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Revision 0

Description of Work for the Step III Vapor and Soil Sampling Program at 218-W-4C Burial Ground for the 4, 20, and 27 Trenches

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

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Richland, Washington 99352

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Contents

1. **Introduction/Scope of Work** 1
2. **Background** 2
3. **Description of Work Activities** 4
   3.1 Sample Locations 4
   3.2 Sample Collection 5
   3.3 Field Quality Control 7
      3.3.1 Duplicates
      3.3.2 Field Splits 7
      3.3.3 Equipment Blanks 7
      3.3.4 Trip Blanks 8
   3.4 Sample Analysis 8
   3.5 Current Trench Conditions 8
   3.6 Borehole Installation 8
4. **Waste Management** 10
5. **Procedures** 11
6. **Quality Assurance** 12
7. **Safety** 13
8. **Schedule** 14
9. **References** 15

Figures

Figure 1. Location of Trenches 4, 20, and 24 in the 218-W-4C Burial Ground 1

Figure 2 Sample Locations and Well IDs 3

Figure 3 Sample Locations and Well ID Step III sampling 218-WC-4b Burial Ground (Sample Symbol Key: Squares are soil & vapor samples, circles are soil vapor screening samples only) 5

Tables

Table 1. Location and Depth- Step III Sample Locations at the 218-W-4C Burial Ground 4

Table 2 Burial Ground Sampling Summary for 218-W-4C 6

Terms

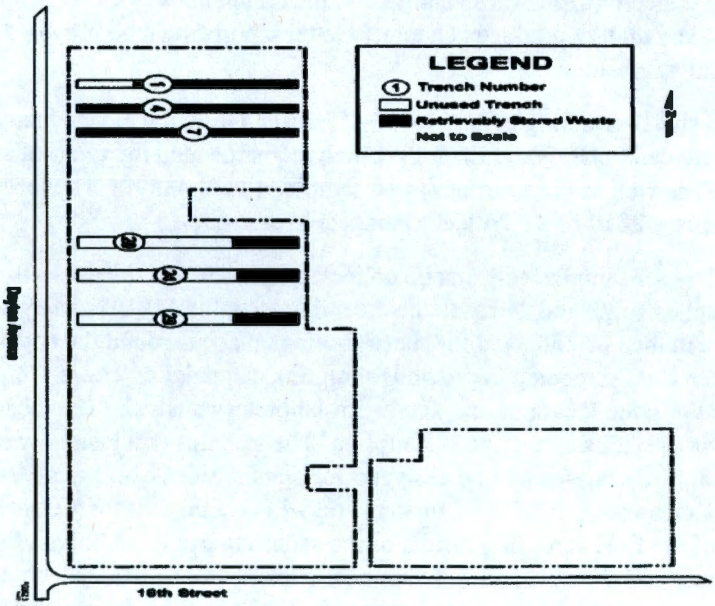
bgs	below ground surface
BTR	Buyers Technical Representative
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	*Code of Federal Regulations*
CGET	CHPRC General Employee Training
CHPRC	CH2M HILL Plateau Remediation Company
COC	contaminant of concern
DOW	Description of Work
DPT	direct push technology
ERSTI	Environmental Radiological Survey Task Instruction
GC/MS	gas chromatography/mass spectroscopy
IDW	investigation-derived waste
OU	Operable Unit
QA	quality assurance
QC	quality control
RCT	Radiological Control Technician
RWP	Radiological Work Permit
SAP	sampling and analysis plan
TRU	transuranic
VOC	volatile organic compound
WAC	*Washington Administrative Code*
WP/LIS	waste packaging/labeling instruction sheet

1. Introduction/Scope of Work

This description of work (DOW) provides the details and requirements for the drilling, associated sampling, and decommissioning activities to be conducted as part of implementing Step III Sampling Protocol at designated trenches within the 218-W-4C Burial Grounds site. A series of boreholes will be installed for sampling vapors and soils at this burial ground site at three (3) separate trenches (Trenches 4, 20, and 24).

The sampling will be conducted in this sequence: vapors sites first then the soil and vapor sites. Nine (9) boreholes will first be drilled through the asphalt pads to collect soil vapor samples for field screening purposes using the MIRAN1 Sapphire Ambient Air Analyzer (MIRAN analyzer). The MIRAN analyzer is an industry standard for field screening of samples for specific VOC compounds. Next, Six (6) boreholes will then be installed around the edge of the pads to collect both soil samples and soil vapor samples. These samples are collected for confirmatory laboratory analysis. They are located adjacent to previous sample locations and were selected based on field screening results (MIRAN analyzer) from the previous 2009 sampling campaign. Based on a review of the field screening results from the nine (9) boreholes vapor sampling event described above, additional sampling locations may be selected to collect confirmatory soil samples and soil vapor samples for laboratory analysis. Samples will be collected at depths of approximately 0.3 m (1 ft), 1.8 m (6 ft), 3.7 m (12 ft), and 9.8 m (32 ft) below ground surface (bgs). The asphalt pad is located at the flat bottom of the trench and is the point of reference for all depth measurements. The depth measurements will commence from the natural ground surface beneath the asphalt and asphalt sub-base. The sampling objective is intended to determine whether any contamination from the waste containers previously stored in these trenches was released to the environment. The boreholes will be decommissioned immediately after sampling is completed. The location of Trenches 4, 20, and 24 in the 218-W-4C Burial Ground is shown in Figure 1.

Figure 1. Location of Trenches 4, 20, and 24 in the 218-W-4C Burial Ground.



[1] MIRAN is a registered trademark of Thermo Electron Corporation.

2. Background

The 218-W-4C Burial Ground began accepting packaged waste materials from Hanford Site operations and offsite sources in 1978. The burial ground contains low-level, transuranic (TRU), 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 (sub-base). Trenches 1, 4, 7, 20, 24, and 29 in the 218-W-4C Burial Ground contained retrievably stored TRU waste.

Concern arose that contaminants may have leaked from retrievably stored waste containers in the burial grounds. The Tri-Party Agreement milestone M-091-40 specifies increments for retrieval of the waste. Concurrently, sampling and analysis is to be performed to determine the nature and extent of any leaked contamination. Sampling and analysis plans (SAPs) were developed and have been approved by the regulators. The SAPs establish requirements for sampling burial ground vent risers and substrate soils in the burial grounds containing retrievably stored waste. A three-step graded approach to sampling the burial grounds was developed as described in DOE/RL-2003-48, *218-W-4C Sampling and Analysis Plan*:

- Step I involved vapor sampling through existing vent risers before any waste is retrieved. Step I sampling was completed in 2004 for the 218-W-4C Burial Ground.
- Step II consisted of soil vapor sampling around the edges of the asphalt pads following waste retrieval to identify locations where condensate or runoff may have drained into the perimeter soils. Step II sampling was completed in 2009 for the 218-W-4C Burial Ground.
- Step III will evaluate the results of Steps I and II to determine whether further characterization is needed by soil vapor sampling and soil sampling around and beneath the asphalt pads in the 218-W-4C Burial Ground.

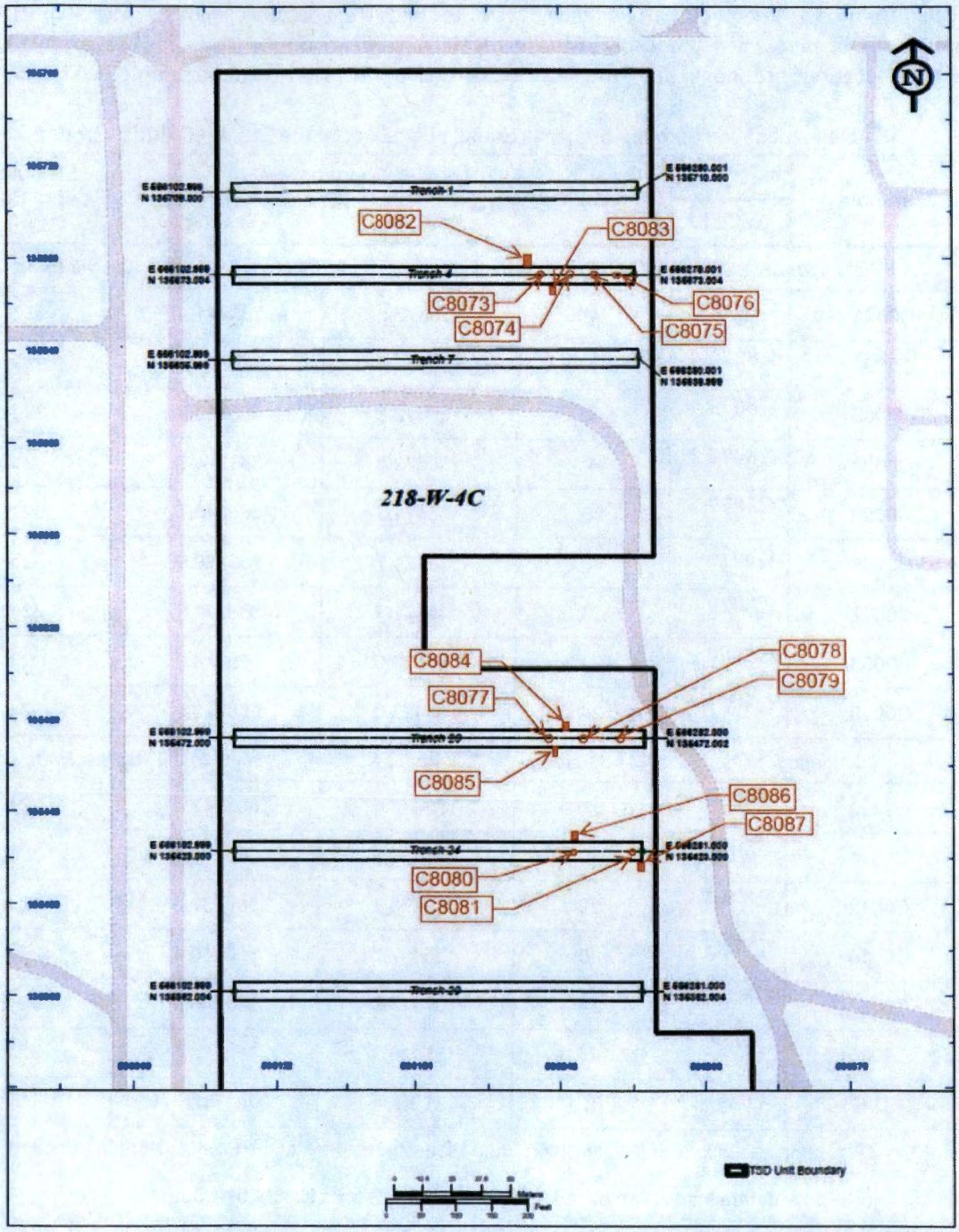
The contaminants of concern (COCs) are volatile organic compounds (VOCs), primarily carbon tetrachloride and its degradation products. Quarterly letter reports must be provided to the regulators with the sampling and analysis results.

Results of the Step I and II sampling at the 218-W-4C Burial Ground were evaluated. A presentation and white paper were provided to DOE and Ecology which recommended the types of sampling to be performed in Step III as well as the locations to be sampled (HNF-44899). The recommendation was approved at the February 2010 M-91 Project Managers Meeting.

During Step III, soil vapor samples will first be collected from nine (9) locations directly under the asphalt pads in Trenches 4, 20, and 24 for field screening using the MIRAN analyzer. Soil samples and soil vapor samples will then be collected for six (6) borings placed around the edges of the pads near hot-spots indentified from field screening in previous sampling campaigns. These samples (soil & vapor) will be taken together at the same locations and depths for laboratory analysis. The locations to be sampled are hot spots identified in previous Step I and II sampling. The samples will be analyzed per the requirements in DOE/RL-2003-48. Soil samples will be analyzed for metals, VOAs, and semi-VOAs. All soil vapor samples will be collected using SUMMA canisters and will be analyzed for VOAs and semi-VOAs. Based on a review of the field screening results of the sampling event, additional locations may be selected to collect both soil samples and soil vapor samples for confirmatory laboratory analysis. The number, depth and location of this set of confirmatory samples will be determined in the field based on the MRIAN results for the 9 boreholes.

Based in previous Step I and II sampling and decision rules in the SAP, no samples will be collected for analyses of radioactive compounds since no radioactivity has been detected to date at these trench locations.

Figure 2 Sample Locations and Well IDs



3. Description of Work Activities

3.1 Sample Locations

Soil vapor samples will first be collected from directly under the asphalt pads in Trenches 4, 20, and 24 for field screening. Field screening will be conducted by MIRAN analyzer. The MIRAN analyzer is an industry standard for field screening of VOC samples. Soil samples and soil vapor samples will then be collected from six (6) boreholes around the edges of the pads for laboratory analysis. The Step III sampling will be performed at hot spots which were detected in previous Step I and II sampling. The Step III sample locations are shown in Figure 3-1. Coordinates of the locations to be sampled and Well I.D.'s

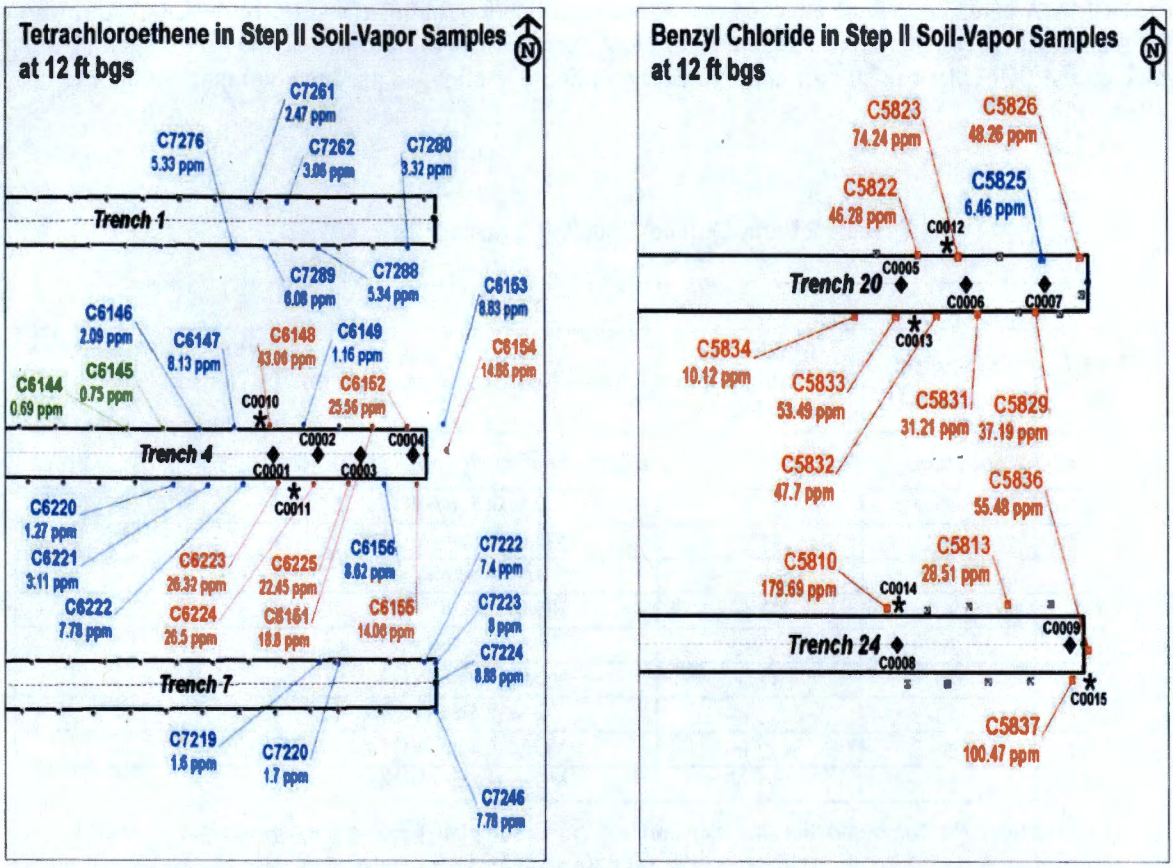
Table 1. Location and Depth- Step III Sample Locations at the 218-W-4C Burial Ground

Borehole	WELL ID	Trench	Coordinates[(A)]		Maximum Depth Below Pad
			Northing	Easting	
FIELD VAPOR SCREENING ONLY: Locations for Soil Vapor Sampling Under the Asphalt Pads					
C0001	C8073	4	135672.8	566244.4	32 ft
C0002	C8074	4	135672.8	566254.0	32 ft
C0003	C8075	4	135672.8	566263.3	32 ft
C0004	C8076	4	135672.8	566274.7	32 ft
C0005	C8077	20	135471.7	566248.7	32 ft
C0006	C8078	20	135471.7	566260.0	32 ft
C0007	C8079	20	135471.7	566274.5	32 ft
C0008	C8080	24	135423.0	566244.9	32 ft
C0009	C8081	24	135423.0	566279.0	32 ft
Locations for Combined Soil Sampling and Soil Vapor Sampling adjacent to the Asphalt Pads					
C0010	C8082	4	135677.4	566242.4	32 ft
C0011	C8083	4	135668.3	566249.2	32 ft
C0012	C8084	20	135475.7	566257.3	32 ft
C0013	C8085	20	135467.5	566250.4	32 ft
C0014	C8086	24	135427.9	566245.9	32 ft
C0015	C8087	24	135418.1	566280.0	32 ft
TBD (B)	TBD	TBD	TBD	TBD	TBD

(A) Sample locations are Washington State Plane coordinates and shown as Northing/Easting in meters.
(B) To be determined (TBD) based on field screening results for C0001-C009.

are provided in Table 3-1.

Figure 3 Sample Locations and Well ID Step III sampling 218-WC-4b Burial Ground (Sample Symbol Key: Squares are soil & vapor samples, circles are soil vapor screening samples only)



♦ – Step III Soil-Vapor Field Screening Sample (9 locations)
★ – Step III Soil Sample/SUMMA Canister (6 locations)

3.2 Sample Collection

A Geoprobe system using direct push technology (DPT) or equivalent system will be used to collect soil vapor samples from directly under the asphalt pads for field screening. The push tip will be positioned as close to the staked location as possible and driven through the pad to the prescribed maximum depth. A soil vapor sample will be drawn from near the bottom of the borehole using a sample pump. The push tip will then be backpulled to the next (shallower) sample location. The lower portion of the borehole will be backfilled with granular bentonite and a soil vapor sample collected at that depth. The process of backpulling, backfilling, and sampling will be repeated until the final sample is collected. At each sample location, soil vapor samples will be collected at depths of 0.3 m (1 ft), 1.8 m (6 ft), 3.7 m (12 ft), and 9.8 m (32 ft) below the asphalt pad. The depth of the boreholes will be determined by the field geologist and may change depending on the conditions encountered in the field. The sample collection tubing and sample pump will be connected directly to the field screening instrument for sample analysis. A coarse

filter prevents bulk debris from being drawn into the sample tubing. A fine filter further prevents contamination of the sample container and field screening MIRAN instrument.

Evacuated SUMMA canisters will be used for collecting the soil vapor samples for laboratory analysis. The SUMMA canisters will be attached to the sample collection tubing after first venting and confirming that the SUMMA canister has maintained sufficient vacuum. The sample will be drawn by opening a valve on the SUMMA canister for approximately 1 minute to allow an adequate volume of vapor to be collected.

Table 2 Burial Ground Sampling Summary for 218-W-4C

WELL ID	Trench # Location (1)	Maximum Sampling Depth Below Pad (2)	Analytical Requirements (3)	Number of Samples
(A) Locations for Soil Vapor Sampling Under the Asphalt Pads- MIRAN Only				
C8073	4	32 ft	VOAs & Semi-VOAs	4- Amb.Air (MIRAN)
C8074	4	32 ft	VOAs & Semi-VOAs	4 Amb.Air (MIRAN)
C8075	4	32 ft	VOAs & Semi-VOAs	4 Amb.Air (MIRAN)
C8076	4	32 ft	VOAs & Semi-VOAs	4 mb.Air (MIRAN)
C8077	20	32 ft	VOAs & Semi-VOAs	4 Amb.Air (MIRAN)
C8078	20	32 ft	VOAs & Semi-VOAs	4 Amb.Air (MIRAN)
C8079	20	32 ft	VOAs & Semi-VOAs	4 Amb.Air (MIRAN)
C8080	24	32 ft	VOAs & Semi-VOAs	4 Amb.Air (MIRAN)
C8081	24	32 ft	VOAs & Semi-VOAs	4 Amb.Air (MIRAN)
(B) Locations for Combined Soil Sampling and Soil Vapor Sampling Around the Asphalt Pads- SUMMA Canisters and standard sample jars for soils				
C8082	4	32 ft	VOAs, Semi VOA,s and RCRA Metals, + Hg	4- Air (SUMMA) 4- Soils (Lab Bottles)
C8083	4	32 ft	VOAs, Semi VOA,s and RCRA Metals, + Hg	4- Air (SUMMA) 4- Soils (Lab Bottles)
C8084	20	32 ft	VOAs, Semi VOA,s and RCRA Metals, + Hg	4- Air (SUMMA) 4- Soils (Lab Bottles)
C8085	20	32 ft	VOAs, Semi VOA,s and RCRA Metals, + Hg	4- Air (SUMMA) 4- Soils (Lab Bottles)
C8086	24	32 ft	VOAs, Semi VOA,s and RCRA Metals, + Hg	4- Air (SUMMA) 4- Soils (Lab Bottles)
C8087	24	32 ft	VOAs, Semi VOA,s and RCRA Metals, + Hg	4- Air (SUMMA) 4- Soils (Lab Bottles)
QA/QC	--	--	See text Section 3	TBD

(1) Direct Push Technology (DPT) will be used to collect each sample
(2) Soil vapor samples at each location will be collected at 1 ft, 6 ft, 12 ft., and 32 Ft.
(3) See DOE/RL-2003-48, Tables 2-4 & 2-5 for details

3.3 Field Quality Control

Field quality control (QC) samples are collected to evaluate homogeneity, the potential for cross-contamination, and laboratory performance. Field QC will differ depending on the type of sampling being conducted.

For soil vapor samples drawn directly into the field screening instrument for analysis, field QC will only include collection of duplicate samples; no equipment blanks will be collected.

For soil vapor samples collected in SUMMA canisters for laboratory analysis, field QC will require the collection of duplicate samples and equipment blank samples.

For soil samples, field QC will require the collection of duplicate samples, field split samples, equipment blank, and trip blank samples.

3.3.1 Duplicates

For soil vapor samples drawn directly into the field screening instrument for analysis, duplicates are defined as two separate analyses, performed sequentially, using the same analytical equipment. A minimum of 5 percent of the total collected soil vapor samples will be duplicated (i.e., one duplicate will be analyzed every 20 samples or, at minimum, one duplicate per day). Where feasible, duplicates will be selected after an initial sample is analyzed and shown to contain detectable concentrations of carbon tetrachloride so valid comparisons can be made between samples.

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 a minimum, one duplicate SUMMA canister sample will be collected.

For soil samples, duplicates are defined in the same way as for vapor samples collected in SUMMA canisters. Duplicate samples are useful in documenting homogeneity in the soil. A minimum of one duplicate sample will be collected during soil sampling. Generally, the duplicates should be collected from areas that are expected to have some contamination so that valid comparisons can be made between the samples (i.e., some of the COCs will be above the detection limit).

3.3.2 Field Splits

Field split samples are used to verify the performance of the primary laboratory. Field split samples will be collected for soil samples only. One field split will be collected for every 20 samples. All split samples will be retrieved from the same sample interval using the same equipment. Samples shall be homogenized, split into two separate aliquots in the field, and sent to two independent laboratories. Field splits should be collected from a zone that is contaminated.

3.3.3 Equipment Blanks

Equipment blanks will be collected at the same frequency as duplicate samples, where applicable, and will be used to verify the adequacy of sampling equipment decontamination procedures.

For soil vapor samples drawn directly into the field screening instrument for analysis, equipment blanks are not required.

For soil vapor samples collected in SUMMA canisters, cleaned SUMMA canisters will be filled with certified clean air and analyzed for the COCs. At least 10 percent of the clean, evacuated SUMMA canisters will be checked.

For soil samples, the equipment blanks shall consist of pure deionized water washed through decontaminated sampling equipment and placed in containers identical to those used for actual field samples. Equipment blanks shall be analyzed for the COCs identified for soils.

3.3.4 Trip Blanks

Trip blanks are prepared as a check for possible contamination originating from container preparation methods, shipment, storage, or site conditions.

A trip blank will be prepared for each batch (cooler) of soil sample containers shipped. The trip blank shall consist of pure deionized water added to clean sample containers. These containers will be transported to the field with the bottle sets and will be returned unopened to the laboratory. The trip blanks will be analyzed for VOCs only.

Trip blanks are not required for SUMMA canister samples. The SUMMA canisters will be cleaned, evacuated, and sealed using a valve before sampling, and resealed with a valve following sampling.

3.4 Sample Analysis

Soil vapor samples collected for field screening will be analyzed using a MIRAN[2] SapphIRe Ambient Air Analyzer (MIRAN analyzer). The MIRAN analyzer is an industry standard method for field screening of VOC samples. The MIRAN analyzer exposes the sample to different wavelengths of infrared radiation and measures the absorption spectra. Based on the absorption spectra, the MIRAN analyzer identifies the contaminants present and their concentrations. The data are intended to determine whether additional characterization is needed by soil vapor sampling and soil sampling in Step III. The COCs are VOCs, primarily carbon tetrachloride and its degradation products. The MIRAN analyzer is specifically "standard-checked" for these VOCs (plus the gases carbon dioxide and methane) and it has a computerized library of approximately 90 other chemicals for which it also analyzes.

Analytical performance requirements for soil vapor samples and soil samples are specified in DOE/RL-2003-48, Tables 2-1 and 2-2. The requirements include the COCs, analytical methods, required detection levels, accuracy, and precision. Sample preservation, container, and holding time guidelines for soil vapor samples in SUMMA canisters and soil samples are specified in DOE/RL-2003-48, Tables 2-4 and 2-5.

3.5 Current Trench Conditions

The Waste Retrieval Project prepared Post-Retrieval Information data sheets when waste retrieval from each trench in the 218-W-4C Burial Ground was completed. 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 data sheets describe the general condition of the waste containers and the as-left condition of the trench. Access to sample locations in Trenches 4 and 20 is direct and unrestricted since all waste material has been removed. However, since some structures remain within Trench 24, arrangements with the site manager, as needed, may be necessary to obtain adequate access to sampling locations (as needed temporary removal of jersey barriers, bench highly sloped soil piles, etc.)

3.6 Borehole Installation

The planning and installation of the boreholes will be conducted under this DOW and will adhere to the guidelines and requirements in the referenced procedures. The boreholes will conform to the resource protection well standards as defined in *Washington Administrative Code* (WAC) 173-160, "Minimum Standards for Construction and Maintenance of Wells."

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[2] MIRAN is a registered trademark of Thermo Electron Corporation.

The boreholes to be installed in each trench are listed in Table 1. The drilling contractor shall install the boreholes to the required depth as confirmed by the field geologist. Drilling and sampling activities at the work site will be documented by the field geologist on Field Activity Report sheets.

The drilling contractor is responsible for cleaning the drill rig and downhole equipment. The procedure GRP-EE-01-6.2, "Field Cleaning and/or Decontamination of Geoprobe and Drilling Equipment," provides cleaning and decontamination requirements. The drill rig and drilling equipment shall be pressure and high-temperature washed prior to mobilization to the site and demobilization from the site. Pressure and high-temperature washing the drill rig between boreholes is not required when multiple boreholes are drilled at the same hazardous waste site (e.g., trench). However, all downhole equipment shall be decontaminated between boreholes on the same hazardous waste site.

Health and safety monitoring will be conducted by an Industrial Hygienist during soil vapor sampling and soil sampling. For each boring, the Industrial Hygienist will screen for carbon tetrachloride using an organic vapor monitor. Monitoring will be conducted at each borehole location prior to sample collection. During the sampling activities, the Industrial Hygienist will perform continuous monitoring in the breathing zone. Controls will be put in place to prevent exposure, including restricting access to limit personnel and entry only to personnel designated to perform the work.

Work activities associated with the borehole installation are considered to pose a low radiological risk. If unanticipated radiological contamination is encountered, a portion of the casing and downhole equipment may not be recoverable. The casing will be removed prior to decommissioning of the borehole unless the casing is unrecoverable. No equipment that is potentially contaminated will be returned to the drilling contractor without thorough radiological monitoring to ensure it is free of contamination. Continuous Radiological Control Technician (RCT) coverage will be provided during all drilling and decommissioning activities. An Environmental Radiological Survey Task Instruction (ERSTI) will be prepared to establish the radiological surveillance activities. A Radiological Work Permit (RWP) will be written as necessary to provide workers with instructions for working in radiologically controlled areas. Radiological risk levels may be reassigned (increased, depending on field conditions) by the Radiological Control organization. If at any time radioactive material above action levels is encountered, work shall be stopped immediately and appropriate controls put in place prior to proceeding.

The boreholes will be decommissioned by backfilling with bentonite crumbles from total depth to 0.9 m (3 ft) bgs. The boreholes will then be filled with grout from 0.9 m (3 ft) bgs to the surface. A bronze survey marker that is die stamped with the borehole identification number and the date of decommissioning will be placed in the top of the grout.

4. Waste Management

Waste generated as a result of drilling these boreholes will be managed under CERCLA as investigation-derived waste (IDW). The 218-W-4C SAP specifies the IDW generated by 218-W-4C Burial Ground characterization activities is to be managed in accordance with the *Waste Control Plan for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*, WMP-20501.The Tri-Party Agreement Change Notice TPA-CN-266 was approved by the regulators to revise the waste control plan to include the boreholes in the 218-W-4C Burial Ground for soil vapor sampling. In addition to the waste control plan, an activity-specific Waste Packaging/ Labeling Instruction Sheet (WP/LIS) will be provided by the CHPRC Waste Management Specialist.

5. Procedures

This section identifies technical procedures/specifications applicable to field activities performed under this Description of Work. Activities associated with the installation of the DPT boreholes and management of waste generated by these activities will adhere to, at a minimum, WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells," and the following CHPRC procedures and requirements:

- 0000X-DC-W0001, Rev. 9, "Supplemental Waste Acceptance Criteria for Disposal at Environmental Restoration Disposal Facility."
- GRP-EE-01-1.11, "Purgewater Management"
- GRP-EE-01-6.2, "Field Cleaning and/or Decontamination of Geoprobe and Drilling Equipment"
- GRP-EE-01-6.3, "Well Development and Testing"
- GRP-EE-01-7.0, "Geologic Logging"
- GRP-EE-02-14.1, "Drilling, Remediating, and Decommissioning Resource Protection Wells and Geotechnical Soil Borings"
- GRP-EE-02-14.5, "Returning Vadose Zone Drill Cuttings/Soils to the Environment"
- GRP-EE-05-4.1: "Analysis of Volatile Organic Compounds in Vapor Samples Using the Miran SapphIRe Analyzer"
- GRP-FS-04-G-005, "Control of Monitoring Instruments"
- GRP-FS-04-G-012, "Sample Packaging and Shipping"
- GRP-FS-04-G-016 "Chain of Custody/Sample Analysis"
- GRP-FS-04-G-029, "Non-VOC Soil Sediment Sampling
- GRP-FS-04-G-033: "Routine and Non-Routine Soil-Gas Sampling"
- PRC-PRO-EP-15333, "Environmental Protection Processes"
- PRC-PRO-EP-15334, "Effluent and Environmental Monitoring for Radionuclide Airborne Emissions"
- PRC-PRO-EP-15335, "Environmental Permitting and Documentation Preparation"
- PRC-PRO-IRM-10863, "Control of Notebooks and Logbooks"
- PRC-RD-EP-15332, "Environmental Protection Requirements"
- WCH-191, *Environmental Restoration and Disposal Facility Waste Acceptance Criteria*

6. Quality Assurance

CHPRC issued document "Quality Assurance Program" (PRC-MP-QA-599), describes how CHPRC implements the quality assurance (QA) requirements conveyed in U.S. Department of Energy Order 414.1C (*Quality Assurance*) and "Nuclear Safety Management" (10 *Code of Federal Regulations* [CFR] 830.121). PRC-MP-QA-599 also shows how the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989) and *Hanford Analytical Services Quality Assurance Requirements Document (HASQARD)* (DOE/RL-96-68) apply to Environmental QA Program Plans. CHPRC has also issued *Environmental Quality Assurance Plan* (CHPRC-00189). All CHPRC employees and subcontractors performing environmental cleanup activities are responsible for performing work in accordance with the requirements set forth in CHPRC-00189. All work performed under this DOW will be performed in compliance with Project Hanford Management System overall QA program design (PRC-MP-QA-599). A project specific QA Program plan for the Soil & Groundwater Remediation Project scope is presented in Appendix C of CHPRC-00189

All operations including drilling, sampling and well completion/decommissioning, testing and associated documentation are subject to surveillance by CHPRC, CHPRC's authorizing agent and/or owner. This surveillance shall in no way relieve the contractor of any contractual responsibilities. Note the term "surveillance" as used here may include inspection, survey, and/or assessment.

Commercially available tape measures and electronic depth sounders shall have an accuracy of +/- 0.1 ft in 300 ft as required by CHPRC procedure GRP-FS-04-G-005 and will be used to make depth and length measurements to +/- 0.01 ft tolerance while drilling and completing the borehole. The surface of the ground adjacent to the borehole will be used as the "ground surface" reference for depth measurements. The brass marker will be placed in the finished grout and surveyed after the borehole has been completed and abandoned. A correlation of the measurements made while drilling to the surveyed elevation will be included in the final report (Section 3.6).

Technical procedures to be followed are listed in Section 5.0 of this document.

7. Safety

All personnel working at the drilling sites will have completed, at a minimum:

- Occupational Safety and Health Administration Act 40-hour Hazardous Waste Site Worker training program (29 CFR 1910.120)
- CHPRC General Employee Training (CGET)
- Hanford Radiation Worker II training.

Work will be performed in accordance with the following procedures:

- CHPRC-00073, *CHPRC Radiological Control Manual*
- Soil and Groundwater Remediation Project Radiological Control Procedures
- CHPRC Occupational Safety and Health Procedures
- Site-specific plans, as applicable for :
  - Health and safety plans
  - Radiological Work Permit, as applicable
  - Activity hazard analysis/job safety analysis
  - Site-specific WP/LIS

Note: The PID shall have the appropriate IP lamp for detection of chlorinated hydrocarbons. In coordination with the IH group, draeger tubes may be used for detection of compounds not well detected up by PID, but tentatively identified in earlier samples by the Miran analyzer such as Phosgene and Benzyl Chloride.

8. Schedule

January and February 2011.

Field preparation and staking of sampling locations will be performed in ~~September and October 2010~~. ~~Planning and~~ Installation of the boreholes and soil vapor sampling and soil sampling will be conducted in ~~October and November~~ 2010. Decommissioning of the boreholes will be completed no later than ~~December~~ 30, 2010.

May 30. 2011

January to March 2011

9. References

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GRP-EE-01-7.0, "Geologic Logging"
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GRP-EE-05-4.1, "Analysis of Volatile Organic Compounds in Vapor Samples Using the Miran SapphIRe Analyzer"
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