the required precision of 25 percent. Both the sample and the duplicate results were qualified with the data flag "D" (i.e., analyte was identified at a secondary dilution factor). The multiple dilutions required for analysis of these samples are the likely reason for the higher RPD.

The purpose of collecting equipment blanks is to verify the adequacy of sampling equipment decontamination procedures. As noted in the SAP (DOE/RL-2003-48), the SUMMA canisters are analyzed for cleanliness at the laboratory.

The percent recovery for the laboratory control samples analyzed for the SUMMA canister samples submitted in October and December was within the specified limits of 70 to 130. This indicates that the laboratory analyses of the VOC concentrations were accurate within 30 percent, as required by the SAP.

No analytes were detected in the blank quality control samples analyzed for the October samples. One analyte (acetaldehyde) was detected in the blank quality control sample analyzed for the December sample (Table 2). Historically, this analyte is considered ubiquitous and likely to be detected in blank samples. The low concentration of acetaldehyde in the blank sample did not exceed 5 percent of the sample concentration and, therefore, is considered to be acceptable.

No holding times were exceeded during collection and laboratory analysis of SUMMA canister samples from vent risers.

5.0 COMPARISON TO REGULATORY REQUIREMENTS

As noted in CP-16886, *Data Quality Objectives Summary Report for the 218-W-4C Burial Ground Contaminant Release Investigation*, preliminary action levels are not applicable to VOC vapor samples.

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR JANUARY – MARCH 2004

6.0 DOCUMENTED CONTAMINANT RELEASES TO THE ENVIRONMENT

Other than incidental and unavoidable vapor releases to atmosphere associated with sampling at the vent risers, no contaminant releases to the environment were documented as a result of the vent riser vapor sampling. The vent riser vapor samples were collected from within the engineered trench. The Step II and Step III characterization of the asphalt pad and vadose zone is designed to evaluate whether contaminants within the engineered trench were released to the environment.

7.0 PLANNED AND/OR SCHEDULED ADDITIONAL WORK

The analysis of the SUMMA canister samples was completed during this quarter (January – March 2004). The Step I sampling and analysis for the 218-W-4C Burial Ground is complete.

Based on the sampling design for the 218-W-4C Burial Ground, Step II sampling is planned following completion of Step I sampling and retrieval of the suspect TRU waste. The Step II characterization will be scheduled when the asphalt pad in an entire trench has become accessible and sampling will not interfere with waste retrieval operations.

8.0 REFERENCES

Atomic Energy Act of 1954, 42 USC 2011, et seq.

CP-16886, 2003, *Data Quality Objectives Summary Report for the 218-W-4C Burial Ground Contaminant Release Investigation*, Rev. 0, Fluor Hanford, Inc., Richland, Washington.

DOE/RL-2003-48, 2003, *218-W-4C Burial Ground Sampling and Analysis Plan*, Rev. 0, U.S. Department of Energy, Richland, Operations Office, Richland, Washington. Issued as an attachment to the Skinnarland letter listed below.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington, as amended.

EPA/625/R-96/010b, 1999, *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition*, U.S. Environmental Protection Agency, Washington, D.C.

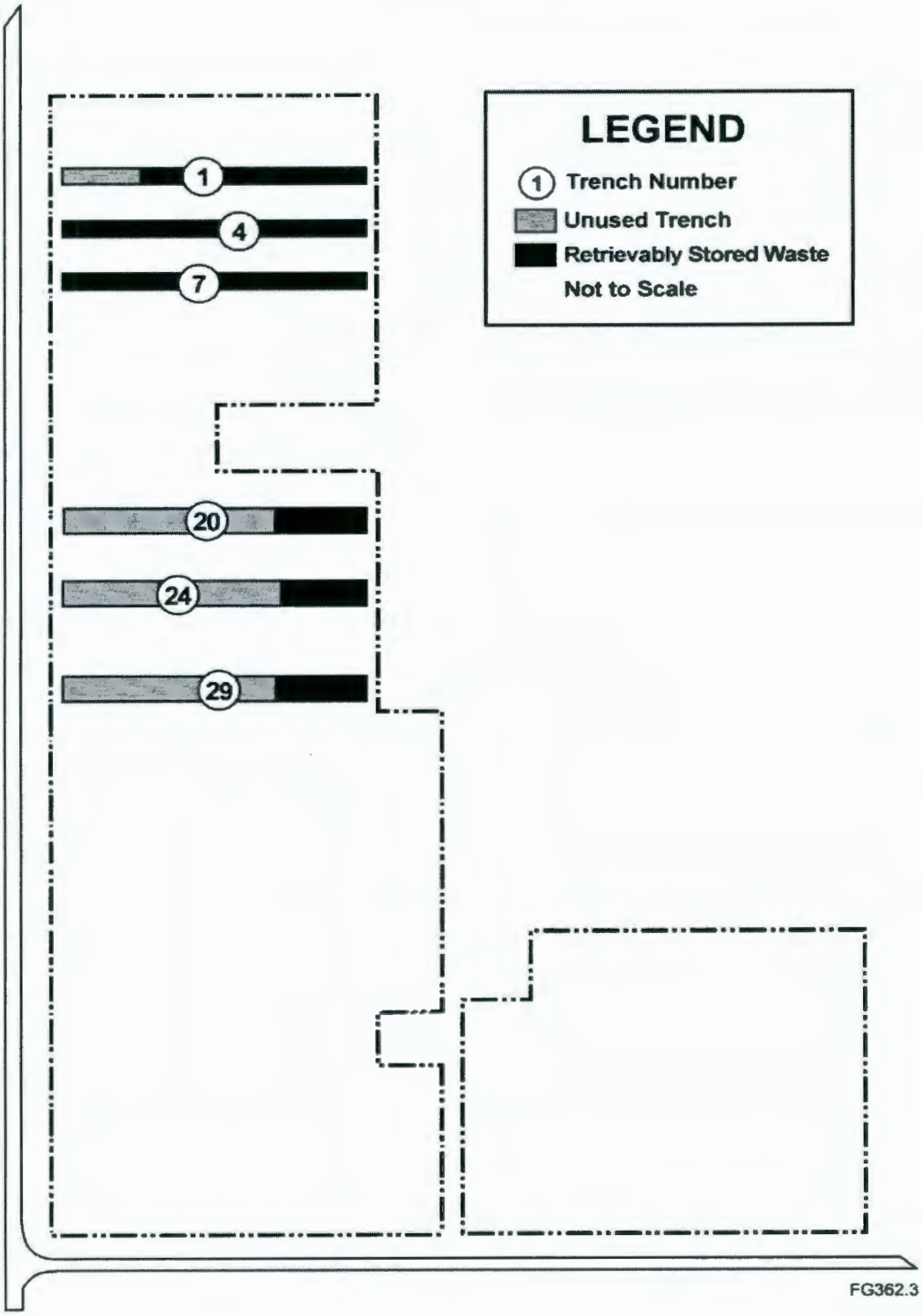
BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR JANUARY – MARCH 2004

FH-0400144, 2004, "Transmittal of the Burial Ground Sampling and Analysis Results for October-December 2003," (letter to K. A. Klein, U. S. Department of Energy, Richland Operations Office, from R. G. Gallagher), Fluor Hanford, Inc., Richland, Washington, February 17.

Skinnarland, R., 2003, "Issuance of the Final 218-W-4C Sampling and Analysis Plan (SAP) in Conjunction with Administrative Order No. 03NWPKW-5494 Issued on April 30, 2003, by the Washington State Department of Ecology (Ecology) and Modified by Stipulation Approved on July 8, 2003, by the Washington State Pollution Control Hearings Board on July 8, 2003," (letter to K. A. Klein, U. S. Department of Energy, Richland Operations Office), Washington State Department of Ecology, Olympia, Washington, September 12. Attachment is DOE/RL-2003-48 listed above.

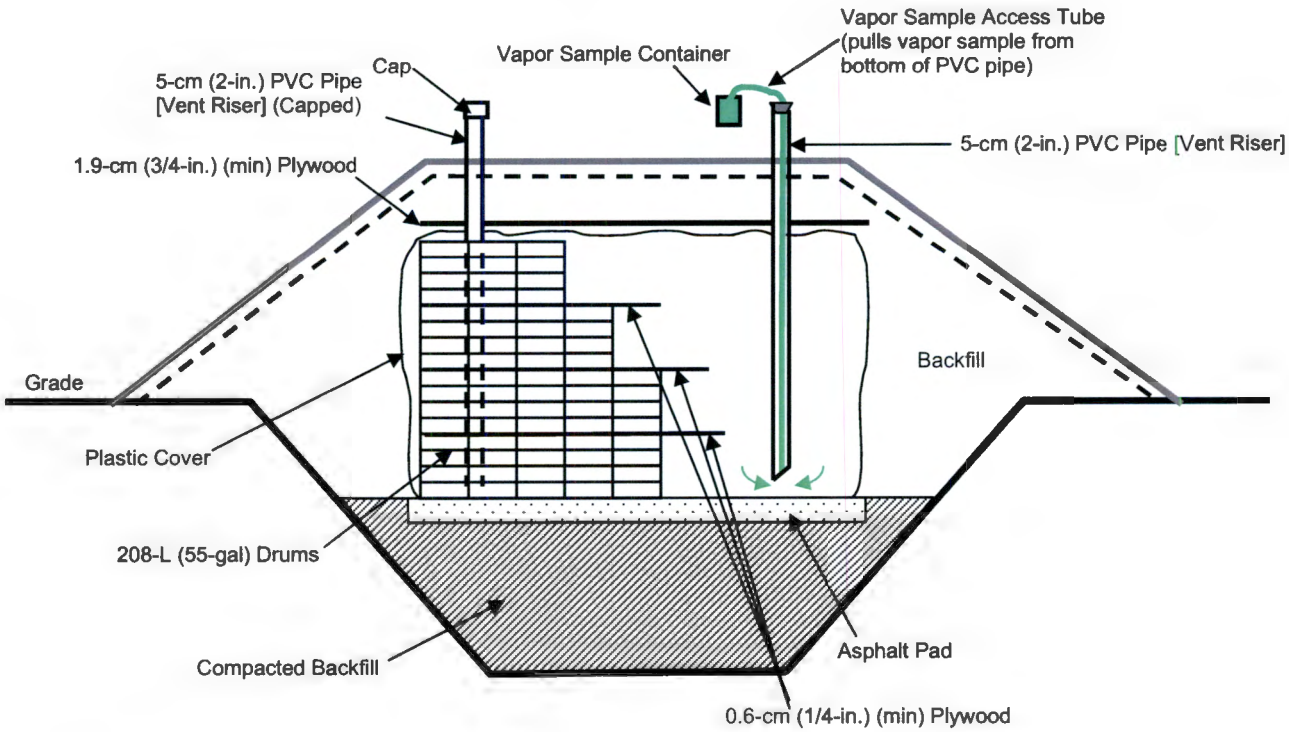
BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR JANUARY – MARCH 2004

Figure 1. Locations of Retrievably Stored Waste Trenches at the 218-W-4C Burial Ground.



BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR JANUARY – MARCH 2004

Figure 2. Schematic View of 218-W-4C Burial Ground Trench and Vent Riser Sampling Method.



PVC = polyvinylchloride.

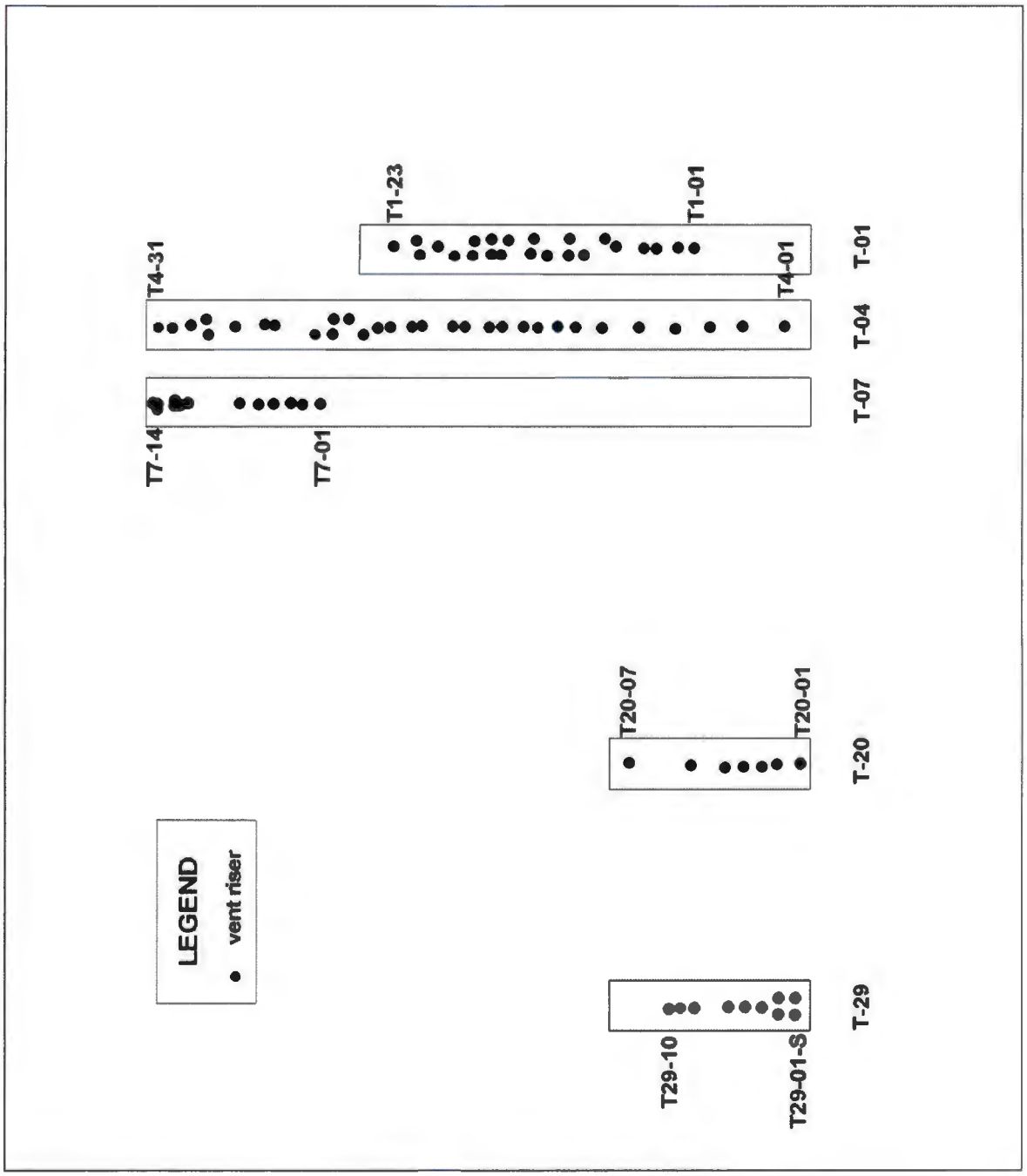


Figure 3. Locations of Vent Risers in 218-W-4C Burial Ground.

Table 1. Analytes Detected by Laboratory Analysis of 218-W-4C Burial Ground Step I Vent Riser Samples. (2 Pages)

Analyte	CAS Number	Concentration Detected in Vent Riser Samples (ppbv)						
		Vent Riser T1-04	Vent Riser T4-04	Vent Riser T4-04 duplicate	Vent Riser T7-06	Vent Riser T20-03	Vent Riser T29-01-S[a]	Vent Riser T29-04-N[a]
		B17TK9	B17TL2	B17TL3	B17TL4	B184P4	B17TL1	B17TL0
1-Chlorobutane[b]	109-69-3							280
1,1-Dichloroethane[b]	75-34-3						16	
1,1,1-Trichloroethane[b]	71-55-6	110			40		68	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1				44			
1,2-Dichloroethane	107-06-2						13	
1-Butanol	71-36-3		320,000 D				12	
2-Butanone	78-93-3						46	31
3-Methylhexane	589-34-4						78	
Acetaldehyde	75-07-0				22	15 B		70
Acetic acid, methylester[b]	79-20-9						29	
Acetone	67-64-1				14		220	140
Acetonitrile	75-05-8							17
Benzene	71-43-2						33	19
Carbon Tetrachloride	56-23-5	16			2,700 D	18	3,400 D	1,900 D
Choroethane	75-00-3				21		180	87
Chloroform	67-66-3				95		75	40
Chloromethane	74-87-3						730 D	220
Dichlorodifluoromethane	75-71-8	NA	NA	NA	NA	910 D	NA	NA
Ethanol	64-17-5							23
Methanol	67-56-1						430 D	230
Methylene Chloride	75-09-2	51					110	59
n-Heptane	142-82-5						19	11

Table 1. Analytes Detected by Laboratory Analysis of 218-W-4C Burial Ground Step I Vent Riser Samples. (2 Pages)

Analyte	CAS Number	Concentration Detected in Vent Riser Samples (ppbv)						
		Vent Riser T1-04	Vent Riser T4-04	Vent Riser T4-04 duplicate	Vent Riser T7-06	Vent Riser T20-03	Vent Riser T29-01-S [a]	Vent Riser T29-04-N [a]
		B17TK9	B17TL2	B17TL3	B17TL4	B184P4	B17TL1	B17TL0
n-Butane	106-97-8	20					66	25
Tetrachloroethene	127-18-4	25,000 D	14,000,000 D	6,200,000 D	36,000 D		2,400 D	2,800 D
Toluene	108-88-3						16	
Trichloroethene	79-01-6	16			21			
Trichloromonofluoromethane	75-69-4	800 D			7,900 D	8,600 D		
Vinyl Chloride	75-01-4						17	

[a] A SUMMA canister sample was collected from vent riser T29-04-N in trench T-29 on October 21, 2003. However, the maximum carbon tetrachloride concentration in Trench T-29 was detected at vent riser T29-01-S. A second SUMMA canister sample was collected in trench T-29 from vent riser T29-01-S on October 22, 2003 to correct this unintentional mistake. Both of these SUMMA canister samples were submitted for laboratory analysis.

[b] Tentatively identified compound.

B = analyte found in associated blank.
CAS = Chemical Abstracts Service registry number.
D = analyte was identified at a secondary dilution factor.
NA = not analyzed.
ppbv = parts per billion by volume.

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T1-04	B17TK9	10/21/2003	11/4/2003	71-55-6	1,1,1-Trichloroethane[a]	110	
T1-04	B17TK9	10/21/2003	11/4/2003	79-34-5	1,1,2,2-Tetrachloroethane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	79-00-5	1,1,2-Trichloroethane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	75-35-4	1,1-Dichloroethene	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	120-82-1	1,2,4-Trichlorobenzene	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	95-63-6	1,2,4-Trimethylbenzene	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	107-06-2	1,2-Dichloroethane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	123-91-1	1,4-Dioxane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	71-36-3	1-Butanol	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	592-41-6	1-Hexene	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	71-23-8	1-Propanol	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	78-93-3	2-Butanone	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	110-43-0	2-Heptanone	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	591-78-6	2-Hexanone	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	107-83-5	2-Methylpentane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	107-87-9	2-Pentanone	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	67-63-0	2-Propanol	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	106-35-4	3-Heptanone	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	589-34-4	3-Methylhexane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	108-10-1	4-Methyl-2-Pentanone	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	75-07-0	Acetaldehyde	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	67-64-1	Acetone	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	75-05-8	Acetonitrile	10	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T1-04	B17TK9	10/21/2003	11/4/2003	71-43-2	Benzene	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	123-72-8	Butyraldehyde	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	109-74-0	Butyronitrile	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	56-23-5	Carbon tetrachloride	16	
T1-04	B17TK9	10/21/2003	11/4/2003	108-90-7	Chlorobenzene	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	75-00-3	Chloroethane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	67-66-3	Chloroform	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	74-87-3	Chloromethane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	108-94-1	Cyclohexanone	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	124-18-5	Decane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	64-17-5	Ethanol	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	107-12-0	Ethyl cyanide	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	100-41-4	Ethylbenzene	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	110-00-9	Furan	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	87-68-3	Hexachlorobutadiene	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	110-54-3	Hexane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	111-13-7	Hexyl methyl ketone	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	67-56-1	Methanol	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	108-87-2	Methyl cyclohexane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	75-09-2	Methylene chloride	51	
T1-04	B17TK9	10/21/2003	1/14/2004	108-38-3	m-Xylene	20	U
T1-04	B17TK9	10/21/2003	11/4/2003	142-82-5	n- Heptane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	106-97-8	n-Butane	20	
T1-04	B17TK9	10/21/2003	11/4/2003	111-65-9	n-Octane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	111-84-2	Nonane	10	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T1-04	B17TK9	10/21/2003	11/4/2003	95-47-6	o-Xylene	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	109-66-0	Pentane	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	100-42-5	Styrene	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	127-18-4	Tetrachloroethene	25000	D
T1-04	B17TK9	10/21/2003	11/4/2003	109-99-9	Tetrahydrofuran	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	108-88-3	Toluene	10	U
T1-04	B17TK9	10/21/2003	11/4/2003	79-01-6	Trichloroethene	16	
T1-04	B17TK9	10/21/2003	11/4/2003	75-69-4	Trichloromonofluoromethane	800	D
T1-04	B17TK9	10/21/2003	11/4/2003	75-01-4	Vinyl chloride	10	U
T4-04	B17TL2	10/22/2003	1/14/2004	79-34-5	1,1,2,2-Tetrachloroethane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	79-00-5	1,1,2-Trichloroethane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	75-35-4	1,1-Dichloroethene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	120-82-1	1,2,4-Trichlorobenzene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	95-63-6	1,2,4-Trimethylbenzene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	107-06-2	1,2-Dichloroethane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	123-91-1	1,4-Dioxane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	71-36-3	1-Butanol	320000	D
T4-04	B17TL2	10/22/2003	1/14/2004	592-41-6	1-Hexene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	71-23-8	1-Propanol	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	78-93-3	2-Butanone	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	110-43-0	2-Heptanone	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	591-78-6	2-Hexanone	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	107-83-5	2-Methylpentane	300000	DU

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T4-04	B17TL2	10/22/2003	1/14/2004	107-87-9	2-Pentanone	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	67-63-0	2-Propanol	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	106-35-4	3-Heptanone	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	589-34-4	3-Methylhexane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	108-10-1	4-Methyl-2-Pentanone	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	75-07-0	Acetaldehyde	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	67-64-1	Acetone	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	75-05-8	Acetonitrile	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	71-43-2	Benzene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	123-72-8	Butyraldehyde	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	109-74-0	Butyronitrile	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	56-23-5	Carbon tetrachloride	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	108-90-7	Chlorobenzene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	75-00-3	Chloroethane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	67-66-3	Chloroform	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	74-87-3	Chloromethane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	108-94-1	Cyclohexanone	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	124-18-5	Decane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	64-17-5	Ethanol	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	107-12-0	Ethyl cyanide	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	100-41-4	Ethylbenzene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	110-00-9	Furan	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	87-68-3	Hexachlorobutadiene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	110-54-3	Hexane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	111-13-7	Hexyl methyl ketone	300000	DU

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T4-04	B17TL2	10/22/2003	1/14/2004	67-56-1	Methanol	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	108-87-2	Methyl cyclohexane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	75-09-2	Methylene chloride	300000	DU
T4-04	B17TL2	10/22/2003	11/5/2003	108-38-3	m-Xylene	600000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	142-82-5	n- Heptane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	106-97-8	n-Butane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	111-65-9	n-Octane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	111-84-2	Nonane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	95-47-6	o-Xylene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	109-66-0	Pentane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	100-42-5	Styrene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	127-18-4	Tetrachloroethene	14000000	D
T4-04	B17TL2	10/22/2003	1/14/2004	109-99-9	Tetrahydrofuran	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	108-88-3	Toluene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	79-01-6	Trichloroethene	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	75-69-4	Trichloromonofluoromethane	300000	DU
T4-04	B17TL2	10/22/2003	1/14/2004	75-01-4	Vinyl chloride	300000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	79-34-5	1,1,2,2-Tetrachloroethane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	79-00-5	1,1,2-Trichloroethane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	75-35-4	1,1-Dichloroethene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	120-82-1	1,2,4-Trichlorobenzene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	95-63-6	1,2,4-Trimethylbenzene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	107-06-2	1,2-Dichloroethane	120000	DU

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T4-04	B17TL3	10/22/2003	11/5/2003	123-91-1	1,4-Dioxane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	71-36-3	1-Butanol	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	592-41-6	1-Hexene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	71-23-8	1-Propanol	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	78-93-3	2-Butanone	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	110-43-0	2-Heptanone	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	591-78-6	2-Hexanone	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	107-83-5	2-Methylpentane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	107-87-9	2-Pentanone	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	67-63-0	2-Propanol	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	106-35-4	3-Heptanone	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	589-34-4	3-Methylhexane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	108-10-1	4-Methyl-2-Pentanone	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	75-07-0	Acetaldehyde	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	67-64-1	Acetone	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	75-05-8	Acetonitrile	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	71-43-2	Benzene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	123-72-8	Butyraldehyde	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	109-74-0	Butyronitrile	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	56-23-5	Carbon tetrachloride	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	108-90-7	Chlorobenzene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	75-00-3	Chloroethane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	67-66-3	Chloroform	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	74-87-3	Chloromethane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	108-94-1	Cyclohexanone	120000	DU

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T4-04	B17TL3	10/22/2003	11/5/2003	124-18-5	Decane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	64-17-5	Ethanol	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	107-12-0	Ethyl cyanide	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	100-41-4	Ethylbenzene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	110-00-9	Furan	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	87-68-3	Hexachlorobutadiene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	110-54-3	Hexane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	111-13-7	Hexyl methyl ketone	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	67-56-1	Methanol	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	108-87-2	Methyl cyclohexane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	75-09-2	Methylene chloride	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	108-38-3	m-Xylene	240000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	142-82-5	n- Heptane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	106-97-8	n-Butane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	111-65-9	n-Octane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	111-84-2	Nonane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	95-47-6	o-Xylene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	109-66-0	Pentane	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	100-42-5	Styrene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	127-18-4	Tetrachloroethene	6200000	D
T4-04	B17TL3	10/22/2003	11/5/2003	109-99-9	Tetrahydrofuran	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	108-88-3	Toluene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	79-01-6	Trichloroethene	120000	DU
T4-04	B17TL3	10/22/2003	11/5/2003	75-69-4	Trichloromonofluoromethane	120000	DU

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T4-04	B17TL3	10/22/2003	11/5/2003	75-01-4	Vinyl chloride	120000	DU
T7-06	B17TL4	10/22/2003	11/5/2003	71-55-6	1,1,1-Trichloroethane[a]	40	
T7-06	B17TL4	10/22/2003	11/5/2003	79-34-5	1,1,2,2-Tetrachloroethane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	44	
T7-06	B17TL4	10/22/2003	11/5/2003	79-00-5	1,1,2-Trichloroethane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	75-35-4	1,1-Dichloroethene	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	120-82-1	1,2,4-Trichlorobenzene	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	95-63-6	1,2,4-Trimethylbenzene	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	107-06-2	1,2-Dichloroethane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	123-91-1	1,4-Dioxane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	71-36-3	1-Butanol	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	592-41-6	1-Hexene	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	71-23-8	1-Propanol	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	78-93-3	2-Butanone	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	110-43-0	2-Heptanone	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	591-78-6	2-Hexanone	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	107-83-5	2-Methylpentane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	107-87-9	2-Pentanone	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	67-63-0	2-Propanol	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	106-35-4	3-Heptanone	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	589-34-4	3-Methylhexane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	108-10-1	4-Methyl-2-Pentanone	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	75-07-0	Acetaldehyde	22	
T7-06	B17TL4	10/22/2003	11/5/2003	67-64-1	Acetone	14	

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T7-06	B17TL4	10/22/2003	11/5/2003	75-05-8	Acetonitrile	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	71-43-2	Benzene	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	123-72-8	Butyraldehyde	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	109-74-0	Butyronitrile	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	56-23-5	Carbon tetrachloride	2700	D
T7-06	B17TL4	10/22/2003	11/5/2003	108-90-7	Chlorobenzene	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	75-00-3	Chloroethane	21	
T7-06	B17TL4	10/22/2003	11/5/2003	67-66-3	Chloroform	95	
T7-06	B17TL4	10/22/2003	11/5/2003	74-87-3	Chloromethane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	108-94-1	Cyclohexanone	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	124-18-5	Decane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	64-17-5	Ethanol	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	107-12-0	Ethyl cyanide	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	100-41-4	Ethylbenzene	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	110-00-9	Furan	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	87-68-3	Hexachlorobutadiene	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	110-54-3	Hexane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	111-13-7	Hexyl methyl ketone	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	67-56-1	Methanol	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	108-87-2	Methyl cyclohexane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	75-09-2	Methylene chloride	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	108-38-3	m-Xylene	20	U
T7-06	B17TL4	10/22/2003	11/5/2003	142-82-5	n- Heptane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	106-97-8	n-Butane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	111-65-9	n-Octane	10	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T7-06	B17TL4	10/22/2003	11/5/2003	111-84-2	Nonane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	95-47-6	o-Xylene	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	109-66-0	Pentane	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	100-42-5	Styrene	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	127-18-4	Tetrachloroethene	36000	D
T7-06	B17TL4	10/22/2003	11/5/2003	109-99-9	Tetrahydrofuran	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	108-88-3	Toluene	10	U
T7-06	B17TL4	10/22/2003	11/5/2003	79-01-6	Trichloroethene	21	
T7-06	B17TL4	10/22/2003	11/5/2003	75-69-4	Trichloromonofluoromethane	7900	D
T7-06	B17TL4	10/22/2003	11/5/2003	75-01-4	Vinyl chloride	10	U
T20-03	B184P4	12/10/2003	1/8/2004	79-34-5	1,1,2,2-Tetrachloroethane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	79-00-5	1,1,2-Trichloroethane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	75-35-4	1,1-Dichloroethene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	120-82-1	1,2,4-Trichlorobenzene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	95-63-6	1,2,4-Trimethylbenzene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	107-06-2	1,2-Dichloroethane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	123-91-1	1,4-Dioxane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	71-36-3	1-Butanol	10	U
T20-03	B184P4	12/10/2003	1/8/2004	592-41-6	1-Hexene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	71-23-8	1-Propanol	10	U
T20-03	B184P4	12/10/2003	1/8/2004	78-93-3	2-Butanone	10	U
T20-03	B184P4	12/10/2003	1/8/2004	110-43-0	2-Heptanone	10	U
T20-03	B184P4	12/10/2003	1/8/2004	591-78-6	2-Hexanone	10	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T20-03	B184P4	12/10/2003	1/8/2004	107-83-5	2-Methylpentane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	107-87-9	2-Pentanone	10	U
T20-03	B184P4	12/10/2003	1/8/2004	67-63-0	2-Propanol	10	U
T20-03	B184P4	12/10/2003	1/8/2004	106-35-4	3-Heptanone	10	U
T20-03	B184P4	12/10/2003	1/8/2004	589-34-4	3-Methylhexane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	108-10-1	4-Methyl-2-Pentanone	10	U
T20-03	B184P4	12/10/2003	1/8/2004	75-07-0	Acetaldehyde	15	B
T20-03	B184P4	12/10/2003	1/8/2004	67-64-1	Acetone	10	U
T20-03	B184P4	12/10/2003	1/8/2004	75-05-8	Acetonitrile	10	U
T20-03	B184P4	12/10/2003	1/8/2004	71-43-2	Benzene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	123-72-8	Butyraldehyde	10	U
T20-03	B184P4	12/10/2003	1/8/2004	109-74-0	Butyronitrile	10	U
T20-03	B184P4	12/10/2003	1/8/2004	56-23-5	Carbon tetrachloride	18	
T20-03	B184P4	12/10/2003	1/8/2004	108-90-7	Chlorobenzene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	75-00-3	Chloroethane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	67-66-3	Chloroform	10	U
T20-03	B184P4	12/10/2003	1/8/2004	74-87-3	Chloromethane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	108-94-1	Cyclohexanone	10	U
T20-03	B184P4	12/10/2003	1/8/2004	124-18-5	Decane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	75-71-8	Dichlorodifluoromethane	910	D
T20-03	B184P4	12/10/2003	1/8/2004	64-17-5	Ethanol	10	U
T20-03	B184P4	12/10/2003	1/8/2004	107-12-0	Ethyl cyanide	10	U
T20-03	B184P4	12/10/2003	1/8/2004	100-41-4	Ethylbenzene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	110-00-9	Furan	10	U
T20-03	B184P4	12/10/2003	1/8/2004	87-68-3	Hexachlorobutadiene	10	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T20-03	B184P4	12/10/2003	1/8/2004	110-54-3	Hexane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	111-13-7	Hexyl methyl ketone	10	U
T20-03	B184P4	12/10/2003	1/8/2004	67-56-1	Methanol	10	U
T20-03	B184P4	12/10/2003	1/8/2004	108-87-2	Methyl cyclohexane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	75-09-2	Methylene chloride	10	U
T20-03	B184P4	12/10/2003	1/8/2004	108-38-3	m-Xylene	20	U
T20-03	B184P4	12/10/2003	1/8/2004	142-82-5	n- Heptane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	106-97-8	n-Butane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	111-65-9	n-Octane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	111-84-2	Nonane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	74-98-6	N-Propane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	95-47-6	o-Xylene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	109-66-0	Pentane	10	U
T20-03	B184P4	12/10/2003	1/8/2004	100-42-5	Styrene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	127-18-4	Tetrachloroethene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	109-99-9	Tetrahydrofuran	10	U
T20-03	B184P4	12/10/2003	1/8/2004	108-88-3	Toluene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	79-01-6	Trichloroethene	10	U
T20-03	B184P4	12/10/2003	1/8/2004	75-69-4	Trichloromonofluoromethane	8600	D
T20-03	B184P4	12/10/2003	1/8/2004	75-01-4	Vinyl chloride	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	71-55-6	1,1,1-Trichloroethane[a]	68	
T29-01-S	B17TL1	10/22/2003	11/5/2003	79-34-5	1,1,2,2-Tetrachloroethane	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	79-00-5	1,1,2-Trichloroethane	10	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T29-01-S	B17TL1	10/22/2003	11/5/2003	75-34-3	1,1-Dichloroethane[a]	16	
T29-01-S	B17TL1	10/22/2003	11/5/2003	75-35-4	1,1-Dichloroethene	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	120-82-1	1,2,4-Trichlorobenzene	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	95-63-6	1,2,4-Trimethylbenzene	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	107-06-2	1,2-Dichloroethane	13	
T29-01-S	B17TL1	10/22/2003	11/5/2003	123-91-1	1,4-Dioxane	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	71-36-3	1-Butanol	12	
T29-01-S	B17TL1	10/22/2003	11/5/2003	592-41-6	1-Hexene	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	71-23-8	1-Propanol	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	78-93-3	2-Butanone	46	
T29-01-S	B17TL1	10/22/2003	11/5/2003	110-43-0	2-Heptanone	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	591-78-6	2-Hexanone	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	107-83-5	2-Methylpentane	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	107-87-9	2-Pentanone	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	67-63-0	2-Propanol	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	106-35-4	3-Heptanone	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	589-34-4	3-Methylhexane	78	
T29-01-S	B17TL1	10/22/2003	11/5/2003	108-10-1	4-Methyl-2-Pentanone	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	75-07-0	Acetaldehyde	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	79-20-9	Acetic acid, methyl ester[a]	29	
T29-01-S	B17TL1	10/22/2003	11/5/2003	67-64-1	Acetone	220	
T29-01-S	B17TL1	10/22/2003	11/5/2003	75-05-8	Acetonitrile	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	71-43-2	Benzene	33	
T29-01-S	B17TL1	10/22/2003	11/5/2003	123-72-8	Butyraldehyde	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	109-74-0	Butyronitrile	10	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T29-01-S	B17TL1	10/22/2003	11/5/2003	56-23-5	Carbon tetrachloride	3400	D
T29-01-S	B17TL1	10/22/2003	11/5/2003	108-90-7	Chlorobenzene	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	75-00-3	Chloroethane	180	
T29-01-S	B17TL1	10/22/2003	11/5/2003	67-66-3	Chloroform	75	
T29-01-S	B17TL1	10/22/2003	11/5/2003	74-87-3	Chloromethane	730	D
T29-01-S	B17TL1	10/22/2003	11/5/2003	108-94-1	Cyclohexanone	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	124-18-5	Decane	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	64-17-5	Ethanol	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	107-12-0	Ethyl cyanide	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	100-41-4	Ethylbenzene	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	110-00-9	Furan	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	87-68-3	Hexachlorobutadiene	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	110-54-3	Hexane	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	111-13-7	Hexyl methyl ketone	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	67-56-1	Methanol	430	D
T29-01-S	B17TL1	10/22/2003	11/5/2003	108-87-2	Methyl cyclohexane	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	75-09-2	Methylene chloride	110	
T29-01-S	B17TL1	10/22/2003	11/5/2003	108-38-3	m-Xylene	20	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	142-82-5	n- Heptane	19	
T29-01-S	B17TL1	10/22/2003	11/5/2003	106-97-8	n-Butane	66	
T29-01-S	B17TL1	10/22/2003	11/5/2003	111-65-9	n-Octane	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	111-84-2	Nonane	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	95-47-6	o-Xylene	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	109-66-0	Pentane	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	100-42-5	Styrene	10	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T29-01-S	B17TL1	10/22/2003	11/5/2003	127-18-4	Tetrachloroethene	2400	D
T29-01-S	B17TL1	10/22/2003	11/5/2003	109-99-9	Tetrahydrofuran	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	108-88-3	Toluene	16	
T29-01-S	B17TL1	10/22/2003	11/5/2003	79-01-6	Trichloroethene	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	75-69-4	Trichloromonofluoromethane	10	U
T29-01-S	B17TL1	10/22/2003	11/5/2003	75-01-4	Vinyl chloride	17	
T29-04-N	B17TL0	10/21/2003	1/14/2004	79-34-5	1,1,2,2-Tetrachloroethane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	79-00-5	1,1,2-Trichloroethane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	75-35-4	1,1-Dichloroethene	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	120-82-1	1,2,4-Trichlorobenzene	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	95-63-6	1,2,4-Trimethylbenzene	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	107-06-2	1,2-Dichloroethane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	123-91-1	1,4-Dioxane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	71-36-3	1-Butanol	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	109-69-3	1-Chlorobutane[a]	280	
T29-04-N	B17TL0	10/21/2003	1/14/2004	592-41-6	1-Hexene	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	71-23-8	1-Propanol	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	78-93-3	2-Butanone	31	
T29-04-N	B17TL0	10/21/2003	1/14/2004	110-43-0	2-Heptanone	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	591-78-6	2-Hexanone	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	107-83-5	2-Methylpentane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	107-87-9	2-Pentanone	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	67-63-0	2-Propanol	10	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T29-04-N	B17TL0	10/21/2003	1/14/2004	106-35-4	3-Heptanone	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	589-34-4	3-Methylhexane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	108-10-1	4-Methyl-2-Pentanone	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	75-07-0	Acetaldehyde	70	
T29-04-N	B17TL0	10/21/2003	1/14/2004	67-64-1	Acetone	140	
T29-04-N	B17TL0	10/21/2003	1/14/2004	75-05-8	Acetonitrile	17	
T29-04-N	B17TL0	10/21/2003	1/14/2004	71-43-2	Benzene	19	
T29-04-N	B17TL0	10/21/2003	1/14/2004	123-72-8	Butyraldehyde	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	109-74-0	Butyronitrile	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	56-23-5	Carbon tetrachloride	1900	D
T29-04-N	B17TL0	10/21/2003	1/14/2004	108-90-7	Chlorobenzene	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	75-00-3	Chloroethane	87	
T29-04-N	B17TL0	10/21/2003	1/14/2004	67-66-3	Chloroform	40	
T29-04-N	B17TL0	10/21/2003	1/14/2004	74-87-3	Chloromethane	220	
T29-04-N	B17TL0	10/21/2003	1/14/2004	108-94-1	Cyclohexanone	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	124-18-5	Decane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	64-17-5	Ethanol	23	
T29-04-N	B17TL0	10/21/2003	1/14/2004	107-12-0	Ethyl cyanide	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	100-41-4	Ethylbenzene	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	110-00-9	Furan	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	87-68-3	Hexachlorobutadiene	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	110-54-3	Hexane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	111-13-7	Hexyl methyl ketone	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	67-56-1	Methanol	230	
T29-04-N	B17TL0	10/21/2003	1/14/2004	108-87-2	Methyl cyclohexane	10	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-4C Burial Ground Trenches. (17 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppbv)	Qualifier
T29-04-N	B17TL0	10/21/2003	1/14/2004	75-09-2	Methylene chloride	59	
T29-04-N	B17TL0	10/21/2003	1/14/2004	108-38-3	m-Xylene	20	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	142-82-5	n- Heptane	11	
T29-04-N	B17TL0	10/21/2003	1/14/2004	106-97-8	n-Butane	25	
T29-04-N	B17TL0	10/21/2003	1/14/2004	111-65-9	n-Octane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	111-84-2	Nonane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	95-47-6	o-Xylene	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	109-66-0	Pentane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	100-42-5	Styrene	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	127-18-4	Tetrachloroethene	2800	D
T29-04-N	B17TL0	10/21/2003	1/14/2004	109-99-9	Tetrahydrofuran	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	108-88-3	Toluene	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	79-01-6	Trichloroethene	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	75-69-4	Trichloromonofluoromethane	10	U
T29-04-N	B17TL0	10/21/2003	1/14/2004	75-01-4	Vinyl chloride	10	U

[a] Tentatively identified compound.

B = analyte found in associated blank.
CAS = Chemical Abstracts Service.
D = analyte was identified at a secondary dilution factor.
HEIS = *Hanford Environmental Information System.*
ppbv = parts per billion by volume.
U = analyzed for but not detected above limiting criteria.

Table 3. Laboratory Results for Eight Volatile Organic Compounds in Samples Collected from the Vent Riser in Each Trench with the Maximum Carbon Tetrachloride Concentrations Based on Field Screening.

Vent Riser	Date Collected	Date Analyzed	DCM (ppmv)	1,1-DCA (ppmv)	TCM (ppmv)	1,1,1-TCA (ppmv)	CCl_4 (ppmv)	TCE (ppmv)	1,1,2 TCA (ppmv)	PCE (ppmv)
T1-04	10/21/2003	11/4/2003	0.051	ND	ND	0.110[b]	0.016	0.016	ND	25 D
T4-04	10/22/2003	1/14/2004	detected	detected	detected	detected	detected	detected	detected[c]	14,000 D
T7-06	10/22/2003	11/5/2004	ND	ND	0.095	0.040[b]	2.7 D	0.021	ND	36 D
T20-03	12/10/2003	1/8/2004	ND	ND	ND	ND	0.018	ND	ND	ND
T29-01-S[a]	10/22/2003	11/5/2004	0.110	0.016[b]	0.075	0.068[b]	3.4 D	ND	ND	2.4 D

[a] The SUMMA canister sample collected from vent riser T29-01-S in trench T-29 is considered the primary sample for this trench because it was collected from the vent riser with the maximum carbon tetrachloride concentration based on field screening.

[b] Tentatively identified compound.

[c] Retention time similar to that for PCE; peak on chromatogram affected by PCE saturation of instrument detector.

CAS = Chemical Abstracts Service.
CCl_4 = carbon tetrachloride.
D = analyte was identified at a secondary dilution factor
DCM = dichloromethane (methylene chloride).
HEIS = Hanford Environmental Information System.
ND = not detected as a calibrated compound or tentatively identified compound.
ppmv = parts per million by volume.
PCE = tetrachloroethylene.
TCE = trichloroethylene.
TCM = trichloromethane (chloroform).
1,1-DCA = 1,1-dichloroethane.
1,1,1-TCA = 1,1,1-trichloroethane.
1,1,2-TCA = 1,1,2-trichloroethane.

Table 4. Field Screening Results for Eight Volatile Organic Compounds in Samples Collected from the Vent Riser in Each Trench with the Maximum Carbon Tetrachloride Concentrations based on Field Screening.

Vent Riser	Date Sampled	Date Analyzed	DCM (ppmv)	1,1-DCA (ppmv)	TCM (ppmv)	1,1,1-TCA (ppmv)	CCl_4 (ppmv)	TCE (ppmv)	1,1,2 TCA (ppmv)	PCE (ppmv)
T1-04	10/16/2003	10/16/2003	0.079j	0.45	<0.20	<0.15	0.24	<0.10	<0.10	0.089j
T4-04	10/21/2003	10/21/2003	4.71x	2.88x	125	985ex	668	15.2x	0.19x	1717ex
T7-06	10/21/2003	10/21/2003	<0.10x	<0.25x	3.77	0.45x	13.5	<0.10x	<0.10x	7.57x
T20-03	10/22/2003	10/22/2003	<0.10x	<0.25x	4.32	0.26x	33.1	<0.10x	<0.10x	4.24x
T29-01-S	10/19/2003	10/19/2003	<0.10	<0.25	3.37	1.52	0.62	<0.10	<0.10	<0.25

Note: The TCM and CCl_4 concentrations reported in this table for the samples from vent risers T4-04, T7-06, and T20-03 were analyzed using the Innova[a] multi-gas analyzer rather than the gas chromatograph and therefore are not suspect-low.

[a] Innova is a trademark of Innova AirTech Instruments A/S, Ballerup, Denmark.

CCl_4 = carbon tetrachloride.
DCM = dichloromethane (methylene chloride).
e = exceeds calibration range.
j = value less than practical quantitation limit.
ppmv = parts per million by volume.
PCE = tetrachloroethylene.
TCE = trichloroethylene.
TCM = trichloromethane (chloroform).
x = Value is suspect-low because of gas chromatograph lamp degradation. However, a positive detection indicates the presence of the compound in the sample.
1,1-DCA = 1,1-dichloroethane.
1,1,1-TCA = 1,1,1-trichloroethane.
I,I,2-TCA = I,1,2-trichloroethane.

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR JANUARY – MARCH 2004

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APPENDIX D

QUARTERLY LETTER REPORT FOR THE 218-W-3A BURIAL GROUND, OCTOBER-DECEMBER 2005

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BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2005

SUMMARY

Step I of the sampling design in DOE/RL-2004-71, *218-W-3A Burial Ground Sampling and Analysis Plan*, has been completed. Vapor samples were collected through existing vent risers in the sections of Trenches T-05 and T-08 that contain retrievably stored waste (RSW)[1] and were analyzed for volatile organic compounds (VOC) using field-screening instruments during the July – September 2005 quarter. Results for vapor samples submitted for laboratory analysis were received during this quarter (October – December 2005) and are provided in this quarterly letter report. Preliminary action levels are not applicable to these vapor samples. Other than incidental and unavoidable vapor releases to atmosphere associated with sampling at the vent risers, no contaminant releases to the environment were documented as a result of the vent riser vapor sampling.

Based on the sampling design in the sampling and analysis plan (SAP) for the 218-W-3A Burial Ground (DOE/RL-2004-71), Step II sampling is planned following retrieval of the RSW.

Step I of the sampling design in DOE/RL-2004-32, *218-E-12B Burial Ground Sampling and Analysis Plan*, was completed during the April – June 2005 quarter. No sampling and analysis activities were conducted as part of the sampling and analysis plan for the 218-E-12B Burial Ground during the October – December 2005 quarter. Therefore, there are no analysis results for the 218-E-12B Burial Ground to be provided for this period.

Based on the sampling design in the sampling and analysis plan for the 218-E-12B Burial Ground (DOE/RL-2004-32), Step II sampling is planned following retrieval of the RSW.

Step I of the sampling design in DOE/RL-2003-48, *218-W-4C Burial Ground Sampling and Analysis Plan*, was initiated during the October – December 2003 quarter and completed during the January – March 2004 quarter. No sampling and analysis activities were conducted as part of the sampling and analysis plan for the 218-W-4C Burial Ground during the October – December 2005 quarter. Therefore, there are no analysis results for the 218-W-4C Burial Ground to be provided for this period.

Based on the sampling design in the sampling and analysis plan for the 218-W-4C Burial Ground (DOE/RL-2003-48), Step II sampling is planned following retrieval of the RSW.

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[1] Retrievably stored for purposes of the *Atomic Energy Act of 1954*.

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2005

1.0 INTRODUCTION

This quarterly letter report has been prepared in response to *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989) Interim Milestone M-91-40, Requirement 2, paragraph 3. This letter report covers the quarter from October through December 2005.

The sampling and analysis activities summarized in this quarterly letter report were conducted in accordance with DOE/RL-2004-71. Draft A of this SAP was submitted to the Washington State Department of Ecology (Ecology) on August 29, 2005.

Vapor sampling is required at all of the vent risers in the 218-W-3A Burial Ground, in support of the dispersed carbon tetrachloride vadose-zone plume remedial investigation for the 200-PW-1 Operable Unit (OU). The SAP for the 200-PW-1 OU investigation was approved in 2004 (DOE/RL-2001-01, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit RI/FS Work Plan: Includes the 200-PW-1, 200-PW-3 and 200-PW-6 Operable Units*, Appendix D). Vent riser vapor sampling was conducted in the 218-W-3A Burial Ground in support of the 200-PW-1 OU investigation in August and September 2005. In accordance with an agreement between Ecology and the U.S. Department of Energy, Richland Operations Office (RL), the field-screening results for the vent risers that are in the portions of Trenches T-05 and T-08 that contain RSW will be used to meet the data needs for field-screening results in Step I of the 218-W-3A Burial Ground SAP.

The 218-W-3A Burial Ground SAP was developed to determine whether contaminants have been released to the vadose zone from RSW in the 218-W-3A Burial Ground in the 200 West Area of the Hanford Site. In the 218-W-3A Burial Ground, Trenches T-9S, T-6S, T-01, T-04, T-05, T-06, T-08, T-10, T-15, T-17, T-23, T-30, T-32, and T-34 contain suspect TRU[1] RSW (Figure 1). Vent risers are present in the portions of Trenches T-05 and T-08 that contain RSW. In these trenches, the RSW typically is contained in 208 L (55-gal) drums. The drums are assumed to be arranged in modules with plywood and a plastic cover over each module. A schematic cross section of a retrievable storage trench containing vent risers is shown in Figure 2.

The 218-W-3A Burial Ground sampling design consists of three steps. Step I is vapor sampling through vent risers in the trenches before waste retrieval. Step II and Step III are conducted following waste retrieval. Step II includes sampling the surface of the trench floor. Step III involves assessing the data collected in Step I and Step II, leading to potential characterization of the substrate soils beneath the trench floor.

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[1] Transuranic (waste materials contaminated with 100 nCi/g of transuranic materials having half-lives longer than 20 years).

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2005

The Step I sampling in the 218-W-3A Burial Ground and the field screening analysis of the samples were completed during the July – September 2005 quarter and were described in the letter report for July – September 2005 (FH-0402233.5, "Transmittal of the Burial Ground Sampling and Analysis Results for July-September 2005"). Laboratory analysis of the Step I samples was completed during the October-December 2005 quarter and is described in this quarterly letter report. As specified in the 218-W-3A SAP, the Step II and Step III sampling to characterize the substrate soils will be conducted when the entire RSW portion of the trench has become accessible and sampling activities will not interfere with waste-retrieval operations. The results of the Step I sampling will be used to focus the Step II sampling.

2.0 SAMPLING METHODOLOGY

Nine vent risers are present in the portions of Trenches T-05 and T-08 that contain RSW in the 218-W-3A Burial Ground (Table 1). No vent risers are present in the portions of the other trenches that contain RSW. As stated in the SAP, sampling was limited to the existing vent risers that were accessible without posing health and safety risks to workers. During Step I, vapor samples were collected from all nine of these vent risers.

Two types of vapor samples were collected. At each trench, vapor samples initially were collected from each riser and analyzed using a field-screening instrument. A vapor sample then was collected from the vent riser in that trench that had the highest VOC concentration, based on the field-screening results. This vapor sample was contained in a SUMMA[1] canister for laboratory analysis. A total of 13 vapor samples were collected. Of these, nine samples were collected for field screening and four samples were collected in SUMMA canisters for laboratory analysis. The samples collected in SUMMA canisters include one each from Trenches T-05 and T-08, one additional sample from Trench T-08, and one duplicate from Trench T-08.

Vent riser sampling was initiated on August 25, 2005, and completed on September 8, 2005. The vent risers in Trench T-05 were sampled on August 25, 2005, and analyzed using field-screening instruments. The vent risers in Trench T-08 were sampled on September 6, 2005, and analyzed using field-screening instruments. The SUMMA canister samples were collected on September 8, 2005.

A sample location number (trench and riser) was established and recorded for each vent riser. The vent risers in each trench were numbered sequentially from west to east.

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[1] SUMMA is a trademark of Moletrics, Inc., Cleveland, Ohio.

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2005

After the vent riser cap was removed, a 15.2 m (50-ft-) long piece of TYGON[1] tubing was lowered to the bottom of the riser or until refusal. The tubing measured 0.64 cm (0.25 in.) inside diameter and 0.95 cm (0.375 in.) outside diameter, with a metal filter on the lower end. The tubing then was pulled back approximately 0.08 m (0.25 ft) to lift the filter off the bottom of the trench. The top of the riser was sealed to prevent intrusion of ambient air during purging and sampling. The vapor sampling method is shown schematically in Figure 2.

The sample tubing was connected to a sampling pump, which was used to pump vapor from the bottom of the vent riser. The sampling pump was operated for 1 to 2 minutes to purge the tubing (purging time was dependent on the sampling pump flow rate). When the sampling pump was operating, the VOC concentrations at the outlet of the pump were monitored using an organic vapor analyzer (OVA). When the VOC concentration readings on the OVA stabilized after purging, or at the discretion of the industrial hygienist and field sampler, the vapor was introduced directly to a Miran SapphIRe Ambient Air Analyzer[2] (Miran analyzer) for field-screening analysis for VOCs. Following sample analysis, the sample tubing was removed from the riser and the cap was replaced.

The field-screening results were used to determine the locations for collection of vapor samples in SUMMA canisters for laboratory analysis. The sampling methodology was similar to that used for the field-screening samples. Following the 1- to 2-minute purge, the valve on the canister was opened for 5 minutes to allow vapor to flow into the 6 L canister. The SUMMA canisters were transported to the laboratory for analysis.

3.0 ANALYTICAL RESULTS

During Step I sampling at the 218-W-3A Burial Ground, vapor samples were collected from inside the engineered trenches through vent risers. Most of the samples were collected near the base of the trench, which is typically approximately 5 m (16 ft) below the engineered surface overlying the trench (FH-0402233.5).

The SUMMA canister samples were analyzed in the laboratory for VOCs. Because of high concentrations of tetrachloroethene (PCE), the samples required special handling. Samples were transferred from the SUMMA canisters to sorbent tubes and analyzed by thermal desorption gas chromatograph/mass spectrometer using a modified EPA Method TO-17 (EPA/625/R-96/010b, *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*).

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[1] TYGON is a trademark of Norton Performance Plastics Corporation, a Saint-Gobain Company, Akron, Ohio.

[2] MIRAN and the SapphIRe Ambient Air Analyzer are registered trademarks of Thermo Electron Corporation, Franklin, Massachusetts.

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Results for the detected analytes, including tentatively identified compounds, are summarized in Table 1. Results for all analytes are provided in Table 2.

The SUMMA canister samples for laboratory analysis were collected from vent risers T-05-02 (sample B1DX09), T-08-03 (sample B1DX12), and T-08-05 (sample B1DX10) on September 8, 2005. A duplicate SUMMA canister sample was collected from vent riser T-08-05 (sample B1DX11). Vapor samples from vent risers T-05-02 and T-08-03 contained the highest VOC concentrations, based on field screening, in Trenches T-05 and T-08, respectively (FH-0402233.5). An additional SUMMA canister sample and the duplicate sample were collected from vent riser T-08-05. The additional and duplicate SUMMA canister samples were collected from a vent riser with slightly lower VOC concentrations to reduce the potential that the highest VOC concentrations would exceed calibration standards and make the duplicate analysis of little value.

Based on the laboratory analysis, the sample from vent riser T-08-03 contained the highest concentration of PCE (Table 1). During field screening, the highest concentration of PCE also was detected in the sample from vent riser T-08-03 (FH-0402233.5).

4.0 QUALITY CONTROL

For vent riser vapor samples collected in SUMMA canisters, the field quality control consisted of duplicate samples and equipment blank samples. As specified in the SAP (DOE/RL-2004-71), one duplicate SUMMA canister sample was collected during vent riser sampling. As explained in Section 3.0, the duplicate was collected from vent riser T-08-05. The only VOC detected in the sample and duplicate sample from vent riser T-08-05 was PCE (Table 1). For this single analyte detected in both the sample and duplicate, the relative percent difference (RPD) was calculated according to the formula:

$$RPD = \frac{(C_1 - C_2)x100}{(C_1 + C_2)/2}$$

where

C_1 = the larger of the two observed values

C_2 = the smaller of the two observed values.

The RPD was 6 percent. This RPD is within the required precision of 25 percent. These calculations indicate that the analytical method produced repeatable measurements.

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The purpose of collecting equipment blanks is to verify the adequacy of sampling equipment decontamination procedures. The SUMMA canisters are analyzed for cleanliness at the laboratory.

The percent recovery for the laboratory control samples analyzed with the SUMMA canister samples was within the specified limits of 70 to 130 for all but three analytes (2-nitropropane, acetaldehyde, and methanol). Because these three analytes were not detected in the SUMMA canister samples, quality control flags were not assigned to the sample results. Laboratory analyses of the VOC concentrations were accurate to within 30 percent, as required by the SAP, for all other analytes.

No analytes were detected in the blank quality control samples.

No holding times were exceeded during collection and laboratory analysis of SUMMA canister samples from vent risers.

5.0 COMPARISON TO REGULATORY REQUIREMENTS

As determined through the data quality objectives process, preliminary action levels are not applicable to VOC vapor samples.

6.0 DOCUMENTED CONTAMINANT RELEASES TO THE ENVIRONMENT

Other than incidental and unavoidable vapor releases to atmosphere associated with sampling at the vent risers, no contaminant releases to the environment were documented as a result of the vent riser vapor sampling. The vent riser vapor samples were collected from within the engineered trench. The Step II and Step III characterization of the trench floor and vadose zone is designed to evaluate whether contaminants within the engineered trench were released to the environment.

7.0 PLANNED AND/OR SCHEDULED ADDITIONAL WORK

The analysis of the SUMMA canister samples from the 218-W-3A Burial Ground was completed during this quarter (October – December 2005). The Step I sampling and analysis for the 218-W-3A Burial Ground is complete.

Based on the sampling design in the 218-W-3A Burial Ground SAP (DOE/RL-2004-71), Step II sampling is planned following completion of Step I sampling and retrieval of the RSW.

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The Step II characterization will be scheduled when the entire RSW portion of the trench has become accessible and sampling will not interfere with waste-retrieval operations.

Based on the sampling design in the 218-E-12B Burial Ground SAP (DOE/RL-2004-32), Step II sampling is planned following completion of Step I sampling and retrieval of the RSW. The Step II characterization will be scheduled when the entire RSW portion of the trench has become accessible and sampling will not interfere with waste-retrieval operations.

Based on the sampling design in the 218-W-4C Burial Ground SAP (DOE/RL-2003-48), Step II sampling is planned following completion of Step I sampling and retrieval of the RSW. The Step II characterization will be scheduled when the asphalt pad in an entire trench has become accessible and sampling will not interfere with waste-retrieval operations.

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2005

8.0 REFERENCES

Atomic Energy Act of 1954, 42 USC 2011, et seq.

DOE/RL-2001-01, 2004, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit RI/FS Work Plan: Includes the 200-PW-1, 200-PW-3 and 200-PW-6 Operable Units*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2003-48, 2003, *218-W-4C Burial Ground Sampling and Analysis Plan*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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DOE/RL-2004-71, 2005, *218-W-3A Burial Ground Sampling and Analysis Plan*, Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

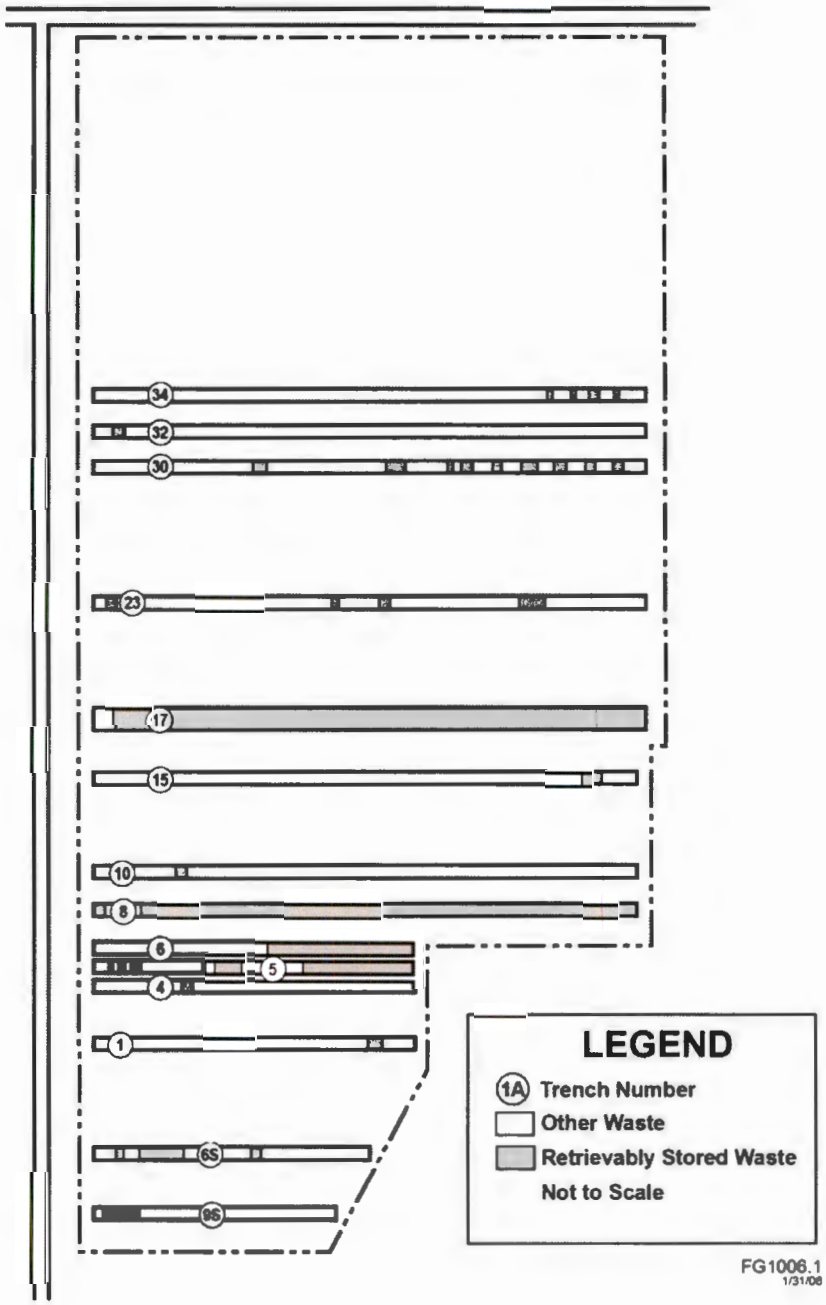
Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington, as amended.

EPA/625/R-96/010b, 1999, *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*, Second Edition, U.S. Environmental Protection Agency, Washington, D.C.

FH-0402233.5, 2005, "Transmittal of the Burial Ground Sampling and Analysis Results for July-September 2005 in Accordance with the *Hanford Federal Facility Agreement and Consent Order* Interim Milestone M-91-40," (external letter to K. A. Klein, U.S. Department of Energy, Richland Operations Office, from R. G. Gallagher), Fluor Hanford, Inc., Richland, Washington, November 8.

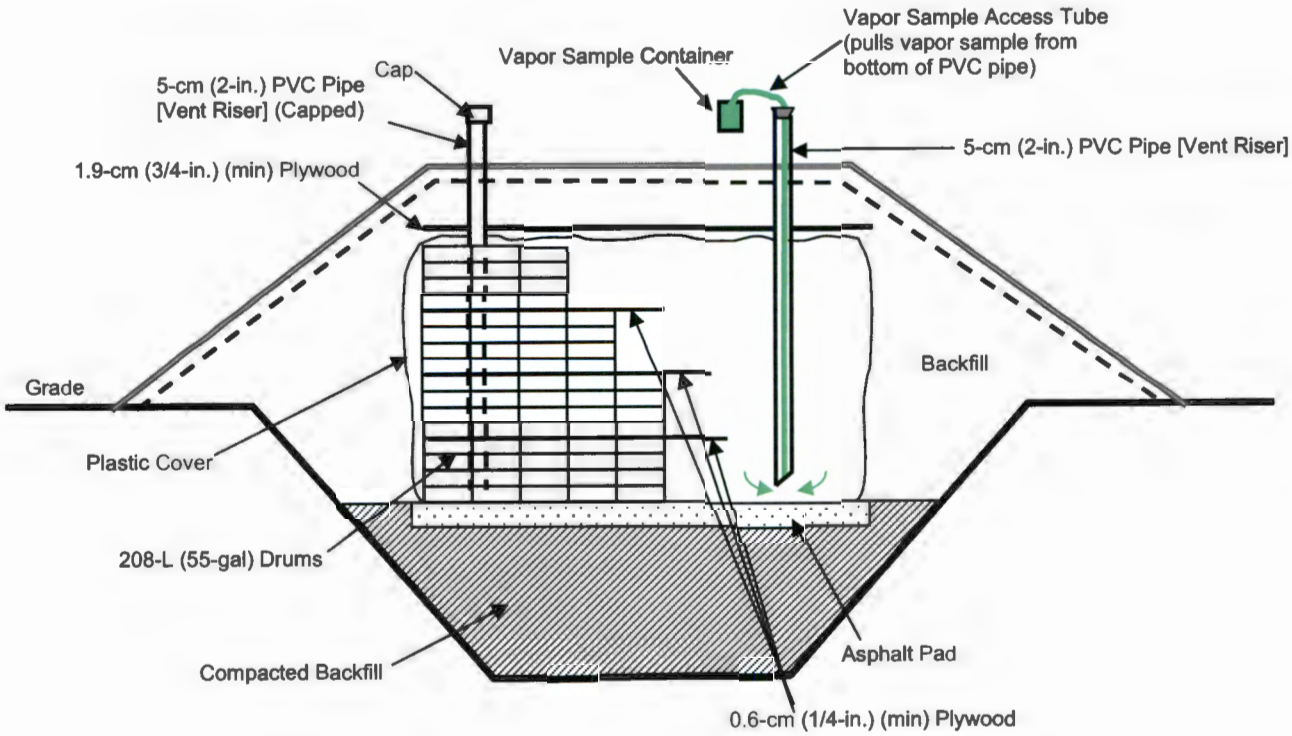
BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2005

Figure 1. Locations of Retrievably Stored Waste Trenches at the 218-W-3A Burial Ground.



BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2005

Figure 2. Schematic View of the 218-W-3A Burial Ground Trench and Vent Riser Sampling Method.



BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR OCTOBER – DECEMBER 2005

Figure 3. Locations of Vent Risers in the 218-W-3A Burial Ground Trenches Containing Retrievably Stored Waste.

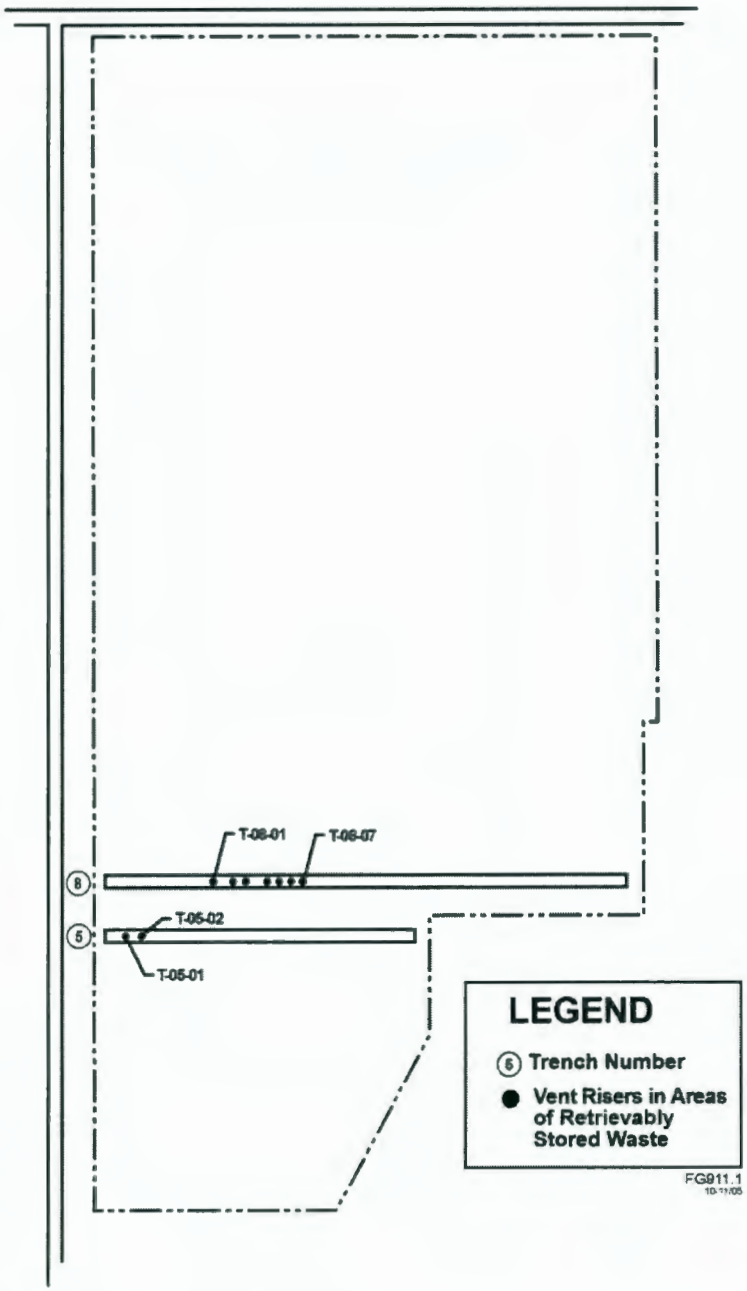


Table 1. Analytes Detected by Laboratory Analysis of 218-W-3A Burial Ground Vent Riser Samples.

Analyte	Chemical Abstracts Service Registry Number	Concentration Detected in Vent Riser Samples (ppmv)			
		Vent Riser T-05-02	Vent Riser T-08-03	Vent Riser T-08-05[a]	Vent Riser T-08-05[a] Duplicate
		B1DX09	B1DX12	B1DX10	B1DX11
1,1-Dichloroethene	75-35-4	1.6			
1,2-Dichloroethane	107-06-2	0.62			
Chloroform	67-66-3	4			
Tetrachloroethene (PCE)	127-18-4	3	4,200	18	17
Trichloroethene	79-01-6	1.3	8.8		

[a] Vapor samples from vent risers T-05-02 and T-08-03 contained the highest VOC concentrations, based on field screening, in trenches T-05 and T-08, respectively. An additional SUMMA canister sample and the duplicate sample were collected from vent riser T-08-05. The additional and duplicate SUMMA canister samples were collected from a vent riser with slightly lower VOC concentrations to reduce the potential that the highest VOC concentrations would exceed calibration standards and make the duplicate analysis of little value.

ppmv = parts per million by volume.

VOC = volatile organic compound.

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches. (9 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppmv)	Qualifier
T-05-02	B1DX09	09/08/2005	10/05/2005	79-34-5	1,1,2,2-Tetrachloroethane	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	75-35-4	1,1-Dichloroethene	1.6	
T-05-02	B1DX09	09/08/2005	10/05/2005	106-93-4	1,2-Dibromoethane	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	107-06-2	1,2-Dichloroethane	0.62	
T-05-02	B1DX09	09/08/2005	10/05/2005	106-99-0	1,3-Butadiene	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	123-91-1	1,4-Dioxane	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	71-36-3	1-Butanol	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	71-23-8	1-Propanol	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	78-93-3	2-Butanone	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	110-43-0	2-Heptanone	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	591-78-6	2-Hexanone	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	79-46-9	2-Nitropropane	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	107-87-9	2-Pentanone	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	67-63-0	2-Propanol	0.26	U
T-05-02	B1DX09	09/08/2005	10/05/2005	106-35-4	3-Heptanone	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	589-38-8	3-Hexanone	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	108-10-1	4-Methyl-2-Pentanone	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	75-07-0	Acetaldehyde	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	67-64-1	Acetone	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	75-05-8	Acetonitrile	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	71-43-2	Benzene	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	123-72-8	Butyraldehyde	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	109-74-0	Butyronitrile	0.28	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches. (9 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppmv)	Qualifier
T-05-02	B1DX09	09/08/2005	10/05/2005	75-15-0	Carbon disulfide	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	56-23-5	Carbon tetrachloride	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	108-90-7	Chlorobenzene	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	67-66-3	Chloroform	4	
T-05-02	B1DX09	09/08/2005	10/05/2005	108-94-1	Cyclohexanone	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	124-18-5	Decane	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	64-17-5	Ethanol	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	107-12-0	Ethyl cyanide	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	100-41-4	Ethylbenzene	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	110-00-9	Furan	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	110-54-3	Hexane	0.3	U
T-05-02	B1DX09	09/08/2005	10/05/2005	111-13-7	Hexyl methyl ketone	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	67-56-1	Methanol	0.82	U
T-05-02	B1DX09	09/08/2005	10/05/2005	75-09-2	Methylene chloride	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	108-38-3	m-Xylene	0.56	U
T-05-02	B1DX09	09/08/2005	10/05/2005	142-82-5	n- Heptane	0.26	U
T-05-02	B1DX09	09/08/2005	10/05/2005	106-97-8	n-Butane	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	74-98-6	N-Propane	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	95-47-6	o-Xylene	0.3	U
T-05-02	B1DX09	09/08/2005	10/05/2005	109-66-0	Pentane	0.26	U
T-05-02	B1DX09	09/08/2005	10/05/2005	127-18-4	Tetrachloroethene	3	
T-05-02	B1DX09	09/08/2005	10/05/2005	109-99-9	Tetrahydrofuran	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	108-88-3	Toluene	0.28	U
T-05-02	B1DX09	09/08/2005	10/05/2005	79-01-6	Trichloroethene	1.3	

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches. (9 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppmv)	Qualifier
T-05-02	B1DX09	09/08/2005	10/05/2005	75-01-4	Vinyl chloride	0.28	U
T-08-03	B1DX12	09/08/2005	10/05/2005	79-34-5	1,1,2,2-Tetrachloroethane	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	75-35-4	1,1-Dichloroethene	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	106-93-4	1,2-Dibromoethane	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	107-06-2	1,2-Dichloroethane	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	106-99-0	1,3-Butadiene	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	123-91-1	1,4-Dioxane	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	71-36-3	1-Butanol	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	71-23-8	1-Propanol	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	78-93-3	2-Butanone	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	110-43-0	2-Heptanone	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	591-78-6	2-Hexanone	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	79-46-9	2-Nitropropane	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	107-87-9	2-Pentanone	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	67-63-0	2-Propanol	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	106-35-4	3-Heptanone	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	589-38-8	3-Hexanone	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	108-10-1	4-Methyl-2-Pentanone	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	75-07-0	Acetaldehyde	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	67-64-1	Acetone	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	75-05-8	Acetonitrile	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	71-43-2	Benzene	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	123-72-8	Butyraldehyde	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	109-74-0	Butyronitrile	2.5	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches. (9 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppmv)	Qualifier
T-08-03	B1DX12	09/08/2005	10/05/2005	75-15-0	Carbon disulfide	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	56-23-5	Carbon tetrachloride	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	108-90-7	Chlorobenzene	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	67-66-3	Chloroform	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	108-94-1	Cyclohexanone	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	124-18-5	Decane	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	64-17-5	Ethanol	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	107-12-0	Ethyl cyanide	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	100-41-4	Ethylbenzene	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	110-00-9	Furan	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	110-54-3	Hexane	2.6	U
T-08-03	B1DX12	09/08/2005	10/05/2005	111-13-7	Hexyl methyl ketone	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	67-56-1	Methanol	7.6	U
T-08-03	B1DX12	09/08/2005	10/05/2005	75-09-2	Methylene chloride	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	108-38-3	m-Xylene	5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	142-82-5	n- Heptane	2.4	U
T-08-03	B1DX12	09/08/2005	10/05/2005	106-97-8	n-Butane	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	74-98-6	N-Propane	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	95-47-6	o-Xylene	2.6	U
T-08-03	B1DX12	09/08/2005	10/05/2005	109-66-0	Pentane	2.4	U
T-08-03	B1DX12	09/08/2005	10/05/2005	127-18-4	Tetrachloroethene	4,200	
T-08-03	B1DX12	09/08/2005	10/05/2005	109-99-9	Tetrahydrofuran	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	108-88-3	Toluene	2.5	U
T-08-03	B1DX12	09/08/2005	10/05/2005	79-01-6	Trichloroethene	8.8	

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches. (9 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppmv)	Qualifier
T-08-03	B1DX12	09/08/2005	10/05/2005	75-01-4	Vinyl chloride	2.5	U
T-08-05	B1DX10	09/08/2005	10/05/2005	79-34-5	1,1,2,2-Tetrachloroethane	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	75-35-4	1,1-Dichloroethene	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	106-93-4	1,2-Dibromoethane	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	107-06-2	1,2-Dichloroethane	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	106-99-0	1,3-Butadiene	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	123-91-1	1,4-Dioxane	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	71-36-3	1-Butanol	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	71-23-8	1-Propanol	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	78-93-3	2-Butanone	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	110-43-0	2-Heptanone	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	591-78-6	2-Hexanone	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	79-46-9	2-Nitropropane	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	107-87-9	2-Pentanone	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	67-63-0	2-Propanol	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	106-35-4	3-Heptanone	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	589-38-8	3-Hexanone	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	108-10-1	4-Methyl-2-Pentanone	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	75-07-0	Acetaldehyde	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	67-64-1	Acetone	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	75-05-8	Acetonitrile	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	71-43-2	Benzene	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	123-72-8	Butyraldehyde	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	109-74-0	Butyronitrile	0.28	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches. (9 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppmv)	Qualifier
T-08-05	B1DX10	09/08/2005	10/05/2005	75-15-0	Carbon disulfide	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	56-23-5	Carbon tetrachloride	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	108-90-7	Chlorobenzene	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	67-66-3	Chloroform	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	108-94-1	Cyclohexanone	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	124-18-5	Decane	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	64-17-5	Ethanol	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	107-12-0	Ethyl cyanide	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	100-41-4	Ethylbenzene	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	110-00-9	Furan	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	110-54-3	Hexane	0.3	U
T-08-05	B1DX10	09/08/2005	10/05/2005	111-13-7	Hexyl methyl ketone	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	67-56-1	Methanol	0.82	U
T-08-05	B1DX10	09/08/2005	10/05/2005	75-09-2	Methylene chloride	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	108-38-3	m-Xylene	0.56	U
T-08-05	B1DX10	09/08/2005	10/05/2005	142-82-5	n- Heptane	0.26	U
T-08-05	B1DX10	09/08/2005	10/05/2005	106-97-8	n-Butane	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	74-98-6	N-Propane	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	95-47-6	o-Xylene	0.3	U
T-08-05	B1DX10	09/08/2005	10/05/2005	109-66-0	Pentane	0.26	U
T-08-05	B1DX10	09/08/2005	10/05/2005	127-18-4	Tetrachloroethene	18	
T-08-05	B1DX10	09/08/2005	10/05/2005	109-99-9	Tetrahydrofuran	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	108-88-3	Toluene	0.28	U
T-08-05	B1DX10	09/08/2005	10/05/2005	79-01-6	Trichloroethene	0.28	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches. (9 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppmv)	Qualifier
T-08-05	B1DX10	09/08/2005	10/05/2005	75-01-4	Vinyl chloride	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	79-34-5	1,1,2,2-Tetrachloroethane	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	75-35-4	1,1-Dichloroethene	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	106-93-4	1,2-Dibromoethane	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	107-06-2	1,2-Dichloroethane	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	106-99-0	1,3-Butadiene	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	123-91-1	1,4-Dioxane	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	71-36-3	1-Butanol	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	71-23-8	1-Propanol	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	78-93-3	2-Butanone	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	110-43-0	2-Heptanone	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	591-78-6	2-Hexanone	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	79-46-9	2-Nitropropane	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	107-87-9	2-Pentanone	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	67-63-0	2-Propanol	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	106-35-4	3-Heptanone	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	589-38-8	3-Hexanone	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	108-10-1	4-Methyl-2-Pentanone	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	75-07-0	Acetaldehyde	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	67-64-1	Acetone	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	75-05-8	Acetonitrile	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	71-43-2	Benzene	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	123-72-8	Butyraldehyde	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	109-74-0	Butyronitrile	0.28	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches. (9 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppmv)	Qualifier
T-08-05	B1DX11	09/08/2005	10/05/2005	75-15-0	Carbon disulfide	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	56-23-5	Carbon tetrachloride	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	108-90-7	Chlorobenzene	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	67-66-3	Chloroform	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	108-94-1	Cyclohexanone	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	124-18-5	Decane	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	64-17-5	Ethanol	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	107-12-0	Ethyl cyanide	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	100-41-4	Ethylbenzene	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	110-00-9	Furan	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	110-54-3	Hexane	0.3	U
T-08-05	B1DX11	09/08/2005	10/05/2005	111-13-7	Hexyl methyl ketone	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	67-56-1	Methanol	0.82	U
T-08-05	B1DX11	09/08/2005	10/05/2005	75-09-2	Methylene chloride	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	108-38-3	m-Xylene	0.56	U
T-08-05	B1DX11	09/08/2005	10/05/2005	142-82-5	n- Heptane	0.26	U
T-08-05	B1DX11	09/08/2005	10/05/2005	106-97-8	n-Butane	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	74-98-6	N-Propane	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	95-47-6	o-Xylene	0.3	U
T-08-05	B1DX11	09/08/2005	10/05/2005	109-66-0	Pentane	0.26	U
T-08-05	B1DX11	09/08/2005	10/05/2005	127-18-4	Tetrachloroethene	17	
T-08-05	B1DX11	09/08/2005	10/05/2005	109-99-9	Tetrahydrofuran	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	108-88-3	Toluene	0.28	U
T-08-05	B1DX11	09/08/2005	10/05/2005	79-01-6	Trichloroethene	0.28	U

Table 2. Laboratory Results for Samples Collected Through Vent Risers in the 218-W-3A Burial Ground Trenches. (9 Pages)

Vent Riser	HEIS Number	Sample Date	Analysis Date	CAS Number	Constituent	Value (ppmv)	Qualifier
T-08-05	B1DX11	09/08/2005	10/05/2005	75-01-4	Vinyl chloride	0.28	U

CAS = Chemical Abstracts Service.
HEIS = *Hanford Environmental Information System* database.
ppmv = parts per million by volume.
U = analyzed for but not detected above limiting criteria.

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