0083146

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

SEP 15 2009

09-AMCP-0207

Ms. J. A. Hedges, Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton
Richland, Washington 99354

Dear Ms. Hedges:

BURIAL GROUND SAMPLING AND ANALYSIS RESULTS FOR APRIL - JUNE 2009, SGW-41533, REVISION 0

This letter transmits Burial Ground Sampling and Analysis Results for April - June 2009, SGW-41533, Revision 0, as required by Hanford Federal Facility Agreement and Consent Order Milestone M-91-40.

If you have any questions, please contact me, or your staff may contact Larry Romine, of my staff, on (509) 376-4747.

Sincerely,

Matthew S. McCormick, Assistant Manager
for the Central Plateau

AMCP:MSC

Attachment

cc: See Page 2

SEP 15 2009

cc w/attach:
G. Bohnee, NPT
L. Buck, Wanapum
D. A. Faulk, EPA
S. Harris, CTUIR
R. Jim, YN
S. L. Leckband, HAB
M. L. Mandis, Ecology
K. Niles, ODOE
D. G. Singleton, Ecology
R. Skinnarland, Ecology
Administrative Record (M-91)
Environmental Portal

cc w/o attach:
G. T. Berlin, CHPRC
R. E. Piippo, CHPRC
V. J. Rohay, CHPRC
J. G. Vance, FFS

SGW-41533
Revision 0

Burial Ground Sampling and Analysis Results for April – June 2009

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

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

CH2MHILL
Plateau Remediation Company

P.O. Box 1600
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SGW-41533
Revision 0

Burial Ground Sampling and Analysis Results for April – June 2009

Date Published
July 2009

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Assistant Secretary for Environmental Management

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Executive Summary

This report documents the results of Step II soil-vapor sampling conducted at Trenches 1 and 7 in the 218-W-4C Burial Ground during April – June 2009. These trenches previously contained suspect transuranic[1] (TRU) waste, which was retrievably stored[2] and has since been retrieved. There was concern that the waste containers may have leaked and released volatile organic compounds to the vadose zone. The sampling was performed in accordance with DOE/RL-2003-48, *218-W-4C Sampling and Analysis Plan*.[3] Soil-vapor samples were collected from the vadose zone through direct-push boreholes at depths up to 9.8 m (32 ft) below the ground surface. The samples were analyzed using an industry standard field-screening instrument and limited laboratory analysis of SUMMA[4] canister samples. No significant concentrations or large accumulations of volatile organic compounds were identified at Trenches 1 and 7. The data were of adequate quality to support further evaluation and met the sampling objectives. This activity completes the field work for Step II sampling at the 218-W-4C Burial Ground. The data gathered at Trenches 1 and 7 in the 218-W-4C Burial Ground will next be reviewed with the data obtained earlier at 218-W-4C Burial Ground Trenches 4, 20, 24, and 29, to determine the need for additional characterization. Step III sampling is tentatively planned for fiscal year 2010, and may include additional soil-vapor sampling and collection of soil samples for laboratory analysis.

Similar sampling is planned at the 218-W-4B, 218-W-3A, and 218-E-12B Burial Grounds under separate sampling and analysis plans. Step I of the sampling program, which involved sampling of vapors from the vent risers before the waste is retrieved, has been completed. Retrieval of the suspect TRU waste in these other burial grounds is underway or will be shortly. The next Step II soil-vapor sampling is currently planned at Trench 17 of the 218-W-3A Burial Ground in fiscal year 2011.

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[1] Radioactive waste as defined in DOE G 435.1-1, *Implementation Guide for Use with DOE M 435.1-1*.

[2] Retrievably stored for purposes of the *Atomic Energy Act of 1954*, 42 USC 2011, et seq.

[3] 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.

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

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Terms

bgs	below ground surface
DQO	data quality objective
FY	fiscal year
HEIS	Hanford Environmental Information System
OVM	organic vapor monitor
ppbv	parts per billion by volume
ppmv	parts per million by volume
RPD	relative percent difference
SAP	sampling and analysis plan
SDG	sample delivery group
Tri-Party Agreement	Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order*
TRU	Radioactive waste as defined in DOE G 435.1-1, *Implementation Guide for Use with DOE M 435.1-1*
VOC	volatile organic compound
WSCF	Waste Sampling and Characterization Facility

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1 Introduction

1.1 Purpose

This report has been prepared in response to Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order* (Tri-Party 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.* This report presents sampling and analysis results obtained during the period of April – June 2009.

1.2 Background

The 218-W-4C Burial Ground, located in the 200 West Area of the Hanford Site, began accepting packaged waste materials from Hanford Site operations and offsite sources in 1978. The burial ground contains low-level, transuranic (TRU),[5] and mixed waste. Some waste (primarily suspect TRU waste in drums and boxes) was segregated from other burial ground waste and placed in separate burial trenches or areas of trenches for temporary storage. This waste was placed in modules on asphalt pads, and covered with plywood and plastic sheeting to allow for possible future retrieval. The asphalt pad typically overlies a gravel layer. Trenches 1, 4, 7, 20, 24, and 29 in the 218-W-4C Burial Ground contained retrievably stored waste (Figures 1-1 and 1-2).

Concern arose in 2003 that contaminants, particularly volatile organic compounds (VOCs), may have leaked from retrievably stored waste containers in the 218-W-4C Burial Ground. The data quality objective (DQO) process in EPA/600/R-96/055, *Guidance for the Data Quality Objectives Process – QA/G-4*, was used to develop the sampling and analytical activities to determine the nature and extent of any leaked contamination. Results of the DQO were documented in FH-0303364, "Transmittal of the Data Quality Objectives Summary Report for the 218-W-4C Burial Ground Contaminant Release Investigation, CP-16886, Revision 0." The contaminants of concern were primarily carbon tetrachloride and its degradation products. The sampling design developed in the DQO was carried over into DOE/RL-2003-48 for implementation in the field. DOE/RL-2003-48 established requirements for sampling of vent risers and substrate soils in the trenches containing retrievably stored waste. A three-step sampling plan was developed.

- Step I involves vapor sampling through existing vent risers before any waste is retrieved from the trenches.
- Step II consists of soil-vapor sampling around the edges of the asphalt pads following waste retrieval to identify locations where condensate or run-off may have drained into the perimeter soils.
- Step III will evaluate the results of Steps I and II to determine if further characterization is needed by soil-vapor sampling and soil sampling beneath the asphalt pads.

[5] Radioactive waste as defined in DOE G 435.1-1, *Implementation Guide for Use with DOE M 435.1-1*.

Figure 1-1. Typical Asphalt Pad and Retrievably Stored Waste

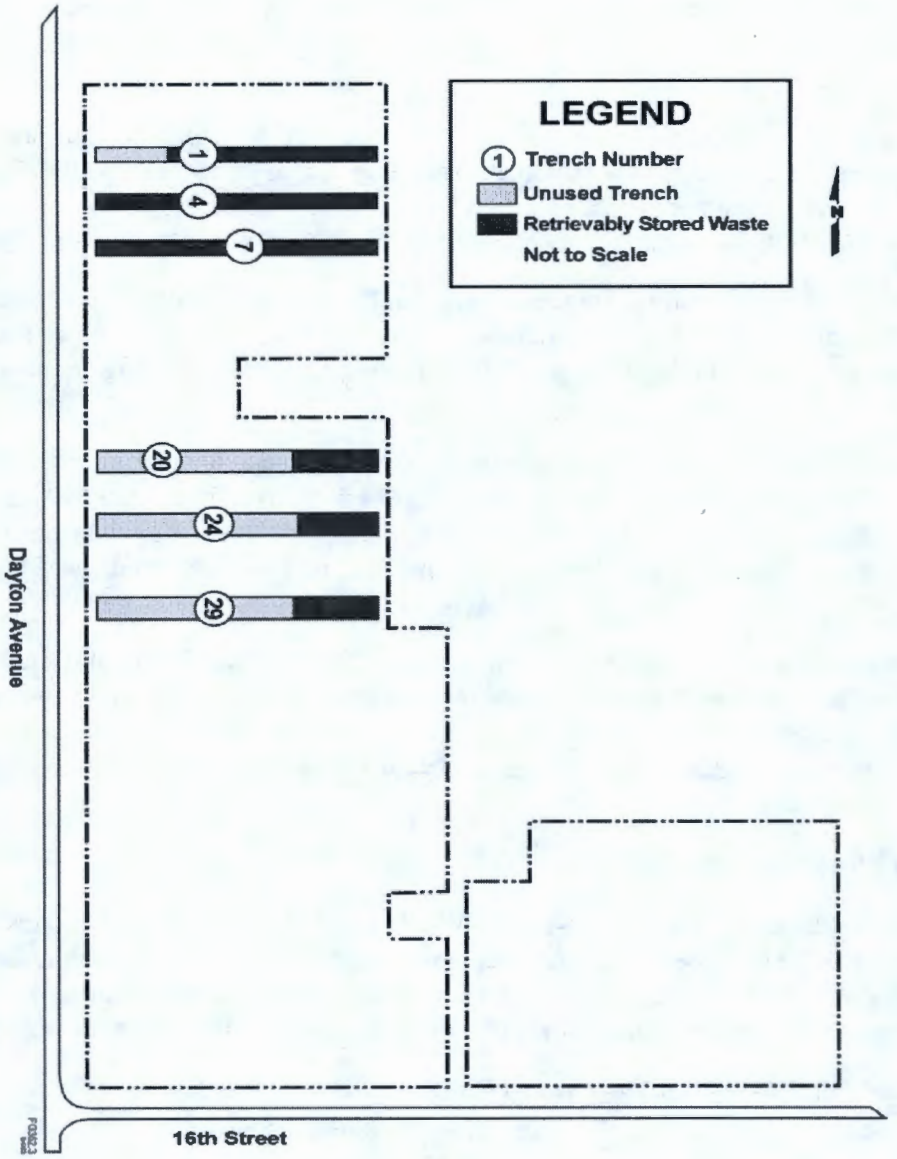

Figure 1-2. Locations of Retrievably Stored Waste at the 218-W-4C Burial Ground

Step I vapor sampling was completed in 2004 for the 218-W-4C Burial Ground. Samples were collected from the 84 vent risers in Trenches 1, 4, 7, 20, and 29; Trench 24 did not have vent risers. Vapor samples initially were collected from each riser in Tedlar[6] bags for onsite analysis using a field-screening instrument. A vapor sample then was collected from the vent riser in each trench that had the highest carbon tetrachloride concentration, based on the field-screening results. These vapor samples were contained in SUMMA[7] canisters for laboratory analysis. The results were included in the quarterly reports

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

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

for October – December 2003 (FH-0400144.1, "Transmittal of the burial Ground Sampling and Analysis Results for October – December 2003") and January – March 2004 (FH-0401097, "Transmittal of the Burial Ground Sampling and Analysis Results for January – March 2004, in Accordance with the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) Settlement and Tentative Agreement Interim Milestone M-91-040").

Step II soil-vapor sampling then was performed around the edges of the asphalt pads in Trenches 4, 20, 24, and 29 following waste retrieval. The systematic sampling design prescribed by DOE/RL-2003-48 was followed. A total of 243 samples were collected for field-screening analysis. The results were reported in SGW-37027, *Burial Ground Sampling and Analysis Results for October – December 2007*.

Retrieval of the waste in the remaining Trenches 1 and 7 of the 218-W-4C Burial Ground has since been completed, allowing access to the trench bottoms and the asphalt pads. Step II soil-vapor sampling was performed at Trenches 1 and 7 in April and May 2009. The results of that sampling are provided in this report.

Trench 1 contained drums with plutonium-contaminated soil from the 216-Z-9 Trench mining operation, noncombustible TRU waste, and approximately 500 cans of ash received in the early 1980s. The ash was generated by the Contaminated Waste Recovery Facility, which incinerated miscellaneous waste (e.g., rubber gloves, rags, paper, spent solvent, and cutting oils) no longer usable in the Z Plant complex (DOE/RL-2003-48).

Trench 7 was excavated at the location of a former waste site. The Z Plant Burning Pit was a disposal site used from 1950 to 1960 for noncombustible nonradioactive construction, office, and non-hazardous laboratory waste, including unnamed chemicals. The burn pit was exhumed during the construction of Trench 7. Later this trench contained TRU boxes, organic waste in drums, and drums of irradiated fuel (DOE/RL-2003-48).

1.3 Related Work

Similar sampling is planned for the 218-W-4B, 218-W-3A, and 218-E-12B Burial Grounds following retrieval of the suspect TRU waste. The DQO process was used to define the sampling requirements for those burial grounds. A multi-step approach to sampling will be used, same as for the 218-W-4C Burial Ground. The sampling and analysis plans (SAPs) for those burial grounds are documented as follows:

- DOE/RL-2004-70, *218-W-4B Burial Ground Sampling and Analysis Plan*
- DOE/RL-2004-71, *218-W-3A Burial Ground Sampling and Analysis Plan*
- DOE/RL-2004-32, *218-E-12B Burial Ground Sampling and Analysis Plan.*

2 Sample Collection and Analysis

2.1 Identification of Sample Locations

Step II soil-vapor sampling was conducted along the edges of the asphalt pads in Trenches 1 and 7 using the systematic sampling design described in DOE/RL-2003-48. The sample locations were spaced at 7.6 m (25 ft) intervals along each side. On each side, a random number generator was used to determine the distance of the first sample location from the corner. The corner locations also were typically sampled. Only those portions of the asphalt pads that contained retrievably stored waste were sampled.

In addition, a small number of biased sample locations were identified at specific locations. The biased sample locations potentially have elevated VOC concentrations. The biased sample locations were determined by (1) reviewing the results of previous Step I vent riser sampling, (2) performing organic vapor monitoring and radiological field-screening surveys of the asphalt pads and the soils along the edges of the pads, (3) conducting visual observations of the surface of the pad for indications of leakage, (4) reviewing waste retrieval records for any releases, and (5) reviewing pertinent inspection records and/or occurrence reports regarding subsidence and/or flooding in the burial ground.

The results of previous Step I vent riser sampling in Trenches 1 and 7 were reviewed. Two risers in Trench 1 (Risers T1-01 and T1-04), and two risers in Trench 7 (Risers T7-06 and T7-14S), were identified as having high concentrations of organic vapors. The former locations of these vent risers in the trenches were determined by global positioning system surveys. Sample locations were then specified directly north and south of these points at the edge of the asphalt pads for Step II soil-vapor sampling.

Organic vapor monitoring and radiological field-screening surveys were conducted on March 24, 2009, in Trench 7 and part of Trench 1. The east end of Trench 1 was not accessible at the time due to ongoing work by burial ground employees to remove a spot of contamination on the asphalt pad. The remainder of Trench 1 was later surveyed on April 6, 2009. Results of the organic vapor monitoring were documented in survey reports IHSF-04031 and IHSF-04081; no organic vapors were detected. Results of the radiological surveys were documented in survey reports GW-09-0533 and GW-09-0632; nothing above background levels was detected.

The Waste Retrieval Project prepared Post-Retrieval Information Data Sheets to document the condition of the containers and the physical end-state for Trenches 1 and 7 following waste retrieval. This information was prepared in accordance with HNF-32441, *Memorandum of Agreement Between the Waste Retrieval Project and the 200-SW-2 Operable Unit Project*. The waste containers in Trenches 1 and 7 were in relatively good condition. No visible soil staining or residue was reported that would possibly indicate leakage. One area of fixed-surface contamination remains in Trench 1. The location coincides with Vent Riser T1-01. The area was covered with a tarp held down by sand bags, and approximately 0.8 m (2.5 ft) of crushed gravel overburden. Another area of contamination also had existed at the east end of Trench 1 where casks of zircaloy hulls were stored. That area was remediated before soil-vapor sampling started by removing an approximately 0.6 by 0.6 m (2- by 2-ft) section of the asphalt pad. No contamination or releases were experienced in Trench 7 during waste retrieval.

The Occurrence Reporting & Processing System database was reviewed for any occurrence reports related to the 218-W-4C Burial Ground. One instance of soil subsidence in Module 5 of Trench 1 was noted in occurrence report PHMC-SOLIDWASTE-2004-2007. The subsidence was attributed to a void space that occurred due to a gap between two covered burial boxes. The overburden soil had been supported by a tarp, which later collapsed. There was no detectable contamination after the event.

The Hanford Information Lessons Learned Sharing database was reviewed for relevant operating experiences. No issues specific to the 218-W-4C Burial Ground were found.

Flooding of the burial grounds has occurred in the past. The winter of 1979 was extremely cold and the ground froze several inches deep. Several inches of snow then fell. A rapid warming caused the snow to melt and water to pond on the still-frozen ground. At the time, Modules 1 through 4 in Trench 1 contained waste. Trench 7 was empty. There were reports (WHC-EP-0912, *The History of the 200 Area Burial Ground Facilities*) of waste drums floating in Trench 4; the drums were recovered and no contamination was believed to have been released. The trench designs were later changed to avoid the accumulation of water. Because of the nature of this event, specific locations for additional Step II sampling could not be determined.

Before sampling, the sample locations were staked in the field. A permanent Hanford Environmental Information System (HEIS) well identification number was assigned to each borehole (e.g., C7202). Figures 2-1 and 2-2 show the sample locations at Trenches 1 and 7.

2.2 Sample Collection for Field Screening

A series of direct-push technology boreholes were installed using a Geoprobe[8] 66DT along the edges of the asphalt pads in Trenches 1 and 7. Soil-vapor samples were collected from the boreholes. The Geoprobe unit is shown in Figure 2-3.

In a typical sampling operation, the Geoprobe rod was positioned as close to the staked location as possible and driven to the prescribed maximum depth. The casing was carbon steel and measured 5.4 cm (2.125 in.) outer diameter by 3.8 cm (1.5 in.) inner diameter. After driving to depth, the casing was backpulled 15 cm (6 in.) to detach the removable drive tip. Next, a length of Teflon[9] tubing was lowered to the bottom of the probe hole. The tubing was 0.6 cm (0.25 in.) inside diameter and had a coarse filter on the lower end to prevent plugging with dirt, and a fine filter aboveground to protect the sample pump and field-screening instrument. The tubing was attached to a metal rod that was lowered to the bottom of the borehole after measuring to confirm the depth. An inflatable packer was used to seal the casing and reduce inflow of ambient air during sampling. The sample assembly is shown in Figure 2-4.

The sample tubing was connected aboveground to the inlet of a sample pump. The discharge of the sample pump was connected to the field-screening instrument by another short piece of tubing. The sample pump was operated for 3 minutes to purge the tubing, based on the length of the probes and tubing and the pumping rate. A soil-vapor sample then was collected from near the bottom of the borehole.

The sample tubing then was removed from the hole and the Geoprobe rod was backpulled to the next (shallower) sample depth. The lower portion of the borehole was backfilled with granular bentonite. The sample tubing was lowered again to collect the next sample. The process of backpulling, backfilling, and sampling was repeated until the final sample was collected. The borehole then was decommissioned.

At each sample location, soil-vapor samples typically were collected at depths of 1.8 m (6 ft) and 3.7 m (12 ft) below the surface of the asphalt pad. Deeper sampling was performed at the locations that potentially have elevated VOC concentrations. At these locations, sampling was performed at 1.8 m (6 ft) intervals to a maximum depth of 9.8 m (32 ft) below ground surface (bgs).

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[8] Geoprobe is a registered trademark of Kejr, Inc., Salina, Kansas.

[9] Teflon is a registered trademark of E. I. du Pont de Nemours and Company.

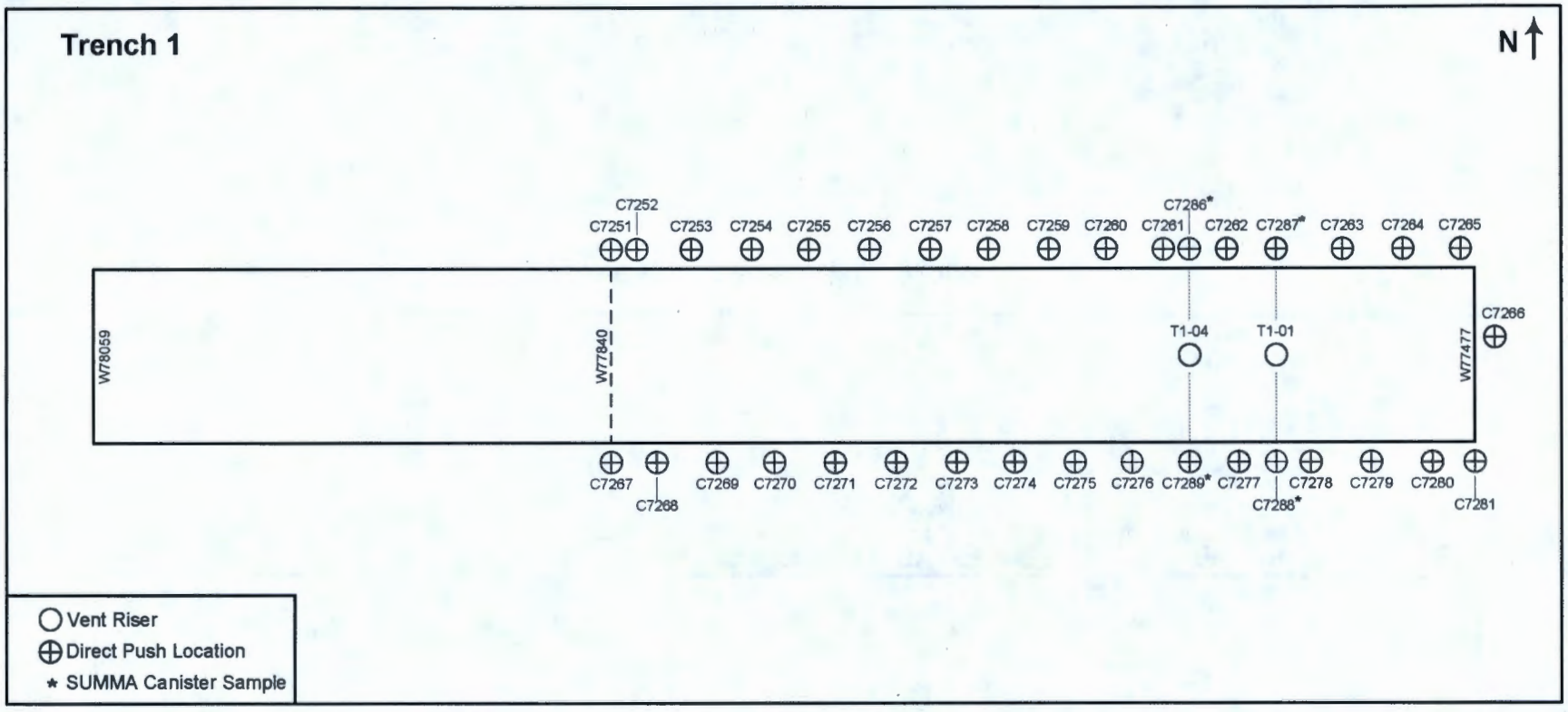

Figure 2-1. Trench 1 Sample Locations

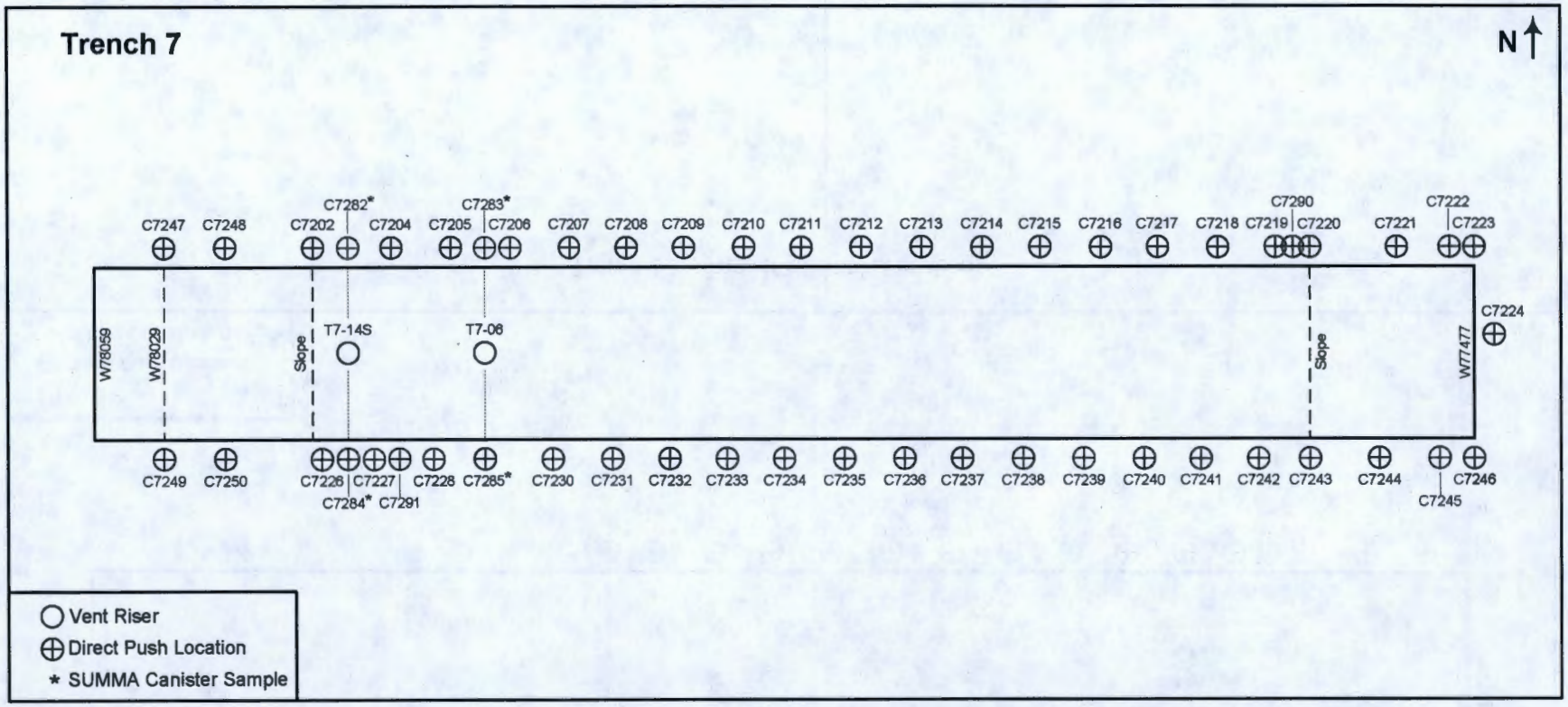

Figure 2-2. Trench 7 Sample Locations

Figure 2-3. Geoprobe Direct-Push Equipment

Figure 2-4. Sample Assembly with Inflatable Packer

2.3 SUMMA Canister Sampling

During the Step II sampling at Trenches 4, 20, 24, and 29 conducted in October – December 2007, the soil-vapor samples were analyzed using a MIRAN[10] SapphIRe Ambient Air Analyzer (MIRAN analyzer). The MIRAN analyzer is an industry standard for field-screening purposes. Certain compounds were identified that had not been used in the 200 Area and were unlikely to have been included in the waste packages stored in the burial ground. While the data were of sufficient quality to meet the intent of the sampling activity, the data were of limited utility in determining potential employee exposures. In response to comments by the regulators, a commitment was made to incorporate use of SUMMA canister sampling and/or thermal desorption sorbent tube sampling in future Industrial Hygiene monitoring of waste retrieval. Step II soil-vapor sampling at Trenches 1 and 7 was recommended to analyze a small fraction of the samples (10 percent) by both the field-screening instrument and at the Waste Sampling and Characterization Facility (WSCF) to allow comparison of the results.

For the April – June 2009 field activities, a plan was developed to incorporate limited SUMMA canister sampling at Trenches 1 and 7. Earlier results from sampling at Trenches 4, 20, 24, and 29 in the 218-W-4C Burial Ground were reviewed. Generally, the highest concentrations of VOCs were found at the deepest sampling intervals. In particular, the maximum concentrations of carbon tetrachloride at Trenches 4, 20, and 29 were detected in deeper boreholes, near vent risers that had previously showed positive indications for VOCs. For the most recent sampling effort, it was decided to obtain a single 6 L (1.6 gal) SUMMA canister sample at each of the biased sample locations. The SUMMA canister samples were collected at or near the bottom of the boreholes immediately before or after drawing the field-screening samples to allow for data comparison. Samples collected in SUMMA canisters were sent to the Hanford Site's WSCF laboratory for analysis.

A vacuum pump was first used to purge the sample tubing for a minimum of 1 minute before taking a SUMMA canister sample. After confirming the SUMMA canister had maintained sufficient vacuum, the SUMMA canister was attached to the sample tubing. The sample was drawn by opening a valve on the SUMMA canister for 3 minutes to allow an adequate volume of vapor to be collected. The SUMMA canisters were given sample numbers and then transferred to the WSCF laboratory.

2.4 Quality Control Sampling

DOE/RL-2003-48 requires collection of duplicate samples and equipment blanks. Field blanks also were collected and instrument response checks were performed.

For soil-vapor samples drawn directly into the field-screening instrument for analysis, duplicates were defined as two separate analyses, performed sequentially, using the same analytical equipment. A minimum of 5 percent of the total collected soil-vapor samples were duplicated (i.e., one duplicate was analyzed every 20 samples or, at minimum, one duplicate per day).

For soil-vapor samples collected in SUMMA canisters, duplicates were defined as independent samples collected as close as possible to the same point in space and time, taken from the same source, stored in separate containers, and analyzed independently (i.e., not homogenized). At minimum, one duplicate SUMMA canister sample was collected. Because the SUMMA canister samples were collected at locations with positive results from earlier vent riser sampling, the samples and duplicate were more likely to contain contaminated vapor.

[10] MIRAN is a registered trademark of Thermo Fisher Scientific, Waltham, Massachusetts.

For soil-vapor samples drawn directly into the field-screening instrument for analysis, no equipment blanks were collected. For soil-vapor samples collected in SUMMA canisters, a single cleaned SUMMA canister was filled with certified clean air and analyzed for the contaminants of concern.

2.5 Analytical Methods

Similar to the Step II sampling for Trenches 4, 20, 24, and 29, soil-vapor samples were again analyzed using a MIRAN analyzer. The MIRAN analyzer exposes a sample to wavelengths of infrared radiation between 1.859 and 14.1 μm and measures the absorption of each wavelength. Based on the absorption profile, the MIRAN analyzer determines the concentration of the selected compound. The contaminants of concern are VOCs, primarily carbon tetrachloride and its degradation products. The absorption profile (absorption versus wavelength) can be exported from the instrument into a companion software program (ThermoMatch[11]) that can identify up to five compounds with the highest concentrations in the vapor sample from a computerized library. As a result, the analysis of VOCs for field screening was not limited to the two to eight compounds identified in DOE/RL-2003-48. The MIRAN analyzer contains factory calibration data for 120 chemical compounds and ThermoMatch has a library of 137 compounds.

The ThermoMatch software program computes a Hit Quality Index corresponding to the quality of the spectral match. A Hit Quality Index above 70 percent is considered a good spectral match and the results are considered adequate for field-screening purposes. A Hit Quality Index below 60 percent indicates that the analyte was detected but the spectral match was of poor quality; there is less confidence in the value reported and it is assigned a qualifying "J" code.

Before the start of work, detection limits were determined for each of the contaminants of concern using the MIRAN analyzer. The detection limit is defined as the minimum concentration of a substance that can be measured and reported with 99 percent confidence. The procedure described in 40 CFR 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants," Appendix B, "Definition and Procedure for the Determination of the Method Detection Limit," was followed in determining the detection limits. The detection limits for each of the contaminants of concern are provided in Table 2-1.

The MIRAN analyzer measures the humidity and accounts for the spectral interference of the water vapor in the results. Very low concentrations of VOCs may be masked if significant water vapor is present as a result of humidity compensation by reducing the measured infrared absorbance of the sample.

Analysis of soil-vapor samples in SUMMA canisters was performed at the WSCF laboratory for a broad suite of VOCs using a gas chromatograph/mass spectrometer. The analysis was conducted in accordance with EPA/625/R-96/010b, *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*, Compendium Method TO-15, "Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)." The WSCF laboratory maintains a list of target analytes for use in analyzing SUMMA canister samples by Compendium Method TO-15. Requests for analytical services to be performed by the laboratory were documented on chain-of-custody forms. Analytical results provided by the laboratory were documented in sample delivery group (SDG) data packages.

[11] ThermoMatch is a registered trademark of Thermo Fisher Scientific, Waltham, Massachusetts.

Table 2-1. Detection Limits for the MIRAN Analyzer

Compound	CAS	Detection Limit (ppmv)
Carbon tetrachloride	56-23-5	0.09
Chloroform	67-66-3	0.07
1,1-Dichloroethane	75-34-3	0.22
Methylene chloride	75-09-2	0.44
Tetrachloroethene	127-18-4	0.16
1,1,1-Trichloroethane	71-55-6	0.15
1,1,2-Trichloroethane	79-00-5	0.07
Trichloroethene	79-01-6	1.2

CAS = Chemical Abstracts Service

The contaminants of concern and the analytical performance requirements are specified in DOE/RL-2003-48. Requirements for detection limits, precision, and accuracy are provided for both field screening of soil-vapor samples and laboratory analysis of SUMMA canisters. Holding times are not applicable to field screening because the samples were drawn directly into the instrument. Holding times are specified for laboratory analysis of SUMMA canisters (14 to 28 days).

2.6 Borehole Decommissioning

After sampling, the direct-push boreholes were decommissioned by filling with granular bentonite from total depth to 0.3 to 0.9 m (1 to 3 ft) bgs. The boreholes then were filled with grout to the surface. A brass survey marker that was die stamped with the borehole identification number and the date of decommissioning was placed in the top of the grout (Figure 2-5). The final locations of the decommissioned boreholes were surveyed on May 22, 2009. The survey was performed using a Trimble[12] 5800 global positioning system receiver under NAD83(91), *North American Datum of 1983*, and NAVD88, *North American Vertical Datum of 1988*. Results of the civil survey are provided in Appendix A. The coordinates of all the boreholes were entered into the Hanford Well Information System database.

Borehole C7230 at Trench 7 was decommissioned with bentonite and grout as described. However, the brass marker was not inserted into the grout by mistake.

[12] Trimble is a registered trademark of Trimble Navigation Limited, Sunnyvale, California.

Figure 2-5. Decommissioned Borehole Following Soil-Vapor Sampling

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3 Results Summary

Direct push soil-vapor sampling at Trenches 1 and 7 was initiated on April 21, 2009, using a Geoprobe. Sampling was completed on May 21, 2009. The drilling contractor was MSE – Technology Applications, Inc. A total of 87 direct-push boreholes were installed. All the boreholes were pushed to the planned depth and were verified in the field. Field-screening activities were performed in accordance with Soil & Groundwater Remediation Project procedures. Field activity reports were prepared for each borehole and provide a timeline of daily activities.

Altogether, 238 samples were collected for direct analysis by the MIRAN analyzer, including duplicates and field blanks. Another 10 samples, including a duplicate and equipment blank, were collected in SUMMA canisters for analysis at the WSCF laboratory. A breakdown of the numbers and types of samples is provided below:

204	MIRAN analyzer field-screening samples
17	MIRAN analyzer duplicates
17	MIRAN field blanks
238	**Total MIRAN analyzer samples**
8	SUMMA canister field-screening samples
1	SUMMA canister duplicate
1	SUMMA canister equipment blank
10	**Total SUMMA canister samples**

The maximum concentrations of each of the contaminants of concern detected at Trenches 1 and 7 are provided in Table 3-1. The complete sample results for all the boreholes are provided in Appendix B.

The MIRAN analyzer frequently detected carbon dioxide and methane in the samples. The carbon dioxide results are absolute values that were not adjusted for atmospheric contributions. The methane results are possibly due to spectral interference by water vapor.

3.1 Trench 1 MIRAN Analyzer Results

A walkdown was performed of Trench 1 before the start of sampling. During the walkdown, an area of staining due to drum corrosion was observed on the surface of the asphalt pad approximately 30 m (100 ft) from the east end of the trench (Figure 3-1). Rust fragments from the waste drums were embedded in the asphalt. A survey of the area detected no radioactive contamination. Sample location C7277 was moved approximately 1.5 m (5 ft) to the west to better align with this area.

The asphalt pad at the east end of Trench 1 was covered by approximately 0.3 m (1 ft) of soil from the nearby embankment. Two sample locations (C7266 and C7281) were affected. The depth of the boreholes was adjusted and soil-vapor samples were collected at 1.8 m (6 ft) and 3.7 m (12 ft) below the surface of the asphalt pad (2.1 m [7.0 ft] and 4.0 m [13.0 ft] bgs actual depth).

Table 3-1. Maximum Soil-Vapor Concentrations Detected at Trenches 1 and 7

Compound	CAS	Trench 1 (ppmv)	Trench 7 (ppmv)
Carbon tetrachloride	56-23-5	2.55	2.80
Chloroform	67-66-3	0.07 U	0.07 U
1,1-Dichloroethane	75-34-3	10.29	0.22 U
Methylene chloride	75-09-2	7.12	0.44 U
Tetrachloroethene	127-18-4	6.14	15.25
1,1,1-Trichloroethane	71-55-6	0.15 U	0.15 U
1,1,2-Trichloroethane	79-00-5	8.64	0.07 U
Trichloroethene	79-01-6	1.2 U	0.86 J

Qualifying codes:
J Indicates an estimated value. Analyte was detected but spectral match was poor quality. Value is reported with a low level of confidence.
U Compound was analyzed for but not detected.

CAS = Chemical Abstracts Service

The gravel over the area of fixed contamination in Trench 1 affected sample locations C7287 and C7288 (Figure 3-2). These boreholes were planned to be deeper because this was a location where VOCs had been detected in earlier vent riser sampling. The depth of these boreholes was increased 0.8 m (2.5 ft) to compensate for the additional overburden. Soil-vapor samples were collected at 9.8 m (32 ft) below the surface of the asphalt pad (10.5 m [34.5 ft] bgs actual depth) and upwards at 1.8 m (6 ft) intervals (8.1, 6.2, 4.4, and 2.6 m [26.5, 20.5, 14.5, and 8.5 ft] bgs actual depth).

The MIRAN analyzer results for Trench 1 are provided in Appendix B, Table B-1. Carbon tetrachloride was detected at 14 locations around the asphalt pad in Trench 1 at concentrations ranging from 0.16 to 2.55 ppmv. The locations where carbon tetrachloride was detected generally were toward the center of that portion of the trench used for waste storage. No carbon tetrachloride was detected at either end of the trench. The maximum concentrations were detected at Boreholes C7287 and C7288 on opposite sides of the asphalt pad around Vent Riser T1-01. High concentrations similarly were found on the south side of the pad at Borehole C7289 adjacent to Vent Riser T1-04. Boreholes C7287, C7288, and C7289 were all pushed to the maximum depth prescribed by DOE/RL-2003-48 (9.8 m [32 ft bgs]), and the highest concentrations were found at the bottoms of the boreholes. Overall, there is an observed tendency within the carbon tetrachloride results for the concentration to increase with depth.

Figure 3-1. Staining on Asphalt Pad in Trench 1 Due to Drum Corrosion

Figure 3-2. Sampling Through Gravel on Asphalt Pad in Trench 1

Tetrachloroethene was detected at nine locations around the asphalt pad in Trench 1. Several locations were the same as where carbon tetrachloride had been detected, and generally were centered about where Vent Risers T1-01 and T1-04 were located. Some additional detects occurred near the east end of the trench. The concentrations ranged from 2.47 to 6.14 ppmv. There was no discernible effect of depth on the concentration.

Several other chemical compounds were detected at Trench 1. Toluene was detected at 11 locations scattered around the trench with a maximum concentration of 18 ppmv at Borehole C7280. Nitrous oxide was detected at six locations, all at the east end of the trench, with a maximum concentration of 88 ppmv also at Borehole C7280. The VOCs 1,1-dichoroethane, methylene chloride, and 1,1,2-trichloroethane were each detected once, and pyridine was detected twice. Carbon dioxide (29 locations) and methane (26 locations) were found at most boreholes, as expected for a landfill.

The contaminants of concern chloroform, 1,1,1-trichloroethane, and trichloroethene were not detected at Trench 1 sample locations.

3.2 Trench 7 MIRAN Analyzer Results

A service road had been constructed by the Waste Retrieval Project at the west end of Trench 7, covering a portion of the asphalt pad. Four sample locations (C7247, C7248, C7249, and C7250) were affected. The elevation of the roadway above the asphalt pad (4.4 m [14.5 ft]) was determined from civil surveys and the depth of the boreholes was adjusted. Soil-vapor samples were collected at 1.8 m (6 ft) and 3.7 m (12 ft) below the surface of the asphalt pad (6.2 and 8.1 m [20.5 and 26.5 ft] bgs actual depth).

Similarly, a ramp had been constructed at the east end of Trench 7 to allow truck access for removing a large waste box. The ramp covered a portion of the asphalt pad and seven sample locations (C7221, C7222, C7223, C7224, C7244, C7245, and C7246). The boreholes at these locations were pushed an additional 2.9 m (9.4 ft) to compensate for the soil overburden. Soil-vapor samples were collected at 1.8 m (6 ft) and 3.7 m (12 ft) below the surface of the asphalt pad (4.7 and 6.5 m [15.4 and 21.4 ft] bgs actual depth).

Review of preliminary results identified tetrachloroethene in some samples obtained at the east end of Trench 7. Borehole C7290 was added and pushed down to 9.8 m (32 ft) bgs to better define the extent of contamination.

Another borehole was added after reviewing the earlier Step I vent riser sample data. Vent Riser T7-07 had shown high concentrations of chloroform. Borehole C7291 was pushed down to 9.8 m (32 ft) bgs along the south edge of the asphalt pad adjacent to the former riser location.

The MIRAN analyzer results for Trench 7 are provided in Table B-2. Carbon tetrachloride was detected at 14 locations at concentrations ranging from 0.16 to 2.8 ppmv. While the locations were mostly scattered, they tended toward the west end and south edge of the asphalt pad. The maximum concentration of carbon tetrachloride was detected at the bottom of Borehole C7290. Carbon tetrachloride also was detected at Boreholes C7283 and C7285 on opposite sides of the asphalt pad around Vent Riser T7-06. Generally, all the detects for carbon tetrachloride at Trench 7 occurred at the bottoms of the boreholes.

Tetrachloroethene was detected at eight locations, primarily at the northeast corner of Trench 7. This location is consistent with what was seen in previous Step II soil-vapor sampling at the nearby Trench 4, where high concentrations of tetrachloroethene were detected at the east end of that trench.
The concentrations at Trench 7 ranged from 1.6 to 15.25 ppmv. The maximum concentration of tetrachloroethene occurred at the bottom of Borehole C7290.

Several other chemical compounds were detected at Trench 7. Toluene was detected at six locations scattered around the trench with a maximum concentration of 14 ppmv at Borehole C7291. Nitrous oxide was detected at three locations, all at the east end of the trench similar to Trench 1, with a maximum concentration of 8.4 ppmv at Borehole C7224. Acetylene was detected once at Borehole C7242. Carbon dioxide (44 locations) and methane (41 locations) were found at most boreholes.

The contaminants of concern chloroform, 1,1-dichloroethane, methylene chloride, 1,1,1-trichloroethane, and 1,1,2-trichloroethane were not detected at Trench 7 sample locations.

3.3 SUMMA Canister Analytical Results

Analytical results for the SUMMA canister samples collected at Trenches 1 and 7 are provided in Table B-3. For comparison, the table also shows the results obtained by the MIRAN analyzer at the same locations and depths. There is generally good agreement between the data sets, given that the MIRAN analyzer is intended for field screening and the SUMMA canister samples were subject to more rigorous analytical methods. Where significant concentrations of a VOC were detected in a SUMMA canister sample, the same compound typically was detected by the MIRAN analyzer at approximately the same order of magnitude. On three occasions, the results were inconsistent where a compound was not detected by the MIRAN analyzer but was detected in the corresponding SUMMA canister sample at concentrations significantly greater than the MIRAN analyzer detection limit. At shallower depths in Borehole C7286, the MIRAN analyzer did detect carbon tetrachloride in concentrations similar to the SUMMA canister sample, confirming its presence. A review of the MIRAN analyzer results for tetrachloroethene at Boreholes C7286 and C7287 did show the presence of that compound too, but in lower concentrations than detected in the SUMMA canister samples. Several VOCs, including some contaminants of concern, were detected in the SUMMA canister samples at concentrations below what could be detected by the MIRAN analyzer (i.e., parts per billion by volume levels). The detection limit, or target of quantitation for VOCs, was 10 parts per billion by volume (ppbv) for all VOCs on the target analyte list except for acetone (25 ppbv), methanol (50 ppbv), and ethanol (50 ppbv).

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4 Quality Control

Supplemental requirements are specified in the SAP (DOE/RL-2003-48) to ensure the quality of the data obtained. Field quality control and analytical performance requirements are included. Duplicate samples, equipment blanks, and field blanks were collected and evaluated. Instrument response checks were performed at the start of the activity, and then again daily to verify calibration of the MIRAN analyzer. Completeness of the sampling activity and adherence to the sampling plan were assessed.

Overall, the sampling methodology specified in the SAP was followed. The MIRAN analyzer performed satisfactorily, given the large number of samples collected. A few exceptions were noted, which should not limit the use of the data; these are discussed in the text. The data are of sufficient quality to use in evaluating Step III characterization needs.

4.1 Duplicate Samples

Duplicate samples are an indicator of sample result quality due to variability in sample collection and analytical methodology, and the sampled material itself. The quality assurance project plan in DOE/RL-2003-48 requires that a minimum of 5 percent of the total collected vapor samples be duplicated. This equates to at least one duplicate sample for every 20 samples, or a minimum of one duplicate sample per day. For soil-vapor samples drawn directly into the field-screening instrument, duplicates are defined as two separate analyses performed sequentially, using the same analytical equipment. For soil-vapor samples collected in SUMMA canisters, duplicates are defined as independent samples collected as close as possible to the same point in space and time, taken from the same source, stored in separate containers, and analyzed independently (i.e., not homogenized). At minimum, one duplicate SUMMA canister sample is to be collected.

Analytical results for the duplicates are provided alongside the sample results in Appendix B. For the 204 soil-vapor samples analyzed by the MIRAN analyzer there were an additional 17 duplicate samples collected, satisfying the 5 percent minimum requirement in DOE/RL-2003-48. One duplicate sample was collected each day with one exception. A duplicate sample was not obtained on April 21, 2009, because the equipment was being mobilized into the trench late in the day. One duplicate SUMMA canister also was collected, satisfying the DOE/RL-2003-48 requirement.

DOE/RL-2003-48 requires an analytical precision of ± 25 percent for soil-vapor samples used for field screening, and for soil-vapor samples collected in SUMMA canisters for laboratory analysis. The required precision applies to VOC detections that are greater than five times the detection limit. For duplicate samples with detection of at least one common VOC in both samples, the relative percent difference (RPD) was calculated for each pair of results according to the formula:

$$RPD = \frac{(C_1 - C_2) \times 100}{(C_1 + C_2)/2}$$

where:

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

For purposes of evaluating sample-duplicate pairs with detection of a VOC in only the sample or the duplicate, the nondetect results were considered to be equivalent to the method detection limit for the particular compound. Using this methodology, an assessment of the duplicate samples and calculation of the RPDs for the MIRAN analyzer results are provided in Table 4-1. The assessment of the SUMMA canister duplicate is shown in Table 4-2. Only the instances where either the sample or duplicate result

was an actual value are shown; many of the results were nondetects for both the sample and duplicate. The DOE/RL-2003-48 requirement of ± 25 percent RPD was generally satisfied. Two instances for the MIRAN analyzer results exceeded the DOE/RL-2003-48 requirement. The results for several sample pairs were less than five times the detection limit and a conclusion could not be reached. Results for the SUMMA canister duplicate sample showed consistent agreement.

Table 4-1. Assessment of Duplicate MIRAN Analyzer Samples

Location	Compound	CAS	Sample (ppmv)	Duplicate (ppmv)	Detection Limit (ppmv)	RPD	Meets Requirements (Y/N)
C7238 12.0 ft bgs	Carbon tetrachloride	56-23-5	0.16 J	0.09 U	0.09	NA*	--
C7247 26.5 ft bgs	Carbon tetrachloride	56-23-5	0.22	0.23	0.09	NA*	--
C7260 12.0 ft bgs	Carbon tetrachloride	56-23-5	0.33	0.31 J	0.09	NA*	--
C7271 12.0 ft bgs	Carbon tetrachloride	56-23-5	0.09 U	0.16	0.09	NA*	--
C7288 14.5 ft bgs	Carbon tetrachloride	56-23-5	0.09 U	0.36	0.09	NA*	--
	Tetrachloroethene	127-18-4	3.59	5.34	0.16	39%	N
C7289 32.0 ft bgs	Carbon tetrachloride	56-23-5	1.88	1.77	0.09	6%	Y
	Tetrachloroethene	127-18-4	3.51	4.47	0.16	24%	Y
C7290 32.0 ft bgs	Carbon tetrachloride	56-23-5	2.73	2.80	0.09	3%	Y
	Tetrachloroethene	127-18-4	10.49	15.25	0.16	37%	N

*Sample and duplicate concentration are less than 5 times the detection limit.

Qualifying codes:

J Indicates an estimated value. Analyte was detected but spectral match was poor quality. Value is reported with a low level of confidence.

U Compound was analyzed for but not detected.

CAS = Chemical Abstracts Service

Table 4-2. Assessment of Duplicate SUMMA Canister Sample

Location	Compound	CAS	Sample (ppbv)	Duplicate (ppbv)	Detection Limit (ppbv)	RPD	Meets Requirements (Y/N)
C7286 32.0 ft bgs	Carbon tetrachloride	56-23-5	1000	970	10	3%	Y
	Chloroform	67-66-3	11	13	10	NA*	–
	Tetrachloroethene	127-18-4	920	800	10	14%	Y
	1,1,1-Trichloroethane	71-55-6	11	13	10	NA*	–
	Trichloroethene	79-01-6	40	46	10	NA*	–

*Sample and duplicate concentration are less than 5 times the detection limit.

CAS = Chemical Abstracts Service

4.2 Equipment Blanks

Equipment blanks are used to identify any potential contamination that may have been introduced into the samples from the surfaces of the sample container. No equipment blanks were collected for soil-vapor samples drawn directly into the MIRAN analyzer because no sample containers were used. The DOE/RL-2003-48 requirement for collection of equipment blanks does not apply in this instance. One clean SUMMA canister (HEIS sample number B20T73) was filled with clean air at the WSCF laboratory and analyzed for VOCs; this met the DOE/RL-2003-48 requirement for checking at least 10 percent of the SUMMA canisters. Analytical results for the SUMMA canister equipment blank showed no evidence of contamination (i.e., no VOCs were detected).

4.3 Field Blanks

Field blanks are used to identify any potential contamination that may have been introduced into the samples through the sampling, packaging, and transportation processes. At least one blank sample of ambient air was analyzed each day of sampling using the MIRAN analyzer, with the exception of April 21, 2009, because the equipment was being mobilized into the trench late in the day. A total of 17 field blanks were run during this quarter's sampling activities. The results for the field blanks are provided in Table 4-3. No VOCs were detected in any of the blanks.

Table 4-3. Results for Ambient Air Samples Collected in Field

HEIS No.	Sample Date	VOCs (ppmv)
B209P5	04/22/09	U
B209R3	04/23/09	U
B209T1	04/24/09	U
B20B15	04/27/09	U
B20B23	04/28/09	U
B20B31	04/29/09	U
B20B39	04/30/09	U
B20B47	05/04/09	U
B20B55	05/06/09	U
B20BB3	05/08/09	U
B20BC1	05/11/09	U
B20B87	05/13/09	U
B20B95	05/14/09	U
B20BH6	05/18/09	U
B20BK3	05/19/09	U
B20BM0	05/20/09	U
B20BF5	05/21/09	U

U = Compound was analyzed for but not detected.

4.4 Initial Calibration Check

The factory calibration data are confirmed on site using quarterly instrument response checks performed using a closed-loop injection system and 10 certified compounds. Results of the most recent quarterly instrument response check are provided in Table 4-4. Good correlation between the expected concentration and the instrument response indicates that the data generated from these analyses are reliable. DOE/RL-2003-48 requires an accuracy of 75 to 125 percent for soil-vapor samples used for field screening.

Table 4-4. Results for Quarterly Instrument Response Check, First Quarter Calendar Year 2009

Compound	CAS	Standard (ppmv)	Measured (ppmv)	% Recovery	Meets Requirements (Y/N)
Carbon tetrachloride	56-23-5	4.53	4.5	99	Y
Chloroform	67-66-3	5.49	4.4	80	Y
1,1-Dichloroethane	75-34-3	9.098	10.4	114	Y
Methylene chloride	75-09-2	25.6	19.7	77	Y
Tetrachloroethene	127-18-4	10.704	12.00	112	Y
1,1,1-Trichloroethane	71-55-6	4.4	4.1	93	Y
1,1,2-Trichloroethane	79-00-5	5.91	5.77	98	Y
Trichloroethene	79-01-6	3.7	3	81	Y
Carbon dioxide	124-38-9	105	93	89	Y
Methane	74-82-8	51	50	98	Y

CAS = Chemical Abstracts Service

4.5 Continuing Calibration Checks

An instrument response check for carbon tetrachloride was run each day using a known standard. The standard and measured VOC concentrations were used to evaluate the accuracy of the carbon tetrachloride analyses reported by the MIRAN analyzer. The percent recovery was calculated according to the formula:

$$\% \, Recovery = \frac{C_m}{C_s} \text{ x } 100$$

where:

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

DOE/RL-2003-48 requires an accuracy of 75 to 125 percent for soil-vapor samples used for field screening. Results of the daily calibration checks are provided in Table 4-5; all the results were satisfactory.

Table 4-5. Results for Daily Instrument Response Checks

Sample Date	Carbon Tetrachloride		% Recovery	Meets Requirements (Y/N)
	Standard (ppmv)	Measured (ppmv)		
04/21/09	4.5	5.22	116	Y
04/22/09	4.5	5.05	112	Y
04/23/09	4.5	4.16	92	Y
04/24/09	4.5	5.28	117	Y
04/27/09	4.5	4.6	102	Y
04/28/09	4.5	4.6	102	Y
04/29/09	4.5	4.39	98	Y
04/30/09	4.5	4.65	103	Y
05/04/09	4.5	4.91	109	Y
05/06/09	4.5	4.96	110	Y
05/08/09	4.5	4.63	103	Y
05/11/09	4.5	5.41	120	Y
05/13/09	4.5	4.25	94	Y
05/14/09	4.5	4.33	96	Y
05/18/09	4.5	5.21	116	Y
05/19/09	4.5	5.04	112	Y
05/20/09	4.5	4.06	90	Y
05/21/09	4.5	3.78	84	Y

4.6 Detection Limits

DOE/RL-2003-48 specifies required detection limits for soil-vapor samples collected for field-screening purposes. Detection limits are provided for an Innova[13] multi-gas analyzer and for a Photovac[14] 10S Plus field-based gas chromatograph. The Innova is a photo-acoustic analyzer that requires an assumption of the compound present and does not account for the potential of interference from other compounds. Replacement parts were no longer available for the Photovac instrument. Both instruments have since been retired. The MIRAN analyzer was selected as a replacement for its versatility and the ability to

[13] Innova is a registered trademark of Innova AirTech Instruments A/S, Ballerup, Denmark.

[14] Photovac is a registered trademark of Photovac, Inc., Waltham, Massachusetts.

accurately measure many gases with a single unit. However, no required detection limits are specified in DOE/RL-2003-48 for the MIRAN analyzer. The sampling plans written later for the 218-W-4B, 218-W-3A, and 218-E-12B Burial Grounds did anticipate use of the MIRAN analyzer, and included required detection limits for that instrument. The required detection limits from those other sampling plans were used here for assessing performance of the MIRAN analyzer.

Before the start of work, detection limits were determined for each of the contaminants of concern using the MIRAN analyzer (Table 2-1). Table 4-6 compares the detection limits for the MIRAN analyzer to the required detection limits. The MIRAN analyzer generally met the specifications except for two compounds (carbon tetrachloride and tetrachloroethene), which slightly exceeded the required minimums.

When analyzing SUMMA canister samples for VOCs in the laboratory, DOE/RL-2003-48 specifies the use of Compendium Method TO-15 and requires a detection limit of 2 to 5 ppbv. Results for the SUMMA canister samples analyzed by the WSCF laboratory show the detection limit was 10 ppbv for all the contaminants of concern. While not meeting the requirement, this is considered adequate because the data are intended to be used to evaluate the performance of the MIRAN analyzer for field screening. In the sampling plans written later for the 218-W-4B, 218-W-3A, and 218-E-12B Burial Grounds, the required detection limit for SUMMA canister samples was adjusted upward to 10 ppbv. This was a reflection of the scope of the project and the intended use of the results. If a project is intending to characterize all constituents at trace level concentrations, then a lower detection limit of 5 ppbv or less is needed. Where analyses are being performed (for example) to support industrial hygiene monitoring where the relevant concentrations (e.g., threshold limit values) are in the high ppbv/parts per million by volume (ppmv) range, then a higher detection limit is appropriate. A number of burial ground samples also have been found to have high concentrations of VOCs and overload the analytical systems set up for trace level work. Separate instruments are set up for samples potentially having parts per million by volume concentrations such as the soil-vapor samples.

Table 4-6. Comparison of MIRAN Analyzer Detection Limits to the Required Detection Limits

Compound	CAS	MIRAN Detection Limit (ppmv)	Required Detection Limit (ppmv)
Carbon tetrachloride	56-23-5	0.09	0.05
Chloroform	67-66-3	0.07	0.07
1,1-Dichloroethane	75-34-3	0.22	0.4
Methylene chloride	75-09-2	0.44	4
Tetrachloroethene	127-18-4	0.16	0.09
1,1,1-Trichloroethane	71-55-6	0.15	0.15
1,1,2-Trichloroethane	79-00-5	0.07	0.25
Trichloroethene	79-01-6	1.2	4

CAS = Chemical Abstracts Service

4.7 Sample Holding Times

DOE/RL-2003-48 specifies holding times for soil-vapor samples collected for field-screening purposes. A 6-hour holding time is required for samples collected for field screening. Because the majority of samples were drawn directly into the MIRAN analyzer and analyzed immediately, the holding time requirement was met.

Samples collected in SUMMA canisters for laboratory analyses are subject to a 14- to 28-day holding time based on DOE/RL-2003-48. Specifying a range of holding times for a sample is not common practice, and the intent is unclear. The analytical procedure, Compendium Method TO-15, recommends a 30-day holding time. The SUMMA canisters were all delivered to the WSCF laboratory within 4 hours of collecting the samples, and the contents analyzed within a maximum of 22 days, generally satisfying the holding time requirement. The SUMMA canister holding times are summarized in Table 4-7.

Table 4-7. SUMMA Canister Sample Holding Times

SDG No.	HEIS No.	Sample Date	Date Analyzed	Holding Time (days)
WSCF20090456	B20LX0	05/18/09	06/04/09	17
WSCF20090463	B20LW9	05/19/09	06/08/09	20
	B20LX1	05/19/09	06/08/09	20
	B20LX2	05/19/09	06/08/09	20
WSCF20090472	B20LW4	05/20/09	06/11/09	22
	B20LW5 (duplicate)	05/20/09	06/11/09	22
	B20LW8	05/20/09	06/11/09	22
WSCF20090476	B20LW6	05/20/09	06/10/09	21
	B20LW7	05/20/09	06/10/09	21
WSCF20090505	B20T73 (blank)	05/27/09	06/10/09	14

4.8 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system. Ideally, valid data would be collected for all the contaminants of concern at every planned sample location. For the purposes of field screening, the objective is to collect sufficient valid data to focus future characterization efforts.

All the boreholes were pushed to the planned depth, and samples were collected from each location and every interval with one exception. No data were obtained by the MIRAN analyzer for Borehole C7211 at Trench 7 at the 1.8 m (6 ft) bgs depth due to operator error. No contaminants of concern were likely present as none were detected in the sample from this borehole at the 3.7 m (12 ft) bgs depth. All the

contaminants of concern were successfully analyzed for in each of the other samples by the MIRAN analyzer. In addition, the following constituents also were reported in one or more of the samples: acetylene, carbon dioxide, methane, nitrous oxide, pyridine, and toluene.

The list of target analytes maintained by the WSCF laboratory for use in analyzing SUMMA canister samples by Compendium Method TO-15 does not include the contaminants of concern 1,1-dichloroethane and 1,1,2-trichloroethane. No results were specifically reported for those compounds in the SUMMA canister samples. However, during the analysis the entire chromatogram is searched and if there are compounds detected that are not included in the target list, then those are analyzed as tentatively identified compounds. A mass spectral library search is then performed; the library includes approximately 150,000 compounds of which 1,1-dichloroethane and 1,1,2-trichloroethane are included. The fact that these compounds were not seen in the samples (even as tentatively identified compounds) allows one to conclude, with high confidence, that those compounds did not exist in the samples greater than 10 ppbv.

A number of other compounds were identified in the SUMMA canisters samples at lower concentrations (i.e., ppbv levels) than could be detected by the MIRAN analyzer including acetone, acetonitrile, benzene, butanal, butane, 1,3-butadiene, 2-butanone, heptane, and propane.

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5 Health and Safety Monitoring and Radiological Field Screening

Health and safety monitoring was conducted by industrial hygienists during the soil-vapor sampling activities at Trenches 1 and 7. For each direct push, the industrial hygienist would screen for VOCs using an organic vapor monitor (OVM). Monitoring for lower explosion limit also was performed if the OVM indicated the presence of VOCs. Typically, the industrial hygienist would monitor at the aboveground opening of the casing shortly after the Geoprobe drive tip was removed and before sampling. Results of industrial hygiene monitoring for VOCs at each borehole are provided in Tables B-1 and B-2 alongside the MIRAN analyzer sample results for comparison. The maximum concentration of VOCs detected by the industrial hygienists at Trench 1 was 7.2 ppmv at Borehole C7270 (3.7 m [12 ft] bgs), and at Trench 7 was 29 ppmv at Borehole C7290 (9.8 m [32 ft] bgs). On the few occasions when organic vapors were detected, the industrial hygienist instructed workers to move away from the borehole. The industrial hygienist would monitor the area around the borehole until the readings were 'nondetect.' In every case, the readings reached nondetect in a relatively short time. Once the industrial hygienist was convinced that the nondetect readings were stable, workers were allowed back in the area. During the sampling activities, the industrial hygienists also performed monitoring of the breathing zone and casing to confirm that the team was not exposed to organic vapors. Controls put in place to prevent exposure included restricting access to limit personnel and allowing entry only to personnel designated to perform the work.

All downhole tools and equipment were surveyed for radiological contamination. Typically, the radiological control technician would wipe the hardware as it was retrieved and monitor for alpha, beta, and gamma radiation. Casing removed from the ground was surveyed and decontaminated before being reused on the next borehole. After sample collection was completed, all gas prefilters were surveyed.

While pushing Borehole C7262 at Trench 1, alpha contamination above normal background was detected. The contamination later was determined to be due to radon accumulation in the borehole. No other radiological contamination was detected throughout the sampling activity.

Added precautions were taken when drilling Boreholes C7287 and C7288 through the gravel over the area of fixed surface contamination in Trench 1. Persons involved in the original waste retrieval were interviewed to better understand the nature and extent of the contamination. After each sampling event, the drill casing was backpulled slowly, and frequent direct surveys were performed and smear samples collected.

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6 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.

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7 Documented Contaminant Releases to the Environment

Other than the incidental and unavoidable air emissions from operating the Geoprobe system, there were no contaminant releases to the environment resulting from this quarter's sampling activities.

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8 Planned Additional Work

The sampling at Trenches 1 and 7 this quarter completes the field work for Step II sampling at the 218-W-4C Burial Ground. The Step II soil-vapor sampling data collected at Trenches 1, 4, 7, 20, 24, and 29 will next be evaluated together with the results of the earlier Step I vent riser sampling. The decision makers will review the prior data to determine the need for additional characterization. Detected contaminant concentrations, uncertainties, and costs will be considered. Agreement will be reached on the scope of further sampling.

Step III sampling of the 218-W-4C Burial Ground is scheduled for fiscal year (FY) 2010. Current baseline planning is consistent with the approach described in DOE/RL-2003-48. Soil-vapor sampling will be performed underneath the asphalt pads in the trenches at specified locations. The samples will be analyzed for VOCs using field-screening instruments. The results will be evaluated together with earlier field-screening results to identify locations with elevated VOC concentrations. At those locations, additional soil-vapor samples will be collected in SUMMA canisters for laboratory analysis. Soil samples also will be collected and analyzed as needed to further define the extent of contamination. If significant contamination is detected, the decision to move forward will be determined through the cleanup processes set forth in the *Resource Conservation and Recovery Act of 1976* and/or the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*.

Suspect-TRU waste also is being retrievably stored at the 218-W-4B, 218-W-3A, and 218-E-12B Burial Grounds. Locations of the trenches containing suspect TRU waste are shown in Figures 8-1, 8-2, and 8-3. Several trenches in these burial grounds are not entirely filled; only a portion may contain retrievably stored suspect TRU waste, creating islands surrounded by other radioactive solid waste. For example, while suspect TRU waste was placed in the southern portions of 218-E-12B Burial Ground Trenches 17 and 27, sixteen containers of suspect TRU waste also were placed in the northern portion of Trench 17. Actions to stabilize the remaining radioactive solid waste may limit access to these areas for sampling and will be evaluated case-by-case.

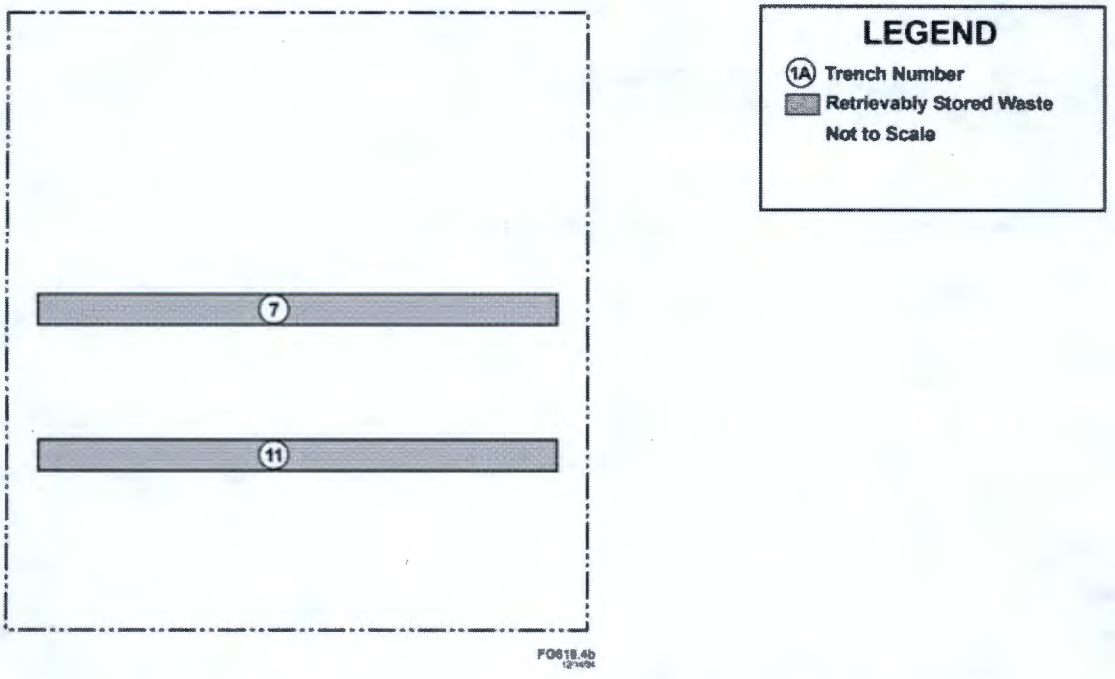

Figure 8-1. Locations of Retrievably Stored Waste in the 218-W-4B Burial Ground

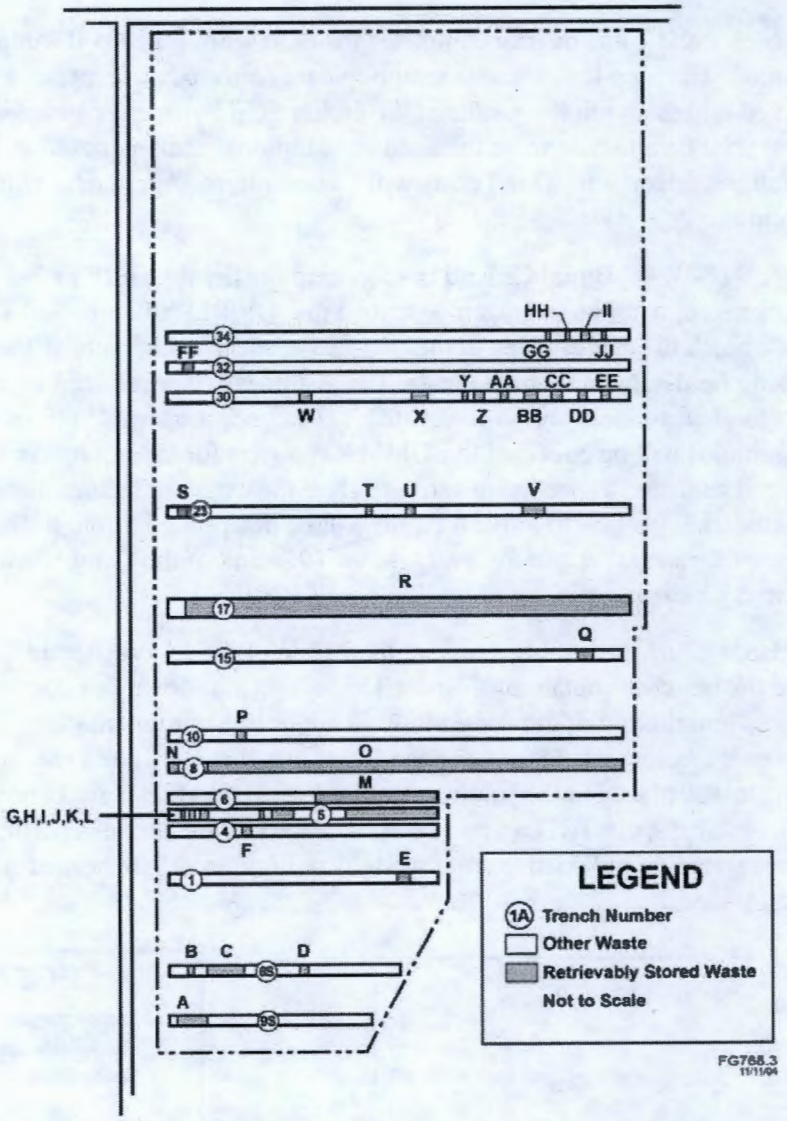

Figure 8-2. Locations of Retrievably Stored Waste in the 218-W-3A Burial Ground

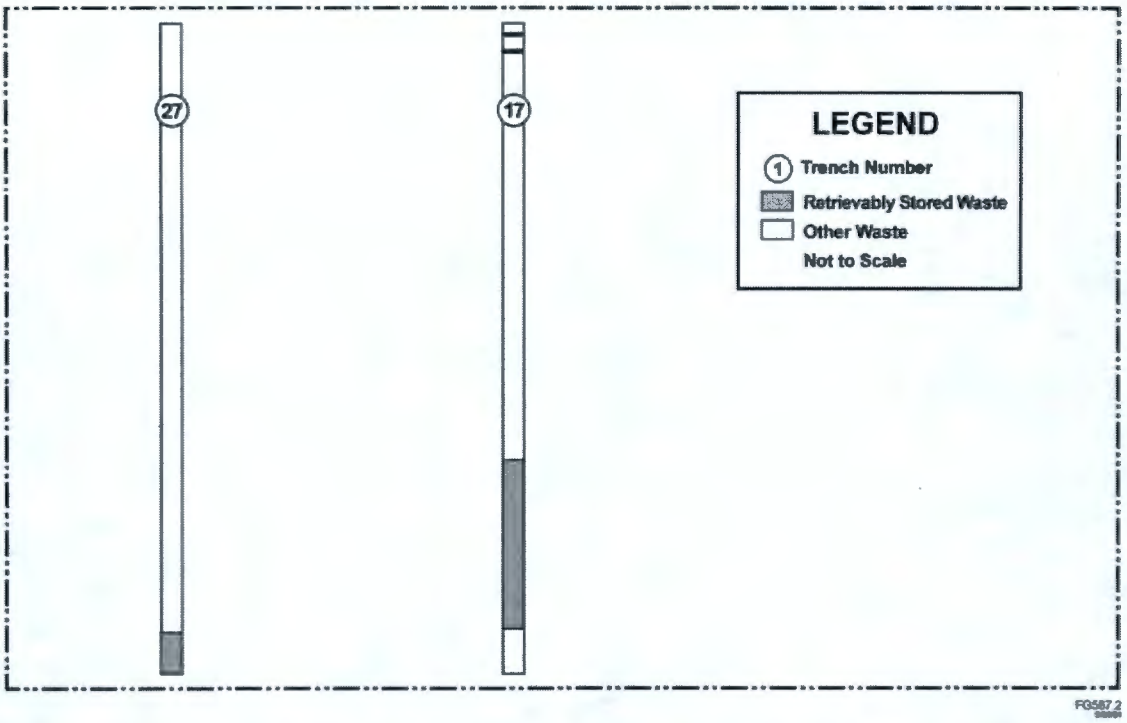

Figure 8-3. Locations of Retrievably Stored Waste in the 218-E-12B Burial Ground

Some waste containers in these other trenches may have corroded and be breached. Contact-handled waste also is intermixed with remote-handled waste, which requires special handling and is being retrieved as current techniques allow. "Next generation" retrieval methods will be deployed for handling the severely deteriorated waste containers, and provide tools for retrieving high-dose remote-handled containers (e.g., shielded overpacks).

The Waste Retrieval Project has identified tentative dates when retrieval of the suspect TRU waste in these burial grounds will be complete. Completion of waste retrieval is contingent on available funding. Trench 17 in the 218-W-3A Burial Ground is currently being retrieved and is approximately 50 percent complete. Trench 11 in the 218-W-4B Burial Ground is being excavated with retrieval to follow. Trench 7 in the 218-W-4B Burial Ground is approximately 50 percent complete; modules 2, 6, 13 to 16, and the top two tiers of 7 and 8 have been retrieved. However, the waste containers in modules 10 to 12 are deteriorated and will await next generation retrieval methods. Retrieval efforts at the 218-E-12B Burial Ground are expected to resume with the availability of *American Recovery and Reinvestment Act of 2009* funding. Sampling plans have been developed for these other burial grounds to determine whether contaminants were released into the vadose zone. Step I vent riser sampling has been completed at all these burial grounds. Step II soil-vapor sampling is now planned. Given the status of waste retrieval, the next Step II sampling will occur in FY 2011 at Trench 17 in the 218-W-3A Burial Ground.

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9 References

40 CFR 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants," *Code of Federal Regulations*, Appendix B, "Definition and Procedure for the Determination of the Method Detection Limit." Available at: http://edocket.access.gpo.gov/cfr_2008/julqtr/pdf/40cfr136AppB.pdf.

American Recovery and Reinvestment Act of 2009, Public Law 111-5, February 17, 2009.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq. Available at: http://www.epa.gov/oecaagct/lcla.html#Hazardous%20Substance%20Responses.

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. Issued as an attachment to the Van Leuven letter (FH-0303364) listed below.

DOE G 435.1-1, *Implementation Guide for Use with DOE M 435.1-1*, U.S. Department of Energy, Washington, D.C.

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.

DOE/RL-2004-32, 2004, *218-E-12B Burial Ground Sampling and Analysis Plan*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www2.hanford.gov/arpir/?content=findpage&AKey=D7228581.

DOE/RL-2004-70, 2006, *218-W-4B Burial Ground Sampling and Analysis Plan*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www2.hanford.gov/arpir/?content=findpage&AKey=DA02967771.

DOE/RL-2004-71, 2006, *218-W-3A Burial Ground Sampling and Analysis Plan*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www2.hanford.gov/arpir/?content=findpage&AKey=DA02722900.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. Available at: http://www.hanford.gov/?page=91&parent=0.

EPA/600/R-96/055, 2000, *Guidance for the Data Quality Objectives Process – QA/G-4*, Office of Environmental Information, U.S. Environmental Protection Agency, Washington, D.C.

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. Available at: http://www.epa.gov/ttnamti1/files/ambient/airtox/tocomp99.pdf.

FH-0303364, 2003, "Transmittal of the Data Quality Objectives Summary Report for the 218-W-4C Burial Ground Contaminant Release Investigation, CP-16886, Revision 0" (external letter to K. A. Klein, U.S. Department of Energy, Richland Operations Office, from D. B. Van Leuven), Fluor Hanford, Inc., Richland, Washington.

FH-0400144.1, 2004, "Transmittal of the Burial Ground Sampling and Analysis Results for October – December 2003" (external letter to K. A. Klein, U.S. Department of Energy, Richland Operations Office, from R. G. Gallagher), Fluor Hanford, Inc., Richland, Washington.

FH-0401097, 2004, "Transmittal of the Burial Ground Sampling and Analysis Results for January – March 2004, in Accordance with the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) Settlement and Tentative Agreement Interim Milestone M-91-040," (external letter to K. A. Klein, U.S. Department of Energy, Richland Operations Office, from R. G. Gallagher), Fluor Hanford, Inc., Richland, Washington.

HNF-32441, 2007, *Memorandum of Agreement Between the Waste Retrieval Project and the 200-SW-2 Operable Unit Project*, Fluor Hanford, Inc., Richland, Washington.

NAD83, 1991, *North American Datum of 1983*, National Geodetic Survey, Federal Geodetic Control Committee, Silver Spring, Maryland, as revised.

NAVD88, 1988, *North American Vertical Datum of 1988*, National Geodetic Survey, Federal Geodetic Control Committee, Silver Spring, Maryland.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq. Available at: http://www.epa.gov/epawaste/inforesources/online/index.htm.

SGW-37027, 2008, *Burial Ground Sampling and Analysis Results for October – December 2007*, Rev. 0, Fluor Hanford, Inc., Richland, Washington.

WHC-EP-0912, 1996, *The History of the 200 Area Burial Ground Facilities*, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Appendix A

Civil Survey of Sample Locations

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SURVEY DATA REPORT				Request No. 093-312
Project No.	Title: 218-W-4C/ Trench 1 & 7 Final Sample Locations REV. 1			File No. 2WT12R25
Job No. PRC/ CACN: 300227-CA10	Prepared By L.A. Henke	Date 5/26/09	Reviewer	Page 1 of 2

DESCRIPTION OF WORK	DISTRIBUTION	SDR	PLOT	DWG
Measured Horizontal and Vertical positions of the Brass Cap Markers for 87 DPT sampling locations.	Survey File	OR		
	C.S. Wright	1		
Horizontal Coordinate System: WCS83S/91 (Meters)	S.E. Imhoff	1		
Vertical Datum: NAVD88 (Meters)	G.T. Berlin	1		
	S.S. Lowe	1		
Equipment Used: Trimble GPS 5800 RTK				

SURVEY RESULTS AND COMMENTS

DPT Name	Northing	Easting	Brass Cap Elevation	Description
C7202	135639.86	566129.66	208.08	DPT BRASS CAP
C7204	135639.67	566140.11	208.08	DPT BRASS CAP
C7205	135639.85	566147.71	208.09	DPT BRASS CAP
C7206	135640.03	566155.29	208.12	DPT BRASS CAP
C7207	135639.98	566162.84	208.09	DPT BRASS CAP
C7208	135639.92	566170.47	208.09	DPT BRASS CAP
C7209	135640.07	566178.06	208.11	DPT BRASS CAP
C7210	135640.06	566185.66	208.10	DPT BRASS CAP
C7211	135640.03	566193.28	208.10	DPT BRASS CAP
C7212	135640.03	566200.92	208.09	DPT BRASS CAP
C7213	135640.10	566208.49	208.13	DPT BRASS CAP
C7214	135639.99	566216.13	208.12	DPT BRASS CAP
C7215	135640.02	566223.74	208.12	DPT BRASS CAP
C7216	135640.04	566231.37	208.07	DPT BRASS CAP
C7217	135640.08	566239.02	208.08	DPT BRASS CAP
C7218	135640.22	566246.63	208.02	DPT BRASS CAP
C7219	135640.22	566254.22	208.01	DPT BRASS CAP
C7220	135639.98	566258.31	208.00	DPT BRASS CAP
C7221	135640.17	566269.79	210.97	DPT BRASS CAP
C7222	135640.17	566277.36	210.77	DPT BRASS CAP
C7223	135640.10	566279.85	210.74	DPT BRASS CAP
C7224	135637.09	566279.84	210.76	DPT BRASS CAP
C7226	135632.05	566130.34	208.17	DPT BRASS CAP
C7227	135632.01	566137.91	208.10	DPT BRASS CAP
C7228	135632.08	566145.60	208.11	DPT BRASS CAP
C7230	135632.13	566160.70	208.04	DPT NO BRASS CAP
C7231	135632.17	566168.32	208.11	DPT BRASS CAP
C7232	135632.41	566175.95	208.08	DPT BRASS CAP
C7233	135632.14	566183.51	208.13	DPT BRASS CAP
C7234	135632.15	566191.19	208.14	DPT BRASS CAP
C7235	135632.20	566198.80	208.12	DPT BRASS CAP

NOTE: This Survey was performed under the supervision of a Licensed Professional Land Surveyor registered in the State of Washington.

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DPT Name	Northing	Easting	Brass Cap Elevation	Description
C7236	135632.00	566206.20	208.16	DPT BRASS CAP
C7237	135632.10	566214.03	208.14	DPT BRASS CAP
C7238	135632.25	566221.64	208.18	DPT BRASS CAP
C7239	135632.18	566229.18	208.14	DPT BRASS CAP
C7240	135632.30	566237.01	208.17	DPT BRASS CAP
C7241	135632.21	566244.60	208.13	DPT BRASS CAP
C7242	135632.39	566252.27	208.11	DPT BRASS CAP
C7243	135632.45	566258.35	208.13	DPT BRASS CAP
C7244	135632.43	566267.66	211.06	DPT BRASS CAP
C7245	135632.45	566275.26	210.85	DPT BRASS CAP
C7246	135632.46	566279.89	210.77	DPT BRASS CAP
C7247	135639.71	566111.52	212.30	DPT BRASS CAP
C7248	135639.81	566118.98	212.10	DPT BRASS CAP
C7249	135632.03	566111.62	212.50	DPT BRASS CAP
C7250	135632.15	566119.20	212.37	DPT BRASS CAP
C7251	135712.48	566168.62	210.10	DPT BRASS CAP
C7252	135712.48	566171.04	210.04	DPT BRASS CAP
C7253	135712.52	566178.66	209.94	DPT BRASS CAP
C7254	135712.58	566186.29	209.84	DPT BRASS CAP
C7255	135712.87	566193.88	209.78	DPT BRASS CAP
C7256	135712.79	566201.48	209.64	DPT BRASS CAP
C7257	135712.83	566209.11	209.50	DPT BRASS CAP
C7258	135712.86	566216.75	209.40	DPT BRASS CAP
C7259	135712.85	566224.40	209.28	DPT BRASS CAP
C7260	135712.92	566232.02	209.13	DPT BRASS CAP
C7261	135712.78	566239.59	209.06	DPT BRASS CAP
C7262	135712.69	566247.20	208.94	DPT BRASS CAP
C7263	135712.80	566262.22	208.72	DPT BRASS CAP
C7264	135712.92	566269.82	208.63	DPT BRASS CAP
C7265	135713.16	566277.44	208.54	DPT BRASS CAP
C7266	135710.27	566279.57	208.75	DPT BRASS CAP
C7267	135705.48	566168.99	210.21	DPT BRASS CAP
C7268	135705.45	566174.74	210.05	DPT BRASS CAP
C7269	135705.53	566182.41	209.94	DPT BRASS CAP
C7270	135705.55	566190.03	209.80	DPT BRASS CAP
C7271	135705.55	566197.63	209.70	DPT BRASS CAP
C7272	135705.60	566205.24	209.58	DPT BRASS CAP
C7273	135705.60	566212.87	209.52	DPT BRASS CAP
C7274	135705.51	566220.50	209.43	DPT BRASS CAP
C7275	135705.44	566228.16	209.33	DPT BRASS CAP
C7276	135705.33	566235.78	209.17	DPT BRASS CAP
C7277	135705.49	566249.05	209.01	DPT BRASS CAP
C7278	135705.55	566258.59	208.72	DPT BRASS CAP
C7279	135705.61	566266.17	208.56	DPT BRASS CAP
C7280	135705.57	566273.80	208.50	DPT BRASS CAP
C7281	135705.70	566279.59	208.90	DPT BRASS CAP
C7282	135639.76	566133.99	208.07	DPT BRASS CAP
C7283	135639.90	566152.33	208.12	DPT BRASS CAP
C7284	135632.04	566133.98	208.13	DPT BRASS CAP
C7285	135632.19	566152.33	208.10	DPT BRASS CAP
C7286	135712.83	566242.69	208.98	DPT BRASS CAP
C7287	135712.81	566253.99	209.52	DPT BRASS CAP
C7288	135705.59	566254.01	209.47	DPT BRASS CAP
C7289	135705.55	566242.74	209.07	DPT BRASS CAP
C7290	135640.06	566257.71	208.01	DPT BRASS CAP
C7291	135632.01	566140.85	208.09	DPT BRASS CAP

NOTE: This Survey was performed under the supervision of a Licensed Professional Land Surveyor registered in the State of Washington.

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Appendix B

Soil-Vapor Sample Results

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Table B-1. MIRAN Analyzer Sample Results for Trench 1

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Carbon Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7251	12.0	B20B60	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1434	34 J	--	--	--	8.3 J	--
C7251	6.0	B20B59	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1962 J	41 J	--	--	--	--	--
C7252	12.0	B20B62	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7252	6.0	B20B61	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2056	46 J	--	--	--	--	--
C7253	12.0	B20B66	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7253	6.0	B20B64	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2513 J	15 J	--	--	--	--	--
C7254	12.0	B20B68	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2296 J	30 J	--	--	--	--	--
C7254	6.0	B20B67	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7255	12.0	B20B70	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2402 J	31 J	--	--	--	--	--
C7255	6.0	B20B69	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2222 J	27 J	--	--	--	--	--
C7256	12.0	B20B74	05/11/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	915 J	13 J	--	--	--	--	--
C7256	6.0	B20B72	05/11/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1243 J	12 J	--	--	--	--	--
C7257	12.0	B20B76	05/11/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1327 J	23 J	--	--	--	--	1.2
C7257	6.0	B20B75	05/11/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1687 J	28 J	--	--	--	--	--
C7258	12.0	B20B78	05/11/09	0.68 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1797	28 J	--	--	--	--	0.9
C7258	6.0	B20B77	05/11/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1701	--	--	--	--	--	--

Table B-1. MIRAN Analyzer Sample Results for Trench 1

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Carbon Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7259	12.0	B20B82	05/11/09	0.82 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2408	42 J	--	--	--	--	0.9
C7259	6.0	B20B80	05/11/09	0.65 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2511	--	--	--	--	--	--
C7260	12.0	B20B84	05/13/09	0.33	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1070	36	--	--	--	4.7	--
C7260	12.0 (dup)	B20B89	05/13/09	0.31 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	672	34 J	--	--	--	--	--
C7260	6.0	B20B83	05/13/09	0.29	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1319	40	--	--	5.2	--	--
C7261	12.0	B20B86	05/13/09	1.00	0.07 U	0.22 U	0.44 U	2.47	0.15 U	0.07 U	1.2 U	1695	57	--	--	--	--	1.7
C7261	6.0	B20B85	05/13/09	0.47	0.07 U	0.22 U	0.44 U	5.26	0.15 U	0.07 U	1.2 U	1768	56	--	--	--	--	--
C7262	12.0	B20B90	05/13/09	1.16	0.07 U	0.22 U	0.44 U	3.06	0.15 U	0.07 U	1.2 U	1943	73	--	--	--	--	5.5
C7262	6.0	B20B88	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7262	6.0 (dup)	B20B97	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7263	12.0	B20B92	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7263	6.0	B20B91	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7264	12.0	B20B94	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1552 J	42 J	--	--	--	--	--
C7264	6.0	B20B93	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	6.14	0.15 U	0.07 U	1.2 U	4521	40	--	32	28	--	--
C7265	12.0	B20B98	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	6450	--	--	47	--	--	--

Table B-1. MIRAN Analyzer Sample Results for Trench 1

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Carbon Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7265	6.0	B20B96	05/14/09	0.09 U	0.07 U	10.29	0.44 U	0.16 U	0.15 U	8.64	1.2 U	7485	--	--	39	--	--	0.2
C7266	13.0	B20BB0	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	7621	--	--	53	--	--	--
C7266	7.0	B20B99	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	6051	--	--	29	--	--	--
C7267	12.0	B20BB2	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7267	12.0 (dup)	B20BB5	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7267	6.0	B20BB1	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7268	12.0	B20BB6	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7268	6.0	B20BB4	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2387	53 J	--	--	--	5.2 J	--
C7269	12.0	B20BB8	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1951	35 J	--	--	--	--	--
C7269	6.0	B20BB7	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2054	41 J	--	--	--	--	--
C7270	12.0	B20BC0	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	7.2
C7270	6.0	B20BB9	05/08/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7271	12.0	B20BC4	05/11/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	576	22	--	--	--	3.7	--
C7271	12.0 (dup)	B20BC3	05/11/09	0.16	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	713	18	--	--	--	--	--
C7271	6.0	B20BC2	05/11/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	599 J	15 J	--	--	--	--	--

Table B-1. MIRAN Analyzer Sample Results for Trench 1

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Carbon Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7272	12.0	B20BC6	05/11/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7272	6.0	B20BC5	05/11/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1328 J	37 J	--	--	--	5.4 J	--
C7273	12.0	B20BC8	05/11/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1594 J	47 J	--	--	--	6.9 J	--
C7273	6.0	B20BC7	05/11/09	0.55 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1955	42 J	--	--	--	5.4 J	--
C7274	12.0	B20BD2	05/11/09	0.73 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1731	55 J	--	--	--	8.2 J	--
C7274	6.0	B20BD0	05/11/09	0.58 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2210	28 J	--	--	--	--	--
C7275	12.0	B20BD4	05/11/09	0.82 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2303	43 J	--	--	--	4.1 J	0.5
C7275	6.0	B20BD3	05/11/09	0.09 U	0.07 U	0.22 U	0.44 U	4.62 J	0.15 U	0.07 U	1.2 U	2391	--	--	--	--	--	--
C7276	12.0	B20BD6	05/13/09	0.33	0.07 U	0.22 U	0.44 U	5.33	0.15 U	0.07 U	1.2 U	1272	50	--	--	--	--	--
C7276	6.0	B20BD5	05/13/09	0.09 U	0.07 U	0.22 U	0.44 U	4.89	0.15 U	0.07 U	1.2 U	1337	52	--	--	--	--	--
C7277	12.0	B20BF0	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7277	6.0	B20BD8	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7278	12.0	B20BF2	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7278	6.0	B20BF1	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7279	12.0	B20BF4	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7279	6.0	B20BF3	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--

Table B-1. MIRAN Analyzer Sample Results for Trench 1

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Carbon Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7280	12.0	B20BF8	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	3.32	0.15 U	0.07 U	1.2 U	4505	--	--	33	--	18	--
C7280	6.0	B20BF6	05/14/09	0.09 U	0.07 U	0.22 U	7.12	0.16 U	0.15 U	0.07 U	1.2 U	8850	--	--	88	--	--	--
C7281	13.0	B20BH0	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7281	7.0	B20BF9	05/14/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	6397	--	--	21	--	--	--
C7286	32.0	B20BK9	05/20/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7286	24.0	B20BK8	05/20/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	921 J	41 J	--	--	--	--	--
C7286	18.0	B20BK7	05/20/09	0.74 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1818 J	63 J	--	--	--	--	--
C7286	12.0	B20BK6	05/20/09	0.65 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1484 J	66 J	--	--	--	13 J	--
C7286	6.0	B20BK4	05/20/09	0.87 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2155 J	63 J	--	--	--	--	--
C7287	34.5	B20BL4	05/20/09	2.55 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2793	58 J	--	--	--	--	--
C7287	26.5	B20BL3	05/20/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1993 J	46 J	--	--	--	--	--
C7287	20.5	B20BL2	05/20/09	0.89 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2419 J	34 J	--	--	--	--	--
C7287	14.5	B20BL1	05/20/09	1.09 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2745 J	30 J	--	--	--	--	--
C7287	8.5	B20BL0	05/20/09	0.09 U	0.07 U	0.22 U	0.44 U	5.29 J	0.15 U	0.07 U	1.2 U	2594 J	59 J	--	--	--	9.4 J	--
C7288	34.5	B20BL9	05/20/09	2.55	0.07 U	0.22 U	0.44 U	2.63	0.15 U	0.07 U	1.2 U	2575	64	--	--	--	--	--
C7288	26.5	B20BL8	05/20/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2133 J	39 J	--	--	--	--	--

Table B-1. MIRAN Analyzer Sample Results for Trench 1

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Carbon Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7288	20.5	B20BL7	05/20/09	0.98 J	0.07 U	0.22 U	0.44 U	5.76 J	0.15 U	0.07 U	1.2 U	2316 J	37 J	--	--	--	--	--
C7288	14.5	B20BL6	05/21/09	0.09 U	0.07 U	0.22 U	0.44 U	3.59	0.15 U	0.07 U	1.2 U	1401	26	--	5.0	--	--	--
C7288	14.5 (dup)	B20BF7	05/21/09	0.36	0.07 U	0.22 U	0.44 U	5.34	0.15 U	0.07 U	1.2 U	1622	24	--	8.6	--	--	--
C7288	8.5	B20BL5	05/21/09	0.09 U	0.07 U	0.22 U	0.44 U	3.15	0.15 U	0.07 U	1.2 U	1347	26	--	3.5	--	--	--
C7289	32.0	B20BM6	05/20/09	1.88	0.07 U	0.22 U	0.44 U	3.51	0.15 U	0.07 U	1.2 U	1424	54	--	--	--	--	--
C7289	32.0 (dup)	B20BM2	05/20/09	1.77	0.07 U	0.22 U	0.44 U	4.47	0.15 U	0.07 U	1.2 U	1535	54	--	--	--	--	--
C7289	24.0	B20BM5	05/20/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1315 J	36 J	--	--	--	--	--
C7289	18.0	B20BM4	05/20/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1648 J	29 J	--	--	--	--	--
C7289	12.0	B20BM3	05/20/09	0.09 U	0.07 U	0.22 U	0.44 U	6.08 J	0.15 U	0.07 U	1.2 U	1964 J	27 J	--	--	--	--	--
C7289	6.0	B20BM1	05/20/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1851 J	31 J	--	--	--	--	--

Qualifying codes:

J Indicates an estimated value. Analyte was detected but spectral match was poor quality. Value is reported with a low level of confidence.

U Compound was analyzed for but not detected.

CAS = Chemical Abstracts Service

ppmv = parts per million by volume

Table B-2. MIRAN Analyzer Sample Results for Trench 7

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene Chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Caron Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7202	12.0	B209P8	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7202	6.0	B209P6	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7202	6.0 (dup)	B209P7	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7204	12.0	B209R0	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	635 J	42 J	--	--	--	--	--
C7204	6.0	B209P9	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7205	12.0	B209R2	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	261 J	47 J	--	--	--	--	--
C7205	6.0	B209R1	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	180 J	49 J	--	--	--	--	--
C7206	12.0	B209R6	04/23/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	30 J	--	--	--	--	--
C7206	6.0	B209R4	04/23/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7206	6.0 (dup)	B209R5	04/23/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	431 J	31 J	--	--	--	--	--
C7207	12.0	B209R8	04/23/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1067 J	39 J	--	--	--	--	--
C7207	6.0	B209R7	04/23/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1109 J	40 J	--	--	--	--	--
C7208	12.0	B209T0	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7208	12.0 (dup)	B209T3	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--

Table B-2. MIRAN Analyzer Sample Results for Trench 7

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene Chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Caron Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7208	6.0	B209R9	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7209	12.0	B209T4	04/24/09	0.37	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1627	33	--	--	--	--	--
C7209	6.0	B209T2	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	768 J	40 J	--	--	--	--	--
C7210	12.0	B209T6	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	545 J	53 J	--	--	--	--	--
C7210	6.0	B209T5	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	607 J	47 J	--	--	--	--	--
C7211	12.0	B209T8	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2138	62 J	--	--	--	--	--
C7211	6.0	B209T7	04/24/09	No MIRAN analyzer data collected for this sample interval.														--
C7212	12.0	B209V2	04/27/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	453 J	24 J	--	--	--	--	--
C7212	6.0	B209V0	04/27/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7213	12.0	B209V4	04/27/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1927 J	16 J	--	--	--	--	--
C7213	6.0	B209V3	04/27/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1313 J	31 J	--	--	--	5 J	--
C7214	12.0	B209V6	04/27/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2237 J	--	--	--	--	--	4
C7214	6.0	B209V5	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7215	12.0	B209W0	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7215	6.0	B209V8	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	580 J	--	--	--	--	--	--
C7216	12.0	B209W2	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--

Table B-2. MIRAN Analyzer Sample Results for Trench 7

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene Chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Caron Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7216	6.0	B209W1	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7217	12.0	B209W4	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7217	6.0	B209W3	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7218	12.0	B209W8	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7218	6.0	B209W6	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1464 J	--	--	--	--	--	--
C7219	12.0	B209X0	04/29/09	0.09 U	0.07 U	0.22 U	0.44 U	1.6	0.15 U	0.07 U	1.2 U	1485	6.8	--	--	--	--	--
C7219	6.0	B209W9	04/29/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7220	12.0	B209X2	04/29/09	0.09 U	0.07 U	0.22 U	0.44 U	1.7 J	0.15 U	0.07 U	1.2 U	1231 J	13 J	--	--	--	--	--
C7220	6.0	B209X1	04/29/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1450 J	11 J	--	--	--	--	0.2
C7221	21.4	B209X6	04/29/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	649 J	26 J	--	--	--	--	--
C7221	15.4	B209X4	04/29/09	0.09 U	0.07 U	0.22 U	0.44 U	2.5	0.15 U	0.07 U	1.2 U	2560	17	--	--	--	--	0.3
C7222	21.4	B209X8	05/04/09	0.09 U	0.07 U	0.22 U	0.44 U	7.4 J	0.15 U	0.07 U	1.2 U	2561 J	11 J	--	3.5 J	--	--	8.1
C7222	15.4	B209X7	05/04/09	0.09 U	0.07 U	0.22 U	0.44 U	4.6	0.15 U	0.07 U	1.2 U	3022	12	--	5.5	--	--	1.5
C7223	21.4	B209Y0	05/04/09	0.09 U	0.07 U	0.22 U	0.44 U	8	0.15 U	0.07 U	1.2 U	2553	18	--	4.7	--	--	6.9
C7223	15.4	B209X9	05/04/09	0.09 U	0.07 U	0.22 U	0.44 U	5.2	0.15 U	0.07 U	1.2 U	2673	17	--	6.9	--	--	3.6
C7224	21.4	B209Y4	05/04/09	0.09 U	0.07 U	0.22 U	0.44 U	8.88 J	0.15 U	0.07 U	1.2 U	2810 J	61 J	--	--	--	--	7.9

Table B-2. MIRAN Analyzer Sample Results for Trench 7

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene Chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Caron Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7224	15.4	B209Y2	05/04/09	0.09 U	0.07 U	0.22 U	0.44 U	4.11	0.15 U	0.07 U	1.2 U	2385	22	--	8.4	--	--	2.9
C7226	12.0	B209Y6	04/21/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1725 J	35 J	--	--	--	--	6
C7226	6.0	B209Y5	04/21/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2036 J	41 J	--	--	--	--	1.1
C7227	12.0	B209Y8	04/22/09	0.16 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	730 J	53 J	--	--	--	--	--
C7227	6.0	B209Y7	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7228	12.0	B20B02	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	494 J	51 J	--	--	--	--	--
C7228	6.0	B20B00	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	470 J	45 J	--	--	--	--	--
C7230	12.0	B20B04	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1235	54	--	--	--	--	--
C7230	6.0	B20B03	04/22/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1409 J	47 J	--	--	--	--	--
C7231	12.0	B20B06	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1857	37 J	--	--	--	--	--
C7231	6.0	B20B05	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1445	38 J	--	--	--	--	--
C7232	12.0	B20B10	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2358	41 J	--	--	--	--	--
C7232	6.0	B20B08	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2243	48 J	--	--	--	--	--
C7233	12.0	B20B12	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2017	55	--	--	--	--	--
C7233	6.0	B20B11	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1839	47 J	--	--	--	--	--
C7234	12.0	B20B14	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2092	59	--	--	--	--	8

Table B-2. MIRAN Analyzer Sample Results for Trench 7

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene Chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Caron Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7234	6.0	B20B13	04/24/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1946	56	--	--	--	--	--
C7235	12.0	B20B18	04/27/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7235	12.0 (dup)	B20B17	04/27/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7235	6.0	B20B16	04/27/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1933	13	--	--	--	--	--
C7236	12.0	B20B20	04/27/09	0.33	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2272	23	--	--	--	--	--
C7236	6.0	B20B19	04/27/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7237	12.0	B20B22	04/27/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1483 J	28 J	--	--	--	4 J	4
C7237	6.0	B20B21	04/27/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2123 J	11 J	--	--	--	--	--
C7238	12.0	B20B26	04/28/09	0.16 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	239 J	8.8 J	--	--	--	2.8 J	--
C7238	12.0 (dup)	B20B25	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7238	6.0	B20B24	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7239	12.0	B20B28	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7239	6.0	B20B27	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7240	12.0	B20B30	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7240	6.0	B20B29	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--

Table B-2. MIRAN Analyzer Sample Results for Trench 7

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene Chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Caron Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7241	12.0	B20B34	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7241	6.0	B20B32	04/28/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	0.86 J	857 J	--	--	--	--	--	--
C7242	12.0	B20B36	04/29/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	667	6.2	5.3	--	--	--	--
C7242	12.0 (dup)	B20B33	04/29/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1245	8.5	--	--	--	3.2	--
C7242	6.0	B20B35	04/29/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7243	12.0	B20B38	04/29/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1697	20 J	--	--	--	--	--
C7243	6.0	B20B37	04/29/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1270	23 J	--	--	--	--	--
C7244	21.4	B20B42	4/30/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7244	21.4 (dup)	B20B41	04/30/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	953 J	13 J	--	--	--	--	--
C7244	15.4	B20B40	04/30/09	0.26	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2126	15	--	--	--	--	--
C7245	21.4	B20B44	05/04/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	3.8
C7245	21.4 (dup)	B20B49	05/04/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7245	15.4	B20B43	05/04/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7246	21.4	B20B46	05/04/09	0.55	0.07 U	0.22 U	0.44 U	7.78	0.15 U	0.07 U	1.2 U	2635	62	--	--	--	--	6.9

Table B-2. MIRAN Analyzer Sample Results for Trench 7

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene Chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Caron Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7246	15.4	B20B45	05/04/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	0.7
C7247	26.5	B20B50	05/06/09	0.22	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2064	18	--	--	--	--	--
C7247	26.5 (dup)	B20B57	05/06/09	0.23	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2108	21	--	--	--	--	--
C7247	20.5	B20B48	05/06/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2229	27J	--	--	--	--	--
C7248	26.5	B20B52	05/06/09	0.31 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1906	23 J	--	--	--	--	1.6
C7248	20.5	B20B51	05/06/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1870	25 J	--	--	--	--	--
C7249	26.5	B20B54	05/06/09	0.34	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2191	32	--	--	--	--	--
C7249	20.5	B20B53	05/06/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1268 J	33 J	--	--	--	--	--
C7250	26.5	B20B58	05/06/09	0.26	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2162	31	--	--	--	--	--
C7250	20.5	B20B56	05/06/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1981	34 J	--	--	--	--	--
C7282	32.0	B20BH5	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	929 J	70 J	--	--	--	--	--
C7282	24.0	B20BH4	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	182 J	61 J	--	--	--	--	--
C7282	18.0	B20BH3	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7282	12.0	B20BH2	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	637 J	48 J	--	--	--	--	--
C7282	6.0	B20BH1	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	325 J	49 J	--	--	--	--	--
C7283	32.0	B20BJ2	05/18/09	0.86 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2032	53 J	--	--	--	--	--

Table B-2. MIRAN Analyzer Sample Results for Trench 7

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene Chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Caron Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7283	24.0	B20BJ1	05/18/09	0.74 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2091	28 J		--	--	--	--
C7283	18.0	B20BJ0	05/18/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2360 J	24 J		--	--	--	--
C7283	12.0	B20BH9	05/18/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7283	6.0	B20BH7	05/18/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7284	32.0	B20BJ7	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7284	32.0 (dup)	B20BK5	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7284	24.0	B20BJ6	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1160 J	48 J	--	--	--	--	--
C7284	18.0	B20BJ5	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1361 J	40 J	--	--	--	--	--
C7284	12.0	B20BJ4	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	835 J	38 J	--	--	--	--	--
C7284	6.0	B20BJ3	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	824 J	39 J	--	--	--	--	--
C7285	32.0	B20BK2	05/19/09	0.86 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1677 J	73 J	--	--	--	--	--
C7285	24.0	B20BK1	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1418 J	70 J	--	--	--	--	--
C7285	18.0	B20BK0	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1307 J	47 J	--	--	--	--	--
C7285	12.0	B20BJ9	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1279 J	46 J	--	--	--	--	--
C7285	6.0	B20BJ8	05/19/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1257 J	41 J	--	--	--	--	--
C7290	32.0	B20NL1	05/18/09	2.73	0.07 U	0.22 U	0.44 U	10.49	0.15 U	0.07 U	1.2 U	2493	68	--	--	--	--	29

Table B-2. MIRAN Analyzer Sample Results for Trench 7

Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Contaminants of Concern								Other Compounds Detected						VOCs Detected by OVM (ppmv)
				Carbon Tetrachloride (ppmv)	Chloroform (ppmv)	1,1-Dichloroethane (ppmv)	Methylene Chloride (ppmv)	Tetrachloroethene (ppmv)	1,1,1-Trichloroethane (ppmv)	1,1,2-Trichloroethane (ppmv)	Trichloroethene (ppmv)	Caron Dioxide (ppmv)	Methane (ppmv)	Acetylene (ppmv)	Nitrous Oxide (ppmv)	Pyridine (ppmv)	Toluene (ppmv)	
				CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	
C7290	32.0 (dup)	B20BH8	05/18/09	2.80	0.07 U	0.22 U	0.44 U	15.25	0.15 U	0.07 U	1.2 U	2598	57	--	--	--	--	--
C7290	24.0	B20NL0	05/18/09	0.85	0.07 U	0.22 U	0.44 U	12.18	0.15 U	0.07 U	1.2 U	2551	43	--	--	--	--	--
C7290	18.0	B20NK9	05/18/09	0.73	0.07 U	0.22 U	0.44 U	9.59	0.15 U	0.07 U	1.2 U	2466	49	--	--	--	--	--
C7290	12.0	B20NK8	05/18/09	0.09 U	0.07 U	0.22 U	0.44 U	3.14 J	0.15 U	0.07 U	1.2 U	1706	45 J	--	--	--	9.8 J	--
C7290	6.0	B20NK7	05/18/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	1285 J	21 J	--	--	--	--	--
C7291	32.0	B20NL6	05/18/09	0.89 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2447 J	51 J	--	--	--	--	--
C7291	24.0	B20NL5	05/18/09	0.78 J	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2311 J	67 J	--	--	--	14 J	--
C7291	18.0	B20NL4	05/18/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	2493 J	34 J	--	--	--	--	--
C7291	12.0	B20NL3	05/18/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--
C7291	6.0	B20NL2	05/18/09	0.09 U	0.07 U	0.22 U	0.44 U	0.16 U	0.15 U	0.07 U	1.2 U	--	--	--	--	--	--	--

Qualifying codes:

J Indicates an estimated value. Analyte was detected but spectral match was poor quality. Value is reported with a low level of confidence.

U Compound was analyzed for but not detected.

CAS = Chemical Abstracts Service

ppmv = parts per million by volume

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Table B-3. SUMMA Canister Sample Results and Comparison to MIRAN Analyzer Results.

Trench	Borehole	Depth (ft bgs)	HEIS No.	Sample Date	Sample Type	Contaminants of Concern								Other Compounds Detected													
						Carbon Tetrachloride (ppbv)	Chloroform (ppbv)	1,1-Dichloroethane (ppbv)	Methylene Chloride (ppbv)	Tetrachloroethene (ppbv)	1,1,1-Trichloroethane (ppbv)	1,1,2-Trichloroethane (ppbv)	Trichloroethene (ppbv)	Carbon Dioxide (ppbv)	Methane (ppbv)	Acetylene (ppbv)	Nitrous Oxide (ppbv)	Pyridine (ppbv)	Toluene (ppbv)	Acetone (ppbv)	Acetonitrile (ppbv)	Benzene (ppbv)	Butanal (ppbv)	Butane (ppbv)	1,3-Butadiene (ppbv)	2-Butanone (ppbv)	Heptane (ppbv)	Propane (ppbv)
						CAS 56-23-5	CAS 67-66-3	CAS 75-34-3	CAS 75-09-2	CAS 127-18-4	CAS 71-55-6	CAS 79-00-5	CAS 79-01-6	CAS 124-38-9	CAS 74-82-8	CAS 74-86-2	CAS 10024-97-2	CAS 110-86-1	CAS 108-88-3	CAS 67-64-1	CAS 75-05-8	CAS 71-43-2	CAS 123-72-8	CAS 106-97-8	CAS 106-99-0	CAS 78-93-3	CAS 142-82-5	CAS 74-98-6
Trench 1	C7286	32.0	B20LW4	05/20/09	SUMMA	1000	11	10 U	10 U	920	11	10 U	40	–	–	–	–	–	–	29	–	–	–	–	–	–	–	–
	C7286	32.0 (dup)	B20LW5	05/20/09	SUMMA	970	13	10 U	10 U	800	13	10 U	46	–	–	–	–	–	–	34	–	–	–	–	–	–	–	–
	C7286	32.0	B20BK9	05/20/09	MIRAN	90 U	70 U	220 U	440 U	160 U	150 U	70 U	1200 U	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	C7287	34.5	B20LW6	05/20/09	SUMMA	1700	27	10 U	10 U	1300	25	10 U	120	–	–	–	–	–	–	50	15	–	20	–	–	–	–	22
	C7287	34.5	B20BL4	05/20/09	MIRAN	2550 J	70 U	220 U	440 U	160 U	150 U	70 U	1200 U	2793000	58000 J	–	–	–	–	–	–	–	–	–	–	–	–	–
	C7288	34.5	B20LW7	05/20/09	SUMMA	1700	28	10 U	10 U	2000	29	10 U	120	–	–	–	–	–	–	34	–	–	–	–	–	–	–	16
	C7288	34.5	B20BL9	05/20/09	MIRAN	2550	70 U	220 U	440 U	2630	150 U	70 U	1200 U	2575000	64000	–	–	–	–	–	–	–	–	–	–	–	–	–
	C7289	32.0	B20LW8	05/20/09	SUMMA	1200	16	10 U	10 U	1200	17	10 U	55	–	–	–	–	–	–	66	–	–	12	–	–	11	–	–
	C7289	32.0	B20BM6	05/20/09	MIRAN	1880	70 U	220 U	440 U	3510	150 U	70 U	1200 U	1424000	54000	–	–	–	–	–	–	–	–	–	–	–	–	–
	C7289	32.0 (dup)	B20BM2	05/20/09	MIRAN	1770	70 U	220 U	440 U	4470	150 U	70 U	1200 U	1535000	54000	–	–	–	–	–	–	–	–	–	–	–	–	–
Trench 7	C7282	32.0	B20LW9	05/19/09	SUMMA	190	10 U	10 U	10 U	10 U	10 U	10 U	10 U	–	–	–	–	–	–	82	13	15	30	13	30	24	–	32
	C7282	32.0	B20BH5	05/19/09	MIRAN	90 U	70 U	220 U	440 U	160 U	150 U	70 U	1200 U	929000 J	70000 J	–	–	–	–	–	–	–	–	–	–	–	–	–
	C7283	32.0	B20LX0	05/18/09	SUMMA	370	10 U	10 U	10 U	10 U	10 U	10 U	10 U	–	–	–	–	–	–	32	–	–	–	–	–	–	–	–
	C7283	32.0	B20BJ2	05/18/09	MIRAN	860 J	70 U	220 U	440 U	160 U	150 U	70 U	1200 U	2032000	53000 J	–	–	–	–	–	–	–	–	–	–	–	–	–
	C7284	32.0	B20LX1	05/19/09	SUMMA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	–	–	–	–	–	–	56	–	–	–	–	–	–	–	–
	C7284	32.0	B20BJ7	05/19/09	MIRAN	90 U	70 U	220 U	440 U	160 U	150 U	70 U	1200 U	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	C7284	32.0 (dup)	B20BK5	05/19/09	MIRAN	90 U	70 U	220 U	440 U	160 U	150 U	70 U	1200 U	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	C7285	32.0	B20LX2	05/19/09	SUMMA	290	10 U	10 U	10 U	10 U	10 U	10 U	10 U	–	–	–	–	–	19	46	10	–	–	–	–	–	17	–
	C7285	32.0	B20BK2	05/19/09	MIRAN	860 J	70 U	220 U	440 U	160 U	150 U	70 U	1200 U	1677000 J	73000 J	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	(blank)	B20T73	05/27/09	SUMMA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Qualifying codes:
- J Indicates an estimated value. Analyte was detected but spectral match was poor quality. Value is reported with a low level of confidence.
- U Compound was analyzed for but not detected.

CAS = Chemical Abstracts Service
ppvb = parts per billion by volume

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