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Closeout Report for IHSS Group 000-4

New Process Waste Lines (NPWL)

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Closeout Report
for IHSS Group 000-4

New Process Waste Lines (NPWL)

October 2005

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for IHSS Group 000-4

New Process Waste Lines (NPWL)

Approval received from the Colorado Department of Public Health and Environment

(October 6, 2005).

Approval letter contained in the Administrative Record.

October 2005

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ENCLOSURE

CD Containing Standardized Real and QC Accelerated Action Data

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ACRONYMS

AL	action level
AR	Administrative Record
ASD	Analytical Services Division
AST	aboveground storage tank
bgs	below ground surface
BMP	Best Management Practice
BZ	Buffer Zone
CA	contamination area
CAD/ROD	Corrective Action Decision/Record of Decision
CAS	Chemical Abstracts Service
CDD	closure description document
CD	compact disc
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm^2	square centimeter
COC	contaminant of concern
CPIR	Contingency Plan Implementation Report
cpm	counts per minute
CRA	Comprehensive Risk Assessment
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
dpm	disintegrations per minute
DQA	Data Quality Assessment
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ER RSOP	Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation
ft	foot
FY	Fiscal Year
GC/MS	gas chromatography/mass spectrometry
HCl	hydrochloric acid
HDPE	high-density polyethylene
HEPA	high efficiency particulate
HNO_3	nitric acid
HPGe	high-purity germanium
HRR	Historical Release Report
IA	Industrial Area
IABZSAP	Industrial Area and Buffer Zone Sampling and Analysis Plan
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Site
IIR	Internal Investigation Report
K-H	Kaiser-Hill Company, L.L.C.

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LCS	laboratory control sample
LLW	low-level radioactive waste
LLMW	low-level mixed waste
ug/kg	micrograms per kilogram
ug/L	micrograms per liter
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
MST	modular storage tanks
NaI	sodium iodide
N/A	not applicable
nCi/g	nanocuries per gram
NFAA	No Further Accelerated Action
NLR	No Longer Representative
NPWL	New Process Waste Lines
OPWL	Original Process Waste Lines
OU	operable unit
PA	Protected Area
PAC	Potential Area of Concern
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
PCB	polychlorinated biphenyl
pCi/g	picocuries per gram
pCi/L	picocuries per liter
PCOC	potential contaminant of concern
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PVC	polyvinyl chloride
QC	quality control
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
RFCA	Rocky Flats Cleanup Agreement
RFETS or Site	Rocky Flats Environmental Technology Site
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RIN	report identification number
RL	reporting limit
RPD	relative percent difference
RSOP	RFCA Standard Operating Protocol for Routine Soil Remediation
RWP	Radiological Work Permit
SAP	Sampling and Analysis Plan
Sbd	sample beginning depth
SD	standard deviation

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Sed	sample ending depth
SEP	Solar Evaporation Ponds
SOR	sum of ratios
SSRS	Subsurface Soil Risk Screen
SVOC	semivolatile organic compound
SWD	Soil Water Database
S&W	Swinerton and Walberg
TRU	transuranic
UBC	under building contamination
UCL	upper confidence limit
V&V	verification and validation
VOC	volatile organic compound
WRW	wildlife refuge worker
yd^3	cubic yards

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EXECUTIVE SUMMARY

Individual Hazardous Substance Site (IHSS) Group 000-4 at the Rocky Flats Environmental Technology Site (RFETS or Site) in Golden, Colorado consists of the New Process Waste Lines (NPWL).

NPWL was a permitted Resource Conservation and Recovery Act (RCRA) Unit and was closed in accordance with approved RCRA closure description documents (CDDs) (DOE 2002e and 2003q). Portions of the NPWL were cleaned and closed in place in accordance with the RCRA Part B Permit.

The NPWL was a network of double-contained underground and aboveground pipelines and used to transport liquid waste streams to Building 374, Waste Treatment Operations. The NPWL transported a variety of waste streams and included the following:

- Laundry water,
- Nonradioactive and chemical laboratory waste,
- Uranium and beryllium waste,
- Radionuclides (americium-241 and plutonium-239/240)
- Polychlorinated biphenyls (PCBs),
- Solar Evaporation Pond (SEP) water,
- Incidental water,
- High nitrate waste from Building 774, and
- Utilities waste.

This closeout report includes information and data on NPWL from all applicable IHSS Groups so that it is a comprehensive summary of NPWL data and actions. Samples collected as part of other IHSS Groups not specifically targeting NPWL but in close proximity to NPWL were also included in this Closeout Report to provide more complete characterization data and support the rationale for NFAA. For this report, the NPWL was divided into four primary areas (100/400 Area, 500 Area, 700 Area, and 800 Area).

Accelerated actions conducted at IHSS Group 000-4 consisted of the following:

- 245 soil samples were obtained from 147 sampling locations (137 characterization locations and 10 confirmation locations).
- Approximately 15,300 ft of NPWL were excavated and disposed of from the Site.

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- Approximately 6,200 ft of NPWL were clean closed and left in place.
- All of the NPWL were flushed and rinsate analyzed under a different project. Results are discussed in the RCRA Unit 374.3 closure document (DOE 2005h).
- NPWL that could not be RCRA-clean closed were removed, further reducing potential future releases of contamination.
- Twenty valve vaults were part of the NPWL network. An effort was made to rinse and decontaminate all of these valve vaults to satisfy RCRA closure criteria. As a result of this effort, 14 valve vaults were RCRA clean closed and 6 valve vaults were completely removed.
- The tops of 14 RCRA clean closed valve vaults were partially excavated to at least 4 ft bgs.
- Of the 14 RCRA clean closed valve vaults, 3 valve vaults contained elevated fixed radiological contamination deep inside the valve vaults. An agreement was reached with CDPHE to leave these three valve vaults in place and contain the fixed contamination by completely filling the valve vault with flow fill. The remaining 11 valve vaults were backfilled with soil.
- The NPWL and supporting valves, pumps, and other equipment contained inside all valve vaults were completely removed.
- The potential sources of contamination related to NPWL that existed at activities or concentrations greater than RFCA WRW soil ALs were removed unless remediation was not required based on RFCA (DOE et al. 2003).
- Arsenic was the only residual contaminants remaining at a concentration greater than the RFCA WRW soil AL; however, remediation was not required according to RFCA (DOE et al. 2003).
- Backfilling of excavations and regrading has been completed.
- Final grading, surface stabilization, and revegetation of areas containing NPWL will be conducted as part of other projects.

All accelerated action objectives related to NPWL were achieved. Confirmation sampling results indicate activities and concentrations are less than RFCA WRW soil ALs. Results of the accelerated action justify No Further Accelerated Action (NFAA) for IHSS Group 000-4 and this justification is based on the following:

- The potential sources of contamination existing in soil at concentrations greater than RFCA WRW soil ALs, with the exception of arsenic at one location were removed, which did not require remediation based on RFCA.

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- All valve vaults associated with NPWL were either partially excavated and backfilled or flow filled, or were completely removed, thereby reducing the potential of future contaminant releases from these areas.
- Remaining NPWL has been rinsed, sampled for RCRA constituents, and shown to be RCRA-clean as identified in the RCRA Unit 374.3 Closure Report (DOE 2005h), further eliminating potential future releases of contamination.
- Residual radionuclide contaminant activities, related to or near former or left in place NPWL, are below RFCA WRW soil ALs.
- In accordance with the SSRS, subsurface soil in the area is not subject to significant erosion.

Currently, no Group-specific engineering controls or environmental monitoring are recommended as a result of the conditions remaining at IHSS Group 000-4. Likewise, no specific institutional or physical controls are recommended as a result of the conditions remaining at IHSS Group 000-4.

IHSS Group 000-4 will be evaluated as part of the Sitewide CRA. The CRA is part of the Remedial Investigation/Feasibility Study (RI/FS) that will be conducted for the Site.

The need for and extent of any more general, long-term stewardship activities will also be analyzed in the RI/FS and proposed as part of the preferred alternative in the Proposed Plan for the Site. Institutional controls and other long-term stewardship requirements for the Site will ultimately be contained in the Corrective Action Decision/Record of Decision (CAD/ROD). This Closeout Report and associated documentation will be retained as part of the Rocky Flats Administrative Record (AR) file.

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1.0 INTRODUCTION

This Closeout Report summarizes accelerated action activities conducted at Individual Hazardous Substance Site (IHSS) Group 000-4 at the Rocky Flats Environmental Technology Site (RFETS or Site) in Golden, Colorado. IHSS Group 000-4 consists of the New Process Waste Lines (NPWL).

In addition, NPWL was addressed in other IHSS Group investigations. Accelerated actions related to NPWL in other IHSS Groups are also presented in this NPWL Closeout Report. Other IHSS Groups that involved NPWL actions are listed in Table 1.

Table 1
Other IHSS Groups Addressing Accelerated Actions

IHSS Group	IABZSAP Addendum	ER RSOP Notification	Data Summary/ Closeout Report
000-1	#IA-02-07 (DOE 2002a)	#02-08 (DOE 2002b)	Closeout Report (DOE 2003a)
000-2	#IA-03-11 (DOE 2003b)	#03-14 (DOE 2003c)	Closeout Report (DOE 2005a)
100-4	#IA-02-01 (DOE 2001a)	#02-01 (DOE 2002c)	Closeout Report(DOE 2003d)
300-4	#IA-03-01 (DOE 2003e)	N/A	Data Summary Report (DOE 2003f)
400-6	#IA-03-14 (DOE 2003g)	N/A	Data Summary Report (DOE 2004a)
400-7	#IA-02-05 (DOE 2002d)	#02-06 (DOE 2002e)	Closeout Report (DOE 2004b)
500-1	#IA-04-03 (DOE 2003h)	#04-03 (DOE 2003i)	Data Summary Report (DOE 2004c)
500-3	#IA-03-12 (DOE 2003j)	#05-02 (DOE 2005b)	Closeout Report (DOE 2005c)
700-2	#IA-04-02 (DOE 2004d)	#04-05 (DOE 2004e)	Closeout Report (DOE 2005d)
700-3	#IA-03-04 (DOE 2003k)	#04-04 (DOE 2004f)	Closeout Report (DOE 2005e)
700-7	#IA-03-15 (DOE 2003l)	#03-10 (DOE 2003m)	Closeout Report (DOE 2004g)
700-10	#IA-04-07 (DOE 2004h)	#04-07 (DOE 2004i)	Data Summary Report (DOE 2004j)
800-1	#IA-03-01 (DOE 2003n)	#03-12 (DOE 2003o)	Closeout Report (DOE 2004k)
800-3	#IA-04-06 (DOE 2004l)	#05-04(DOE 2005f)	Closeout Report (DOE 2005g)
800-5	#IA-02-04 (DOE 2002f)	#02-05 (DOE 2002g)	Data Summary Report (DOE 2004m)
800-6	#IA-02-01 (DOE 2001b)	#02-02 (DOE 2002h)	Closeout Report (DOE 2003p)

NPWL was a permitted Resource Conservation and Recovery Act (RCRA) Unit and was closed in accordance with approved RCRA closure description documents (CDDs) (DOE 2002i and 2003q). Portions of the NPWL were cleaned and closed in place in accordance with the RCRA Part B Permit.

Approximately 21,500 feet (ft) of NPWL existed at the Site. Approximately 15,300 ft of NPWL were removed and 6,200 ft of NPWL were clean closed and left in place. During accelerated action activities, soil was collected from 147 locations near and along the NPWL. Twenty valve vaults were part of the NPWL network and six valve vaults were completely removed, three valve vaults were partially excavated and flow filled, and eleven valve vaults were partially excavated and backfilled with soil.

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The NPWL was a network of double-contained underground and aboveground pipelines and used to transport liquid waste streams to Building 374, Waste Treatment Operations. The NPWL transported a variety of waste streams and included the following:

- Laundry water,
- Nonradioactive and chemical laboratory waste,
- Uranium and beryllium waste,
- Radionuclides (americium-241 and plutonium-239/240)
- Polychlorinated biphenyls (PCBs),
- Solar Evaporation Pond (SEP) water,
- Incidental water,
- High nitrate waste from Building 774, and
- Utilities waste.

Accelerated action activities, including NPWL characterization and removal, were planned and executed in accordance with the Industrial Area (IA) Sampling and Analysis Plan (SAP) (IASAP) (DOE 2001c), the Environmental Restoration (ER) Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) for Routine Soil Remediation (ER RSOP) (DOE 2003r), and the IHSS Group 000-4 RSOP Notification #05-01 (DOE 2004n). In addition, several other IASAP Addenda and RSOP Notifications addressed NPWL related actions, and are referenced in Table 1.

This Closeout Report contains results from all IHSS 000-4 NPWL investigations. Soil samples from 147 locations are presented in this Closeout Report. In order to present these data in manageable groups, the Site was divided into 4 primary areas for this report. NPWL related accelerated action activities and results are presented for each of the following areas:

- 100/400 Area,
- 300/500 Area,
- 700 Area, and
- 800 Area.

The NPWL and associated valve vaults within these defined areas are shown on Figure 1.

This report contains the information necessary to demonstrate attainment of cleanup objectives and final closure of IHSS Group 000-4, including the following:

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- Site characterization information
  - Description of site characterization activities, and
  - Site characterization data, including data tables and maps;

- Site accelerated action information
  - Description of accelerated action, including the rationale for the action,
  - Map of the project area and dates and durations of specific remedial activities, and
  - Photographs documenting site remediation and reclamation activities;

- Confirmation sampling data, including data tables and location maps, as well as a comparison of the confirmation data to applicable cleanup goals;

- Deviations from the ER RSOP (DOE 2003r);

- The Subsurface Soil Risk Screen (SSRS);

- Near-term stewardship actions and long-term stewardship recommendations;

- Disposition of wastes;

- Site reclamation information;

- Table of No Longer Representative (NLR) locations that have been remediated. These data will be used to mark database records so they are not used in the CRA or other Site analyses; and

- Data Quality Assessment (DQA), including comparisons of confirmation data with project data quality objectives (DQOs).

- Approval of this Closeout Report constitutes regulatory agency concurrence that IHSS Group 000-4 is a No Further Accelerated Action (NFAA) Site. This information and NFAA determination will be documented in the Fiscal Year (FY) 2005 (05) Annual Update for the Historical Release Report (HRR).

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2.0 SITE CHARACTERIZATION

IHSS Group 000-4 characterization information consists of historical process knowledge and analytical data. Historical information for IHSS Group 000-4 was derived from the HRR and annual updates (DOE 1992-2004), the Industrial Area Data Summary Report (DOE 2000), and the IASAP (DOE 2001c) and is summarized in Section 2.1. Summaries of historical information from the other IHSS Groups listed in Table 1 are provided in Section 2.2. Accelerated action analytical data for IHSS Group 000-4 are summarized in Section 2.3.

The enclosed compact disc (CD) contains the complete accelerated action data set for IHSS Group 000-4, including NPWL-related data derived from other IHSS Groups. The CD includes standardized real and quality control (QC) data, including Chemical Abstracts Service (CAS) numbers, analyte names, and units.

2.1 Historical Information – IHSS Group 000-4 (NPWL)

As previously mentioned, the NPWL consisted of a network of double-contained underground and aboveground pipelines and tanks that transported liquid waste streams to Building 374, Waste Treatment Operations. The NPWL overlapped the OPWL in many places and, for the most part, replaced the Original Process Waste Line (OPWL) infrastructure. Installation of the NPWL was completed in 1984. Some of the OPWL lines were converted to NPWL.

Potential contaminants of concern (PCOCs) included acids, bases, solvents, radionuclides, PCBs, metals, oils, and photographic laboratory chemicals.

Releases from NPWL were documented at several PACs and are summarized below:

- Nitric acid (HNO_3), hydrofluoric acid, and hydrochloric acid (HCl) from Building 123 scrubber;
- Nitrate, radionuclides, and acids from Valve Vaults 11, 12, and 13; and
- Nitrate and radionuclides from process waste line leaks.

Spilled material from Building 123 was containerized and transferred into the Building 123 process waste system on November 7, 1989. Responses to occurrences at Valve Vaults 11, 12, and 13 have included repairing valve vaults and piping and removing contaminated soil. Contaminated soil from process waste line leaks was excavated and removed (DOE 1999).

These incidents are further described in Section 2.2.

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2.2 Historical Information – Other IHSS Groups

Historical information on other IHSS Groups where NPWL was addressed is described in Sections 2.2.1 through 2.2.15.

2.2.1 IHSS Group 000-1 – Solar Evaporation Ponds (SEP)

Solar Evaporation Ponds IHSS 000-101

NPWL in the SEP area consisted of an aboveground line, part of the NPWL system and RCRA Unit 374.3. Typically, water transferred from Building 910 to Building 774 (Figure 1) did not contain RCRA-contaminated wastewater.

Modular Storage Tanks (MSTs) were located north of the SEP (Figure 1) and tied to the NPWL system through the MST return line located east of the SEP (DOE 2003a). The MST return line conveyed water to Building 910; however, the return line was neither part of RCRA Unit 374.3 nor the NPWL system. Aboveground NPWL then conveyed water from Building 910 to Building 774.

During 1999, a temporary authorization was received to transfer decant water from the 750 Pad sludge removal project and cooling tower water from Building 779. The wastewater from the 750 Pad project contained concentrations of metals in the parts per billion (ppb) range and concentrations of methyl ethyl ketone in the parts per million (ppm) range. The cooling water from Building 779 was contaminated with arsenic (11 milligrams per liter [mg/L]). Upon completion of the transfer of this waste to Building 374, the transfer line was to be flushed, rinsed, and sampled and analyzed to ensure no residual contamination remained.

2.2.2 IHSS Group 000-2 (OPWL)

Building 123 Process Waste Line Break, PAC 100-602

On April 13, 1989, Valve Vault 17, located on Cottonwood Avenue between Buildings 443 and 444, was found flooded with approximately 1,200 gallons of aqueous waste. Subsequent investigation showed the source of the waste was a break in the process waste line in Manhole 1, south of Building 123. Leakage from the break had migrated into bedding material surrounding the pipe and ultimately reached Valve Vault 17 through either pipe bedding materials (soil), or a polyvinyl chloride (PVC) electrical conduit. Discharge of Building 123 process waste into the broken line was discontinued on April 18, 1989, five days after the release to Valve Vault 17 was first detected. The potentially affected area includes the process waste line between Manhole 2 and Valve Vault 18 (immediately south of Building 123), the process waste line between Valve Vaults 18 and 17, and soil around Valve Vaults 18 and 17. In July 1989, groundwater containing blue dye, used several months earlier to trace the release, was observed seeping into excavations around Valve Vault 18. According to one report, the release may also have reached the storm sewer system. Numerous detailed reports address these actions.

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The release consisted of Building 123 process waste. Based on typical daily quantities of wastes discharged from Building 123, the following materials were likely released to the environment:

- 25 gallons urine;
- 12.5 gallons HNO_3 (unknown concentration);
- 20 gallons HCl (unknown concentration);
- 1.5 pounds ammonium thiocyanate;
- 1.0 pound ammonium iodide; and
- 2.5 gallons ammonium hydroxide (unknown concentration).

The above materials would have been diluted in approximately 2,000 gallons of tap water.

Minor amounts of naturally occurring uranium were detected in soil and water samples collected after the release. Up to 140 picocuries per liter (pCi/L) alpha activity was recorded in samples of the waste from Valve Vault 17. One water sample from a manhole south of Building 123 also contained 8 percent ethylene glycol.

After process waste discharge to the broken line was discontinued, soil sampling was conducted to determine the source and extent of the release. A temporary aboveground line was installed, and a replacement underground line was planned for completion by June 1, 1989. The release was documented in Resource Conservation and Recovery Act (RCRA) Contingency Plan Implementation Report (CPIR) No. 89-003 and in Rocky Flats Plant Internal Investigation Report (IIR) No. 89-55. Because the affected area was near existing IHSSs scheduled for investigation and remediation activities, no cleanup was initiated at that time. The area was addressed later as part of the IHSS 000-2 OPWL project (DOE 2005a).

2.2.3 IHSS Group 100-4 – Under Building Contamination (UBC) 123 – Health Physics Laboratory

Waste Leaks IHSS 100-148

The eastern wing of Building 123 was encompassed by IHSS 148. Building 123 was constructed as a laboratory and was one of the first buildings at RFETS. When constructed, the building consisted of a north wing running east-west and an east wing running north-south. A west wing running north-south was added onto the western end of the north wing in the late 1960s (probably 1968) and an addition to the southern end of the east wing was added in approximately 1972.

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Persons interviewed for the CEARP Phase 1 document indicated that several small spills of nitrate-bearing wastes occurred around the outside of Building 123. These wastes may have contained radionuclides. Additionally, interviewees indicated that there were potential releases of nitrate-bearing wastes from the OPWL buried beneath Building 123. This pipeline was in use from the start of operations in Building 123 until the OPWL was replaced by the NPWL. The abandonment of the OPWL beneath Building 123 occurred no later than February 1975 when engineering drawings documented the abandonment of the OPWL system. The NPWL that replaced the OPWL consisted of either double-contained or overhead lines (DOE 2003d).

Surface soil samples were collected and analyzed as part of the Operable Unit (OU) 13 RCRA Facility Investigation/Remedial Investigation (RFI/RI). Thirty-four analytes were detected in the surface soil samples, including 26 inorganic compounds and 8 radionuclides. Eleven analytes exceeded background concentrations at a minimum of one sampling location throughout IHSS 148. Constituents that exceeded background concentrations were chromium, cobalt, copper, lead, nickel, strontium, zinc, americium-241, plutonium-239/240, uranium-233/234, and uranium-238. These data are available in the IA Data Summary Report (DOE 2000).

A soil gas survey was conducted on a 25-ft grid and samples were analyzed in the field using gas chromatography/mass spectrometry (GC/MS). Sixty-four soil gas locations were sampled and 13 samples contained volatile organic compound (VOC) levels in excess of the 1 micrograms per liter (μg/L) method detection limit (MDL). Benzene, toluene, ethylbenzene, xylene, and fuel constituents were detected in samples collected from the perimeter of Building 123 and within the east and west wings of the building. Trichlorofluoromethane was detected in nine samples distributed throughout the IHSS 148 area at levels up to 2.6 μg/L. Tetrachloroethene was detected at 1.5 μg/L in a sample collected east of Building 123.

2.2.4 IHSS Group 500-1

Valve Vaults 11, 12, and 13 IHSS 300-186

Valve Vaults 11, 12, and 13 (Figure 1) were located inline along the process waste line south of Building 374 and west of Building 552. Several incidents occurred in one or more of the valve vaults resulting in the release of process waste to the environment. Process waste lines connected the valve vaults and containment lines surrounded the pipes. In addition to the double-contained lines, the process waste lines were equipped with leak-detection sensors.

The first incident related to these valve vaults for which documentation was found was on June 12, 1985. Contractors excavating a drainage ditch along the southern side of the PA in the northeastern corner of the Building 371 parking lot broke the outer containment of four lines and the inner line of the low-level transfer line near Valve Vault 13. Soon after it was broken, pumping began from the process waste tanks in Building 460 to Building 374, allowing liquid to be released from the inner pipe. Details of the spill in 1985 indicated a pH of 5 and 6 on litmus paper with a laboratory analysis of 7.2. The process

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waste consisted of Oakite and distilled water. It was estimated at the time that 1,700 gallons of liquid were pumped, but only approximately 4.4 gallons were spilled onto the ground. The pipe was repaired after the 1985 incident. Investigation at that time revealed no radioactive contamination.

In June 1986, corrosion of a 1-inch-diameter hole in a black iron flange, which was connected to a stainless-steel piping system, caused a release of process waste into Valve Vault 13. The sump pump recirculated the liquid in the vault. The sensor alarm sounded but was not responded to until the next day. In June 1986, the black iron flange was replaced with a stainless-steel flange with no release of contamination. These repairs were thought to have contributed to the leak found in 1987, because the repairs were not compatible with the original design.

The June 1986 incident involved an acidic liquid waste that corroded the iron flange. In October 1986, the soil surrounding the pipe was saturated with a yellow liquid. Monitoring of the area disclosed alpha, beta, and uranium-238 contamination of up to 1.7×10^5, 5×10^4, and 9×10^2 pCi/L, respectively. Analytical results from water samples indicated the presence of americium, plutonium, uranium, total alpha activity, and total beta activity.

The process line between Valve Vault 12 and Valve Vault 13 was reported leaking on October 24, 1986. The process waste lines were designed to provide a constant slope between adjacent valve vaults to allow any liquid in the containment pipe to flow into a vault and trigger an alarm. No alarm sounded when the release occurred. It was determined at the time the leak occurred that the lines had been previously repaired and reworked in 1981 or 1982 and that they were replaced in a manner that did not allow drainage. Instead, a trap was created, allowing saturation of the bedding material and soil around the pipe.

After the leak had been detected in October 1986, an area 30 ft by 100 ft was excavated to locate the leak in the process waste lines. The repairs were completed on November 13, 1986. A series of small cofferdams was built to contain surface water and groundwater, and the collected fluids were eventually removed by a tank truck and placed in SEP 207-A. Approximately 24 waste boxes of radionuclide-contaminated sand and gravel were shipped off site for low-level radioactive disposal. Cleanup was completed on December 8, 1986, by reducing the radiation levels to slightly above background. The area was backfilled.

On June 1, 1987, a radioactive leak was discovered near Valve Vault 13 when contamination was found in the culvert drain collection basin. The leak was found to be in the high-level transfer line between Building 374 and Valve Vault 13. A radioactive acidic solution was released in the June 1987 incident. Analytical results from samples collected in the culvert drain collection basin showed 42,000 pCi/L gross alpha activity and 13,000 pCi/L gross beta activity.

In response to the culvert contamination in 1987, dikes were installed in the drain path to prohibit further draining. Liquids were drained from the transfer pipe and pumped to a

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mobile tanker. The culvert was taken out and soil was removed until both alpha and beta counts were below 250 counts per minute (cpm). A work order was submitted to install a leak-detection device; however, it is not known whether this was complete. The high- and low-level transfer lines were replaced with fibercast piping and repaired to the original design specifications.

On September 13, 1988, Valve Vault 12 was flooded with 1,700 gallons of high nitrate solution during transfer between Building 774 and Building 374. A connection at a tygon tube became separated which allowed the leak to occur.

In October 1989, a significant amount of liquid was found in Valve Vault 11, Valve Vault 12, and Valve Vault 13. The alarms had sounded in the Building 231 Pump House, Pump Station #1, and Valve Vault 19, but upon inspection no problems were found at these locations. The inspection continued and resulted in the discovery of liquid in Vaults 11, 12, and 13.

The liquid that leaked in 1989 was approximately 10,000 gallons of SEP water with a pH of 7.5 to 8.0. Analytical results of radioactivity levels indicated 3,122 to 7,134 pCi/L gross alpha activity.

A document written in May 1989 indicated that backfilling of an excavation at this valve vault would have to be delayed for over a year because of legalities in dealing with the contaminated waste. This excavation may be due to the flooding incident in 1988.

The supervisor of Building 374 ordered pumping stopped from Building 778 and Building 774 in response to the 1989 incident. The RCRA/Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) office was notified. The appropriate lockout/tagouts were provided on the valves in Valve Vault 12 and in the Building 231 Pump House. The liquid was removed and repairs to the line were completed by October 22, 1989. The line flow-tested successfully. A RCRA CPIR (89-015) was prepared and submitted on this incident.

2.2.5 IHSS Group 800-3

Valve Vault 2, PAC 800-1200

During a routine inspection of Valve Vault 2 on April 25, 1989, liquid was discovered in the leak detection collection bottle. The bottle was also leaking; therefore, the alarm was not sounded. The leak was coming from the south process transfer line that consisted of a 3-inch PVC Schedule 80 pipe inside a 6-inch polyethylene chase pipe (containment pipe). A pH check of the liquid indicated that the inner pipe, which originated from waste tanks in Building 883, was leaking. Three discharges had occurred through this line since the vault was last inspected (March 14, 1989), at which time no leaks were apparent.

Building 883 generated a process waste that was HNO_3 and/or rinsate water contaminated with depleted uranium. A pH check of the liquid showed a pH of 1 to 2. The waste was partially neutralized with roughly equal amounts of a KOH solution before it was

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discharged to Building 374 via Valve Vault 2. Total alpha activity measured 39,000,000 pCi/L.

Upon detection of the leak, discharge valves from the waste tanks in Building 883 were closed and locked out. Plumbing changes took place within 2 days after the leak was detected to ensure that no more transfers were made through the line. Hydrostatic testing of the inner line began on May 8, 1989, and continued through the month. Removal of the inner line began on May 29 and continued through June 2. Salt encrustations were found at the elbow where the process waste line exits the nitrad pickling operation room.

From June 5 to 9, 1989, the secondary chase pipe was hydrostatically tested. When it was found leaking, the line was inspected by electronic visual imaging on June15, 1989, to locate the leak. Soil sampling had not begun as of July 31, 1989.

Because the release amounts exceeded the reportable quantity, the event was reported to the National Response Center on June 15, 1989. A RCRA CPIR (Implementation Report No. 89-007) was submitted.

2.3 Accelerated Action Data

Soil characterization sampling targeting NPWL and locations near NPWL was conducted from January 2002 to July 2005. Samples collected as part of other IHSS Groups not specifically targeting NPWL but in close proximity to NPWL were included in this Closeout Report to provide more complete characterization data and support the rationale for NFAA. A total of 147 accelerated action soil characterization and confirmation sampling locations were sampled in IHSS Group 000-4. Soil characterization sampling locations conducted as part of the IHSS Group 000-4 project were selected to target valve vaults as they were removed, breaks in the pipeline containment, stained soil, and pipe joints, and sections of NPWL that could not be clean-closed (DOE 2004n). NPWL that were clean-closed under the RFETS RCRA Part B Permit did not require soil characterization sampling. Only two soil sampling locations contained contaminants at activities or concentrations greater than RFCA soil WRW ALs.

Accelerated action sampling and analyses of soil samples related to NPWL are summarized in Table 2. Accelerated action sampling specifications and deviations, including potential contaminants of concern (PCOCs) and media sampled from IHSS Group 000-4 and other IHSS Groups, are presented in Table 3.

Table 2
IHSS Group 000-4 Accelerated Action
Soil Sampling and Analysis Summary

Category	Planned Total	Actual Total
Number of Sampling Locations	N/A – An IHSS Group 000-4 IASAP Addendum does not exist; therefore, a planned total is not available. Samples were collected in accordance with the ER RSOP (DOE 2003r).	78 (from IHSS Group 000-4) 69 (additional locations collected under other IHSS Groups) 147 Combined Total

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Category	Planned Total	Actual Total
Number of Samples	N/A	95 (from IHSS Group 000-4) 150 (additional samples collected under other IHSS Groups) 245 Combined Total
Number of Metals Analyses (SW-846 6010/6010B or 6200)	N/A	140
Number of Radionuclide Analyses (alpha or gamma)	N/A	241
Number of SVOC Analyses (SW-846 8270B)	N/A	23
Number of VOC Analyses (SW-846 8260)	N/A	100
Number of Nitrate-N Analyses (SW9056 or E300.0)	N/A	20
Number of TRPH Analyses (SW8440)	N/A	41

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Table 3
IHSS Group 000-4 Accelerated Action Sampling Specifications and Deviations

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
100/400	000-4	BT38-007	749007.662	2081519.837	749147.516	2081576.589	Subsurface Soil	2.5-3.0	Radionuclides	Biased characterization sample on NPWL between B122 and VV-18.
100/400	000-4	BT39-011	749281.25	2081471.452	749156.534	2081519.041	Subsurface Soil	2.0-2.5	Radionuclides VOCs	Biased characterization sample on NPWL outside south wall of B122.
100/400	000-4	BT39-012	749280.814	2081471.67	749156.042	2081519.912	Subsurface Soil	2.0-2.5	Radionuclides	Biased characterization sample on NPWL outside south wall of B122.
100/400	000-4	BU37-000	748921.087	2081715.799	748920.237	2081722.336	Subsurface Soil	6.0-6.5	Metals Nitrate/Nitrite Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
100/400	100-4	BU38-002	749043.942	2081539.886	749039.101	2081729.023	Subsurface Soil	8.0	Radionuclides	(UBC 123 Radiological Health Physics Laboratory IHSS 100-148 Waste Leaks) Manhole 2
100/400	100-4	BU38-003	749034.393	2081540.754	749038.606	2081656.205	Subsurface Soil	7.0	Radionuclides	(UBC 123 Radiological Health Physics Laboratory IHSS 100-148 Waste Leaks)
100/400	100-4	BU38-004	749025.713	2081541.622	749068.933	2081652.691	Subsurface Soil	5.0	Radionuclides	(UBC 123 Radiological Health Physics Laboratory IHSS 100-148 Waste Leaks)
100/400	100-4	BU38-005	749017.9	2081541.622	749089.941	2081652.691	Subsurface Soil	5.0	Radionuclides	(UBC 123 Radiological Health Physics Laboratory IHSS 100-148 Waste Leaks) Southwestern Sump
100/400	100-4	BU38-006	749011.824	2081541.622	749103.451	2081652.691	Subsurface Soil	5.0	Radionuclides	(UBC 123 Radiological Health Physics Laboratory IHSS 100-148 Waste Leaks) Western Sump
100/400	100-4	BU38-007	749004.011	2081542.49	749145.413	2081652.691	Subsurface Soil	5.0	Radionuclides	(UBC 123 Radiological Health Physics Laboratory IHSS 100-148 Waste Leaks) Northern Sump on Western Side
100/400	100-4	BU38-008	748998.803	2081543.359	749124	2081652.691	Subsurface Soil	5.0	Radionuclides	(UBC 123 Radiological Health Physics Laboratory IHSS 100-148 Waste Leaks) West Process Line
100/400	000-2	BU38-017	748975.277	2081732.394	749003.637	2081729.928	Subsurface Soil	4.5-6.5	Metals Radionuclides VOCs	Biased characterization sample proposed in 000-2 IASAP Addendum. Near NPWL.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
100/400	000-4	BU38-019	749135.108	2081558.128	749135.169	2081586.404	Subsurface Soil	4.5-5.0	Metals Nitrate/Nitrite Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
100/400	000-4	BU38-020	749065.755	2081558.128	749065.678	2081587.89	Subsurface Soil	5.0-5.5	Metals Nitrate/Nitrite Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
100/400	000-4	BU38-021	748994.234	2081559.754	748997.43	2081591.845	Subsurface Soil	8.0-8.5	Metals Nitrate/Nitrite Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
100/400	000-4	BU38-022	748991.524	2081643.737	748997.442	2081643.727	Subsurface Soil	8.0-8.5	Metals Nitrate/Nitrite Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
100/400	000-4	BU38-023	749031.62	2081730.971	749031.684	2081730.914	Subsurface Soil	7.0-7.5	Metals Nitrate/Nitrite Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
100/400	000-4	BU38-024	748988.274	2081730.429	748992.582	2081729.187	Subsurface Soil	7.0-7.5	Metals Nitrate/Nitrite Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
100/400	000-4	BU38-025	748989.529	2081724.887	748999.138	2081585.488	Subsurface Soil	8.0-8.5	Radionuclides	Biased characterization sample on NPWL between B122 and VV-18.
100/400	000-4	BV37-000	748903.207	2081771.607	748903.948	2081785.943	Subsurface Soil	5.0-5.5	Metals Nitrate/Nitrite Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
100/400	000-4	BV38-015	749005.742	2081791.011	748995.92	2081725.553	Subsurface Soil	6.0-7.0	Radionuclides	Biased characterization sample at VV-18.
100/400	000-4	BV38-016	749005.863	2081791.286	749001.65	2081732.332	Subsurface Soil	7.0-7.5	Metals Radionuclides	Biased characterization sample at VV-18.
100/400	000-4	BV38-017	748998.364	2081791.429	748997.99	2081727.46	Subsurface Soil	7.5-8.0	Radionuclides	Biased characterization sample at VV-18.
100/400	400-7	BW38-009	749031.458	2082118.675	749194.732	2082215.962	Subsurface Soil	3.0-3.3	Metals Radionuclides VOCs	Confirmation location, biased location added to target NPWL.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
100/400	400-7	BX38-019	749071.034	2082185.886	749120.898	2082184.921	Subsurface Soil	16.5-17.5	Radionuclides TPH VOCs	Biased location to target IHSS 129 relocated 50 ft N and 6 ft W to avoid steam lines and fence. Collected sample from one interval shallower than planned due to equipment refusal; had only partial recovery.
100/400	400-7	BX38-040	749116.875	2082209.648	749116.885	2082209.629	Surface Soil Subsurface Soil	0.0-0.5 0.5-2.5 2.5-4.5 4.5-6.5	Radionuclides (4.5-6.5 only) TPH	Biased location added to target IHSS 129 to delineate TPH contamination.
100/400	400-7	BX38-043	N/A	N/A	749115.424	2082227.424	Surface Soil Subsurface Soil	0.0-0.5 0.5-2.5 2.5-4.5 4.5-6.5 6.5-8.5 8.5-10.5 10.5-12.5 14.5-16.5 16.5-18.5	TPH	Biased location added to target IHSS 129 to delineate TPH contamination. Partial Recovery at intervals 10.5-12.5 and 14.5-16.5.
100/400	400-7	BX38-045	N/A	N/A	749116.424	2082239.069	Surface Soil Subsurface Soil	0.0-0.5 0.5-2.5 2.5-4.5 4.5-6.5 6.5-8.5 8.5-10.5 10.5-12.5 12.5-14.5	TPH	Biased location added to target IHSS 129 to delineate TPH contamination.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
100/400	400-7	BX38-046	N/A	N/A	749122.157	2082306.395	Surface Soil Subsurface Soil	0.0-0.5 0.5-2.5 2.5-4.5 4.5-6.5 6.5-8.5 8.5-10.5 10.5-12.5 12.5-14.5 14.5-16.5 16.5-18.5 18.5-20.5 20.5-22.5	TPH	Biased location added to target IHSS 129 to delineate TPH contamination.
100/400	400-7	BX38-055	N/A	N/A	749121.465	2082167.028	Subsurface Soil	12.0-12.5	TPH	In-process sampling location for southern side of tank excavation.
100/400	000-4	BX38-057	749130.498	2082269.164	749131.037	2082262.706	Subsurface Soil	8.0-8.5	Metals Radionuclides TRPH VOCs	Biased characterization sample at end of removed NPWL east of VV-16.
100/400	400-6	BY37-019	748912.56	2082372.01	748912.542	2082372.031	Surface Soil Subsurface Soil	0.0-0.5 0.5-2.5	Metals Radionuclides VOCs (0.5-2.5 only)	No significant change in location.
100/400	400-7	BY38-011	749130.987	2082410.712	749131.623	2082416.427	Surface Soil Subsurface Soil	0.0-0.5 0.5-2.5 4.5-6.5	Metals Radionuclides SVOCs VOCs (except 0.0-0.5)	Biased location to target Valve Vault 20 relocated 1 ft N and 6 ft E to get adjacent to target. No change in depth intervals or analytes.
100/400	000-2	BY38-013	749011.899	2082413.46	749011.8503	2082413.426	Subsurface Soil	2.5-4.5	Metals Radionuclides VOCs	Biased characterization sample proposed in 000-2 IASAP Addendum. Near NPWL.
100/400	000-2	BY38-016	749024.733	2082498.011	749034.65	2082417.63	Subsurface Soil	4.0-4.5	Metals Radionuclides VOCs	Biased characterization sample. Proposed sampling at approximately 100 ft intervals along OPWL. Location is near NPWL.
100/400	400-7	BY38-042	N/A	N/A	749120.192	2082207.938	Subsurface Soil	18.0-18.2	TPH	Confirmation sampling location in the East Plume, center of western trench.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
100/400	400-7	BY38-046	N/A	N/A	749116.218	2082214.558	Subsurface Soil	16.0-16.2	TPH	Confirmation sampling location in the East Plume, Valve Vault 16.
100/400	400-7	BY39-011	N/A	N/A	749154.698	2082216.745	Subsurface Soil	8.0-8.2	TPH	Confirmation sampling location in the East Plume, northern side of western trench.
100/400	400-7	BY39-012	N/A	N/A	749123.69	2082285.659	Subsurface Soil	8.0-8.2	TPH	Confirmation sampling location in the East Plume, northern side of central trench.
100/400	400-7	BY39-013	N/A	N/A	749117.172	2082344.544	Subsurface Soil	5.0-5.2	TPH	Confirmation sampling location in the East Plume, northern side of eastern trench.
300/500	000-4	BX44-001	750311.094	2082316.857	749990.711	2082622.966	Subsurface Soil	7.0-7.5	Metals Radionuclides SVOCs VOCs	Biased characterization sample targeting repaired NPWL location.
300/500	500-1	BY43-000	749997.97	2082512.209	749998.061	2082512.216	Subsurface Soil	2.5-4.5 4.5-6.5	Metals Radionuclides	Statistical location; no significant change in location.
300/500	500-1	BY44-001	750196.913	2082536.659	750196.943	2082539.829	Surface Soil Subsurface Soil	0.0-0.5 2.5-4.5 4.5-6.5	Metals Radionuclides VOCs (except 0.0-0.5)	Statistical location; moved 3 ft east to be within 1 ft of NPWL.
300/500	000-4	BZ42-014	749948.579	2082543.239	750010.396	2082529.351	Subsurface Soil	3.0-3.3	Radionuclides	Biased characterization sample at VV-13.
300/500	000-4	BZ42-015	749939.17	2082584.014	750012.432	2082546.466	Subsurface Soil	3.0-3.3	Radionuclides	Biased characterization sample at VV-13.
300/500	000-4	BZ42-016	749920.35	2082554.217	750016.407	2082566.185	Subsurface Soil	3.0-3.3	Radionuclides	Biased characterization sample at VV-13.
300/500	500-1	BZ43-000	750001.545	2082550.257	750003.701	2082555.204	Subsurface Soil	14.5-16.5	Metals Radionuclides	Biased location targeted at NPWL and valve vault; moved 6 ft northeast to be within 1 ft of NPWL and valve vault.
300/500	500-1	BZ43-001	749988.175	2082553.796	749984.487	2082552.194	Subsurface Soil	14.5-16.5	Metals Radionuclides	Biased location targeted at NPWL and valve vault; moved 4 ft SW to be within 1 ft of NPWL and valve vault.
300/500	500-1	BZ43-002	749990.927	2082541.999	749984.512	2082542.177	Subsurface Soil	14.5-16.5	Metals Radionuclides	Biased location targeted at NPWL and valve vault; moved 6 ft south to be within 1 ft of NPWL.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
300/500	000-4	BZ43-003	749992.5	2082661.149	749998.611	2082658.815	Subsurface Soil	12.5-14.5	Metals Nitrate/Nitrite Radionuclides	Biased characterization sample at VV-12.
300/500	000-4	BZ43-004	749988.961	2082674.518	749980.463	2082674.206	Subsurface Soil	12.5-14.5	Metals Radionuclides	Biased characterization sample at VV-12.
300/500	500-1	BZ43-005	749991.714	2082604.916	749991.706	2082612.92	Subsurface Soil	6.5-8.5 8.5-10.5 10.5-11.0	Metals Radionuclides	Biased location targeted at NPWL and valve vault; moved 8 ft east to be within 1 ft of NPWL;10.5-11.0 interval shortened because of expanding clay.
300/500	500-1	BZ43-006	749991.714	2082577.39	749996.299	2082577.613	Subsurface Soil	6.5-8.5 8.5-10.5 10.5-12.5	Metals Radionuclides	Biased location targeted at NPWL; moved 4.6 ft north to be within 1 ft of NPWL.
300/500	500-1	BZ43-007	750017.016	2082542.758	750016.615	2082551.858	Subsurface Soil	2.5-4.5 4.5-6.5	Metals Radionuclides	Statistical location moved 9.1 ft east to be within 1 ft of NPWL.
300/500	500-1	BZ43-008	750052.995	2082541.538	750052.834	2082543.591	Subsurface Soil	2.5-4.5 4.5-6.5	Metals Radionuclides	Statistical location moved 2 ft east to be within 1 ft of NPWL.
300/500	500-1	BZ43-009	750088.975	2082540.318	750089.068	2082543.206	Subsurface Soil	2.5-4.5 4.5-6.5	Metals Radionuclides	Statistical location moved 3 ft east to be within 1 ft of NPWL.
300/500	500-1	BZ43-010	750124.954	2082539.099	750124.546	2082537.064	Subsurface Soil	3.0-4.5 5.5-6.5	Metals Radionuclides	Statistical location moved 2.1 ft west to be within 1 ft of NPWL; partial recovery from both intervals.
300/500	500-1	BZ43-011	750160.933	2082537.879	750160.767	2082541.063	Surface Soil Subsurface Soil	0.0-0.5 2.5-4.5 4.5-6.5	Metals Radionuclides VOCs (except 0.0-0.5)	Statistical location moved 3 ft east to be within 1 ft of NPWL.
300/500	000-4	BZ43-028	749998.075	2082547.714	749993.69	2082550.805	Subsurface Soil	10.0-12.0	Metals Radionuclides	Biased characterization sample at VV-13.
300/500	000-4	BZ43-029	750091.096	2082546.551	750091.64	2082545.318	Surface Soil Subsurface Soil	0.0-0.3 7.0-7.3	Metals (only 7.0-7.3) Radionuclides	Biased characterization sample on NPWL between B374 and VV-13.
300/500	000-4	BZ43-030	750117.909	2082727.203	749965.925	2082958.28	Surface Soil	0.0-0.5	Radionuclides	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	BZ43-031	749977.483	2082611.542	749993.612	2082623.816	Subsurface Soil	7.5-8.0	Radionuclides VOCs	Confirmation to BX44-001 hotspot excavation.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
300/500	000-4	BZ43-032	749973.638	2082611.457	749989.828	2082620.197	Subsurface Soil	7.5-8.0	Radionuclides VOCs	Confirmation to BX44-001 hotspot excavation.
300/500	000-4	BZ43-033	749977.569	2082616.242	749991.319	2082627.596	Subsurface Soil	7.5-8.0	Radionuclides VOCs	Confirmation to BX44-001 hotspot excavation.
300/500	000-4	BZ43-034	749973.381	2082616.499	749988.668	2082624.879	Subsurface Soil	7.5-8.0	Radionuclides VOCs	Confirmation to BX44-001 hotspot excavation.
300/500	000-4	BZ43-035	749975.518	2082613.935	749991.322	2082625.491	Subsurface Soil	8.0-8.3	Radionuclides VOCs	Confirmation to BX44-001 hotspot excavation.
300/500	000-4	BZ43-036	749975.421	2082611.361	749983.211	2082653.539	Subsurface Soil	9.0-10.0	Metals Radionuclides VOCs	Biased characterization sample at VV-12.
300/500	000-4	BZ43-037	749975.685	2082616.28	749978.049	2082584.689	Subsurface Soil	17.0-18.0	Metals Radionuclides VOCs	Biased characterization sample on NPWL between VV-12 and VV-13.
300/500	000-4	BZ43-038	749977.345	2082613.887	749935.063	2082618.401	Surface Soil	0.0-0.5	Radionuclides	Biased characterization sample added south of NPWL between VV-12 and VV-13.
300/500	000-4	BZ43-039	749974.969	2082611.333	749947.136	2082619.394	Surface Soil	0.0-0.5	Radionuclides	Biased characterization sample added south of NPWL between VV-12 and VV-13.
300/500	000-4	BZ43-040	749974.79	2082616.501	749957.983	2082621.421	Surface Soil	0.0-0.5	Radionuclides	Biased characterization sample added south of NPWL between VV-12 and VV-13.
300/500	000-4	BZ44-004	750180.628	2082546.551	750180.625	2082546.579	Subsurface Soil	8.0-9.0	Metals Radionuclides	Biased characterization sample on NPWL between B374 and VV-13.
300/500	000-4	BZ44-005	750268.998	2082545.389	750268.998	2082545.389	Subsurface Soil	8.0-9.0	Metals Radionuclides	Biased characterization sample on NPWL between B374 and VV-13.
300/500	000-4	BZ44-006	750346.903	2082545.389	750346.903	2082545.389	Subsurface Soil	9.0-10.0	Metals Radionuclides	Biased characterization sample on NPWL between B374 and VV-13.
300/500	300-4	BZ45-005	750448.241	2082550.26	750395.702	2082554.764	Subsurface Soil	6.5-8.0	Metals Radionuclides	No significant change. (Text to right from Data Summary, deviation calc shows 50 ft N-S difference??)
300/500	000-4	CA43-004	749983.849	2082925.197	749986.475	2082922.564	Subsurface Soil	0.5-2.5 2.5-4.5 4.5-6.5	VOCs	Biased characterization sample on NPWL between VV-11 and VV-12.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
300/500	000-4	CA43-016	749991.954	2082751.233	749987	2082750.904	Subsurface Soil	6.5-8.5 8.5-10.5 10.5-12.5	Metals Radionuclides	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	CA43-017	749990.165	2082858.01	749994.256	2082858.148	Subsurface Soil	7.0-8.5 8.5-10.5 10.5-12.5	Metals Radionuclides	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	CA43-022	749993.278	2082932.607	749991.994	2082932.164	Subsurface Soil	11.0-11.5	Metals Radionuclides SVOCs VOCs	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	CB42-024	749954.664	2083020.581	750004.392	2083035.033	Subsurface Soil	1.0-1.3	Radionuclides	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	CB43-000	749990.095	2083101.733	749977.418	2083102.468	Subsurface Soil	12.5-14.5	Metals Radionuclides	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	CB43-001	749993.016	2083113.661	749982.101	2083116.535	Subsurface Soil	12.5-14.5	Metals Radionuclides	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	CB43-008	749991.427	2083081.934	749999.464	2083081.648	Subsurface Soil	0.5-2.5 2.5-4.5 4.5-6.5	VOCs	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	CB43-019	749995.58	2083019.719	750001.842	2083034.524	Subsurface Soil	0.5-2.5 2.5-4.5 4.5-6.5	VOCs	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	CB43-024	749979.697	2082987.412	749968.219	2082987.888	Subsurface Soil	0.5-2.5 2.5-4.5 4.5-6.5	VOCs	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	CB43-029	749999.733	2082957.504	749999.691	2082957.557	Subsurface Soil	0.5-2.5 2.5-4.5 4.5-6.5	VOCs	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	CB43-047	749992.693	2083033.243	749994.87	2083032.476	Subsurface Soil	7.0-8.0	Metals Radionuclides	Biased characterization sample on NPWL between VV-11 and VV-12.
300/500	000-4	CB43-048	749992.438	2083033.579	749991.824	2082678.35	Subsurface Soil	9.0-11.0	Metals Radionuclides	Biased characterization sample at VV-12.
300/500	500-1	CC43-002	749987.275	2083144.15	749979.134	2083145.824	Subsurface Soil	0.5-2.5 2.5-4.5 4.5-6.5	VOCs	Statistical location; moved 8.3 ft south to avoid process waste line.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
300/500	500-1	CC43-004	749989.604	2083289.024	749993.004	2083295.733	Surface Soil Subsurface Soil	0.0-0.5 0.5-2.5 2.5-4.5 4.5-6.5	Metals Radionuclides VOCs (except 0.0-0.5)	Statistical location; moved 7.5 ft northeast to avoid manhole.
300/500	500-1	CC43-007	750002.522	2083255.422	750000.085	2083257.191	Subsurface Soil	4.5-6.5	Metals PCBs Radionuclides VOCs	Statistical location; moved 3.0 ft southeast to avoid underground line.
300/500	500-1	CC43-008	749979.881	2083227.433	749996.579	2083217.175	Subsurface Soil	4.5-6.5	Metals PCBs Radionuclides VOCs	Statistical location; moved 19.6 ft northwest to avoid underground utilities.
300/500	500-1	CC43-012	749992.798	2083193.831	750000.989	2083194.522	Subsurface Soil	4.5-6.5	Metals PCBs Radionuclides VOCs	Statistical location; moved 8.2 ft north to avoid underground (electrical?) line.
300/500	500-1	CC43-017	750005.716	2083160.228	750005.732	2083160.322	Subsurface Soil	4.5-6.5	Metals PCBs Radionuclides VOCs	Statistical location; no significant change in location.
300/500	000-4	CC43-037	749990.651	2083213.405	749993.099	2083213.455	Surface Soil	0.0-0.5	Metals Radionuclides VOCs	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
300/500	000-4	CD43-019	749989.567	2083348.32	749986.48	2083345.368	Subsurface Soil	6.0-6.3	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
300/500	000-4	CD43-020	749988.483	2083450.725	749982.466	2083450.059	Subsurface Soil	6.0-6.3	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
300/500	500-3	CD43-022	750026.257	2083533.487	750034.7971	2083549.844	Subsurface Soil	17.0-18.0	Radionuclides	Southern sidewall of Building 528 excavation. Sampled from excavator bucket.
300/500	500-3	CD43-024	750032.211	2083533.216	750059.3052	2083539.531	Subsurface Soil	20.0-21.0	Radionuclides	Center of Building 528 excavation. Sampled from excavator bucket.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
300/500	500-3	CD43-029	750032.799	2083434.543	750060.129	2083480.533	Subsurface Soil	20.0-22.0	Radionuclides	Characterization sample collected beneath Building 561 tank.
300/500	500-3	CE43-000	750051.504	2083563.59	750054.497	2083555.328	Subsurface Soil	6.5-7.1 8.5-10.1 10.5-11.5 12.5-14.0 14.7-15.8 16.5-18.5 18.5-20.5 20.5-22.4	Metals Radionuclides VOCs	Relocated (8.8 NW) to target OPWL and Building 528 basement. Location is near NPWL.
300/500	000-4	CE43-016	749987.4	2083549.879	749980.507	2083532.481	Subsurface Soil	10.0-10.3	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
300/500	000-4	CE43-017	749987.4	2083613.272	749982.981	2083613.917	Subsurface Soil	8.0-8.3	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
300/500	000-4	CK44-024	750305.679	2084842.195	750012.106	2082774.164	Subsurface Soil	7.5-8.0 9.0-10.5	Radionuclides	Biased location added under NPWL between Tanks 231A and 231B.
700	000-4	CE40-002	749485.669	2083688.044	749485.694	2083693.185	Subsurface Soil	10.0-10.5	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
700	000-4	CE40-003	749381.639	2083689.128	749386.308	2083693.923	Subsurface Soil	10.0-10.5	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
700	000-4	CE41-000	749687.77	2083686.961	749687.785	2083686.902	Surface Soil	0.0-0.3	Metals Radionuclides VOCs	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
700	000-4	CE41-001	749590.784	2083688.044	749591.811	2083688.335	Subsurface Soil	15.0-15.5	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
700	000-4	CE41-002	749641.072	2083695.278	749685.18	2083698.246	Subsurface Soil	4.5-5.0	Radionuclides	Biased characterization sample north of VV-7.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
700	700-2	CE42-001	749916.847	2083689.502	749916.871	2083700.012	Subsurface Soil	2.5-4.5 4.5-6.5	Metals Radionuclides SVOCs VOCs	Biased sample. Location moved approximately 4 ft northwest to target OPWL. Location is near NPWL.
700	000-4	CE42-007	749886.62	2083686.961	749886.632	2083686.922	Subsurface Soil	8.0-8.5	Metals Radionuclides VOCs	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
700	000-4	CE42-008	749788.008	2083687.503	749787.975	2083687.49	Surface Soil	0.0-0.3	Metals Radionuclides VOCs	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
700	000-4	CE43-018	750117.438	2083686.961	750117.343	2083686.975	Subsurface Soil	10.0-10.5	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
700	000-4	CE43-019	749986.858	2083685.877	749993.668	2083687.287	Subsurface Soil	8.5-8.8	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
700	700-10	CE44-027	750315.44	2083613.736	750315.278	2083616.844	Subsurface Soil	12.5-14.5 14.5-16.5 16.5-18.5 18.5-20.5 20.5-22.0	Radionuclides VOCs	Biased; targeted on down gradient side of building opposite tank; both alpha and gamma spectrometry samples collected in all intervals; radionuclide samples in lower three intervals not in SAP Addendum; moved 3.1 ft east to avoid building footer; 20.
700	700-10	CE44-028	750306.196	2083613.823	750305.834	2083616.561	Subsurface Soil	12.5-14.5 14.5-16.5 16.5-18.5 18.5-20.5 20.5-22.5	Radionuclides VOCs	Biased; targeted on down gradient side of building opposite pumps; both alpha and gamma spectrometry samples collected; radionuclide samples in lower three intervals not in SAP Addendum; moved 2.7 ft east to avoid building footer; no change in inter.
700	000-4	CE44-033	750246.392	2083686.419	750237.774	2083682.974	Subsurface Soil	8.0-8.5	Metals Radionuclides	Biased characterization sample at VV-9.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
700	700-3	CE46-013	750672.884	2083730.704	750672.685	2083745.663	Surface Soil Subsurface Soil	0.0-0.5 0.5-2.5 2.5-4.5 4.5-6.5	Metals Radionuclides SVOCs VOCs (except 0.0-0.5)	Statistical characterization location; no significant change in location; 1.0 ft of asphalt fill. No change in depth intervals and analytes.
700	000-4	CG39-005	749344.013	2084108.792	749365.098	2083668.014	Subsurface Soil	6.5-7.0	Radionuclides	Biased characterization sample south of VV-7.
700	000-1	CH46-049	750750.091	2084173.197	750821.314	2084185.802	Surface Soil	0.0-0.2	Radionuclides	Biased characterization on NPWL near SEP.
700	000-1	CH46-050	750750.036	2084190.488	750865.242	2084180.461	Surface Soil	0.0-0.2	Radionuclides	Biased characterization on NPWL near SEP.
700	700-7	CI46-010	750707.283	2084388.558	750714.914	2084387.386	Surface Soil	0.0-0.5	Metals Radionuclides	Statistical location; relocated 7.6 ft N and 1.2 ft W to stay clear of water line.
700	700-7	CI46-014	750721.54	2084421.614	750721.531	2084421.63	Surface Soil Subsurface Soil	0.0-0.5 0.5-2.5 2.5-4.5 4.5-6.5 6.5-8.5 8.5-10.5	Metals Radionuclides VOCs (except 0.0-0.5)	Statistical location; no significant change in location.
700	700-7	CJ46-021	750721.313	2084578.534	750721.296	2084578.532	Surface Soil Subsurface Soil	0.0-0.5 0.5-2.5 2.5-4.5 4.5-6.5 6.5-8.5 8.5-10.5	Metals Radionuclides VOCs (except 0.0-0.5)	Statistical location; no significant change in location.
800	000-2	BY38-039	N/A	N/A	749176.584	2083685.205	Subsurface Soil	4.5-5.5	Metals Radionuclides VOCs	Additional biased characterization sample. Near NPWL.
800	000-4	CE35-001	748508.758	2083698.339	748509.64	2083699.103	Subsurface Soil	7.0-8.0	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
800	000-4	CE35-002	748413.397	2083698.339	748415.116	2083698.702	Subsurface Soil	7.0-7.5	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
800	000-4	CE36-000	748703.273	2083698.339	748706.828	2083696.691	Subsurface Soil	6.0-6.5	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
800	000-4	CE36-001	748605.745	2083698.339	748599.467	2083698.729	Subsurface Soil	7.0-7.5	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
800	800-3	CE37-003	748896.018	2083698.033	748883.176	2083699.002	Subsurface Soil	20.0-22.0	Metals Radionuclides SVOCs VOCs	Biased location to target first native soil interval beneath valve vault; moved several times due to sampling refusal; final location was 13 ft south of planned location. Estimated depth to vault is 15 ft bgs; there is a 2-3 ft sump present and appr
800	000-4	CE37-009	748890.745	2083698.881	748883.468	2083698.825	Subsurface Soil	8.0-9.5	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
800	000-4	CE37-010	748793.758	2083698.339	748792.913	2083695.364	Subsurface Soil	6.0-7.0	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
800	000-4	CE37-011	748841.106	2083698.106	748854.008	2083702.66	Surface Soil	0.0-0.1	Radionuclides	Biased characterization sample south of VV-2.
800	000-4	CE39-005	749171.952	2083690.754	749168.87	2083694.922	Subsurface Soil	12.0-12.5	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
800	800-5	CF33-000	748124.84	2083824.359	748123.827	2083816.862	Subsurface Soil	16.5-18.5	Metals Radionuclides SVOCs VOCs	Moved outside of building because of concerns with groundwater beneath the building.
800	800-5	CF33-004	748101.172	2083838.062	748098.54	2083832.87	Subsurface Soil	16.9-17.4	Metals Radionuclides SVOCs VOCs	Location and depth interval were changed due to actual location of the OPWL. Location is near NPWL.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
800	800-5	CF33-010	748131.956	2083867.655	748131.956	2083867.655	Subsurface Soil	5.0-5.01	Metals Radionuclides SVOCs VOCs	Sample collected at "D" (4.5-6.5) interval instead of "E" (6.5-8.5) interval to target actual depth of OPWL. Depth interval represents a grab sample. Location is near NPWL.
800	800-5	CF33-011	748148.962	2083801.486	748143.538	2083807.896	Subsurface Soil	5.0-5.5	Metals Radionuclides SVOCs VOCs	Additional sampling location targeting OPWL. Location is near NPWL.
800	800-5	CF34-022	748184.54	2083801.565	748188.61	2083796.23	Subsurface Soil	25.0-25.5	Metals Radionuclides SVOCs VOCs	Additional sampling location targeting OPWL. Location is near NPWL.
800	000-2	CF35-040	748420.186	2083742.608	748428.797	2083736.401	Subsurface Soil	2.5-3.0	Radionuclides Metals VOCs	Additional biased characterization sample.
800	800-3	CF37-009	748892.487	2083738.648	748896.138	2083738.837	Subsurface Soil	4.5-6.5	Metals Radionuclides SVOCs VOCs	Biased location to target NPWL; moved 4 ft N to get closer to target. Planned depth was 14.5-16.5
800	000-4	CF37-030	748892.912	2083777.446	748906.485	2083792.508	Subsurface Soil	12.0-12.5	Metals Radionuclides	Biased characterization location along approximately 100' spacing intervals on NPWL to be removed
800	800-1	CF38-009	749093.76	2083883.326	749098.928	2083885.089	Subsurface Soil	4.5-4.8	Metals Radionuclides SVOCs VOCs	Biased location added under NPWL.
800	800-1	CF38-010	749093.444	2083935.543	749095.829	2083949.459	Subsurface Soil	4.5-4.8	Metals Radionuclides SVOCs VOCs	Biased location added under NPWL.
800	000-2	CF39-000	749171.374	2083881.998	749172.472	2083848.635	Subsurface Soil	6.0-6.1	Radionuclides Metals VOCs	Additional biased characterization sample. Near NPWL.

Area	IHSS Group	Location	Planned Northing	Planned Easting	Actual Northing	Actual Easting	Media	Actual Depth Interval (ft)	Actual Analytes	Comments/Deviations
800	800-1	CG38-033	749092.811	2084015.609	749095.774	2084017.949	Subsurface Soil	4.5-4.8	Metals Radionuclides SVOCs VOCs	Biased location added under NPWL.

Results of accelerated action characterization and confirmation sampling are discussed by area in Sections 2.3.1 through 2.3.4. Analytical results for all accelerated action characterization, in-process, and confirmation samples are presented in Table 4. In addition, analytical results with activities or concentrations greater than RFCA WRW soil AL exceedances are identified with bold text in Table 4.

2.3.1 100/400 Area

The 100/400 Area includes samples collected as part of IHSS Groups 000-2, 000-4, 100-4, and 400-7 investigations. During sampling activities, 35 characterization and 5 confirmation locations were sampled. None of the soil samples collected from the 100/400 Area contained contaminants at activities or concentrations greater than RFCA WRW soil ALs. Analytical results of soil characterization sampling with concentrations greater than background means plus two standard deviations or reporting limits (RLs) are shown on Figure 2.

Confirmation samples were collected as part of the IHSS Group 400-7 project near Valve Vault 16 during soil excavation activities. None of the samples contained contaminants at activities or concentrations greater than RFCA WRW soil ALs.

2.3.2 300/500 Area

The 300/500 Area includes samples collected as part of IHSS Group 000-4, 300-4, 500-1, and 500-3 projects. Sixty-four locations were sampled in the 300/500 Area including 59 characterization locations and 5 confirmation locations.

Radionuclides were detected at one location at activities greater than there respective RFCA WRW soil ALs. Sample location BX44-001 contained americium-241 (566.5 pCi/g), plutonium-239/240 (3,290.1 pCi/g), uranium-234 (2,056 pCi/g), uranium-235 (27.41 pCi/g), and uranium-238 (2,056 pCi/g).

Remediation of radionuclide-contaminated soil was required at sample location BX44-001. NPWL at this location had been repaired with a stainless steel sleeve and was observed to be leaking at one end of the sleeve. Removal activities conducted as part of the IHSS Group 000-4 project are described in Section 4.4. Analytical results of soil characterization sampling with concentrations greater than background means plus two standard deviations or RLs are shown on Figure 3.

2.3.3 700 Area

The 700 Area contains NPWL-related soil samples collected under IHSS Group 000-1, 000-4, 700-2, 700-3, 700-7, and 700-10 ER projects. Soil samples were collected at 24 locations related to NPWL in the 700 Area. Sample location CI40-6014 had a plutonium-239/240 activity of 284.7 pCi/g at a depth of 0.5 to 2.5 ft. NPWL at this location was above ground therefore deeper intervals were not evaluated as part of NPWL. This location was remediated as part of the IHSS Group 700-7 (UBC 779) accelerated action. No other contaminants were reported with activities or concentrations greater than RFCA WRW soil ALs as shown on Figure 4.

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Table 4
IHSS Group 000-4 Accelerated Action Soil Characterization Sampling Results Greater Than Background Means Plus Two Standard Deviations or RLs

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
100/400	000-4	BT38-007	749147.516	2081576.589	2.50	3.00	Uranium-235	0.189	8	0.120	-	pCi/g
100/400	000-4	BT38-007	749147.516	2081576.589	2.50	3.00	Uranium-238	2.619	351	1.490	-	pCi/g
100/400	100-4	BU38-002	749039.101	2081729.023	8.00	8.01	Americium-241	0.035	76	0.020	-	pCi/g
100/400	100-4	BU38-004	749068.933	2081652.691	0.00	0.17	Americium-241	0.046	76	0.023	-	pCi/g
100/400	100-4	BU38-004	749068.933	2081652.691	0.00	0.17	Uranium-235	0.128	8	0.094	-	pCi/g
100/400	100-4	BU38-005	749089.941	2081652.691	5.00	5.01	Americium-241	0.050	76	0.020	-	pCi/g
100/400	000-2	BU38-017	749003.637	2081729.928	4.50	6.50	Aluminum	40000.000	228000	35373.170	-	mg/kg
100/400	000-4	BU38-020	749065.678	2081587.89	5.00	5.50	Zinc	190.000	307000	73.760	-	mg/kg
100/400	000-4	BU38-023	749031.684	2081730.914	7.00	7.50	Aluminum	19000.000	228000	16902.000	-	mg/kg
100/400	000-4	BU38-023	749031.684	2081730.914	7.00	7.50	Chromium	19.000	268	16.990	-	mg/kg
100/400	000-4	BU38-023	749031.684	2081730.914	7.00	7.50	Lithium	13.000	20400	11.550	-	mg/kg
100/400	000-4	BU38-023	749031.684	2081730.914	7.00	7.50	Nickel	16.000	20400	14.910	-	mg/kg
100/400	000-4	BU38-025	748999.138	2081585.488	8.00	8.50	Uranium-235	0.168	8	0.094	-	pCi/g
100/400	000-4	BV38-016	749001.65	2081732.332	7.00	7.50	Barium	1230.000	26400	289.380	-	mg/kg
100/400	400-7	BW38-009	749194.732	2082215.962	3.00	3.30	Acetone	6.800	102000000	-	4.600	ug/kg
100/400	000-4	BX44-001	749990.711	2082622.966	7.00	7.50	2-Methylnaphthalene	1100.000	20400000	-	22.000	ug/kg
100/400	**000-4**	**BX44-001**	**749990.711**	**2082622.966**	**7.00**	**7.50**	**Americium-241**	**566.500**	**76**	**0.020**	**-**	**pCi/g**
100/400	000-4	BX44-001	749990.711	2082622.966	7.00	7.50	Barium	954.000	26400	289.380	-	mg/kg
100/400	000-4	BX44-001	749990.711	2082622.966	7.00	7.50	bis(2-Ethylhexyl)phthalate	140.000	1970000	-	35.000	ug/kg
100/400	000-4	BX44-001	749990.711	2082622.966	7.00	7.50	Fluorene	57.000	40800000	-	21.000	ug/kg
100/400	000-4	BX44-001	749990.711	2082622.966	7.00	7.50	Mercury	13.800	25200	1.520	-	mg/kg
100/400	000-4	BX44-001	749990.711	2082622.966	7.00	7.50	Naphthalene	1400.000	3090000	-	535.000	ug/kg
100/400	***000-4***	***BX44-001***	***749990.711***	***2082622.966***	***7.00***	***7.50***	***Plutonium-239/240***	***3229.050***	***50***	***0.020***	-	***pCi/g***
100/400	***000-4***	***BX44-001***	***749990.711***	***2082622.966***	***7.00***	***7.50***	***Uranium-234***	***2056.000***	***300***	***2.640***	-	***pCi/g***
100/400	**000-4**	**BX44-001**	**749990.711**	**2082622.966**	**7.00**	**7.50**	**Uranium-235**	**27.410**	**8**	**0.120**	-	**pCi/g**
100/400	**000-4**	**BX44-001**	**749990.711**	**2082622.966**	**7.00**	**7.50**	**Uranium-238**	**2056.000**	**351**	**1.490**	-	**pCi/g**

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
100/400	*400-6*	*BY37-019*	*748912.542*	*2082372.031*	*0.00*	*0.50*	*Uranium-234*	*2.802*	*300*	*2.253*	-	*pCi/g*
100/400	400-6	BY37-019	748912.542	2082372.031	0.00	0.50	Uranium-235	0.169	8	0.094	-	pCi/g
100/400	400-6	BY37-019	748912.542	2082372.031	0.00	0.50	Uranium-238	2.802	351	2.000	-	pCi/g
100/400	*400-6*	*BY37-019*	*748912.542*	*2082372.031*	*0.50*	*2.50*	*Uranium-234*	*2.717*	*300*	*2.640*	-	*pCi/g*
100/400	400-6	BY37-019	748912.542	2082372.031	0.50	2.50	Uranium-235	0.248	8	0.120	-	pCi/g
100/400	400-6	BY37-019	748912.542	2082372.031	0.50	2.50	Uranium-238	2.717	351	1.490	-	pCi/g
100/400	400-7	BY38-011	749131.623	2082416.427	0.50	2.50	Fluoranthene	53.000	27200000	-	43.000	ug/kg
100/400	400-7	BY38-011	749131.623	2082416.427	0.50	2.50	Uranium-235	0.175	8	0.120	-	pCi/g
100/400	400-7	BY38-011	749131.623	2082416.427	4.50	6.50	Benzo(a)anthracene	44.000	34900	-	42.000	ug/kg
100/400	400-7	BY38-011	749131.623	2082416.427	4.50	6.50	Chrysene	51.000	3490000	-	37.000	ug/kg
100/400	400-7	BY38-011	749131.623	2082416.427	4.50	6.50	Fluoranthene	100.000	27200000	-	42.000	ug/kg
100/400	400-7	BY38-011	749131.623	2082416.427	4.50	6.50	Pyrene	110.000	22100000	-	60.000	ug/kg
100/400	400-7	BY38-011	749131.623	2082416.427	4.50	6.50	Uranium-235	0.173	8	0.120	-	pCi/g
100/400	000-2	BY38-013	749011.8503	2082413.426	2.50	4.50	Aluminum	80000.000	228000	35373.170	-	mg/kg
100/400	000-2	BY38-013	749011.8503	2082413.426	2.50	4.50	Arsenic	21.000	22.2	13.140	-	mg/kg
100/400	000-2	BY38-013	749011.8503	2082413.426	2.50	4.50	Lithium	50.000	20400	34.660	-	mg/kg
100/400	000-2	BY38-013	749011.8503	2082413.426	2.50	4.50	Toluene	12.600	31300000	-	5.480	ug/kg
100/400	*000-2*	*BY38-013*	*749011.8503*	*2082413.426*	*2.50*	*4.50*	*Uranium-234*	*3.990*	*300*	*2.640*	-	*pCi/g*
100/400	000-2	BY38-013	749011.8503	2082413.426	2.50	4.50	Uranium-235	0.242	8	0.120	-	pCi/g
100/400	000-2	BY38-013	749011.8503	2082413.426	2.50	4.50	Uranium-238	3.990	351	1.490	-	pCi/g
100/400	000-2	BY38-013	749011.8503	2082413.426	2.50	4.50	Vanadium	120.000	7150	88.490	-	mg/kg
100/400	000-2	BY38-016	749034.65	2082417.63	4.00	4.50	Acetone	9.600	102000000	-	5.600	ug/kg
300/500	500-1	BY44-001	750196.943	2082539.829	0.00	0.50	Copper	24.000	40900	18.060	-	mg/kg
300/500	500-1	BY44-001	750196.943	2082539.829	0.00	0.50	Manganese	460.000	3480	365.080	-	mg/kg
300/500	*500-1*	*BY44-001*	*750196.943*	*2082539.829*	*0.00*	*0.50*	*Uranium-234*	*2.587*	*300*	*2.253*	-	*pCi/g*
300/500	500-1	BY44-001	750196.943	2082539.829	0.00	0.50	Uranium-235	0.227	8	0.094	-	pCi/g
300/500	500-1	BY44-001	750196.943	2082539.829	0.00	0.50	Uranium-238	2.587	351	2.000	-	pCi/g
300/500	500-1	BY44-001	750196.943	2082539.829	2.50	4.50	Uranium-235	0.197	8	0.120	-	pCi/g
300/500	500-1	BY44-001	750196.943	2082539.829	4.50	6.50	Uranium-235	0.154	8	0.120	-	pCi/g
300/500	500-1	BY44-001	750196.943	2082539.829	4.50	6.50	Uranium-238	1.929	351	1.490	-	pCi/g

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
300/500	000-4	BZ42-014	750010.396	2082529.351	3.00	3.30	Uranium-234	3.214	300	2.640	-	pCi/g
300/500	000-4	BZ42-014	750010.396	2082529.351	3.00	3.30	Uranium-235	0.183	8	0.120	-	pCi/g
300/500	000-4	BZ42-014	750010.396	2082529.351	3.00	3.30	Uranium-238	3.214	351	1.490	-	pCi/g
300/500	000-4	BZ42-015	750012.432	2082546.466	3.00	3.30	Uranium-234	2.902	300	2.640	-	pCi/g
300/500	000-4	BZ42-015	750012.432	2082546.466	3.00	3.30	Uranium-238	2.902	351	1.490	-	pCi/g
300/500	000-4	BZ42-016	750016.407	2082566.185	3.00	3.30	Uranium-234	3.504	300	2.640	-	pCi/g
300/500	000-4	BZ42-016	750016.407	2082566.185	3.00	3.30	Uranium-235	0.191	8	0.120	-	pCi/g
300/500	000-4	BZ42-016	750016.407	2082566.185	3.00	3.30	Uranium-238	3.504	351	1.490	-	pCi/g
300/500	500-1	BZ43-000	750003.701	2082555.204	14.50	16.50	Uranium-234	5.553	300	2.640	-	pCi/g
300/500	500-1	BZ43-000	750003.701	2082555.204	14.50	16.50	Uranium-235	0.361	8	0.120	-	pCi/g
300/500	500-1	BZ43-000	750003.701	2082555.204	14.50	16.50	Uranium-238	5.553	351	1.490	-	pCi/g
300/500	500-1	BZ43-001	749984.487	2082552.194	14.50	16.50	Uranium-234	5.132	300	2.640	-	pCi/g
300/500	500-1	BZ43-001	749984.487	2082552.194	14.50	16.50	Uranium-235	0.244	8	0.120	-	pCi/g
300/500	500-1	BZ43-001	749984.487	2082552.194	14.50	16.50	Uranium-238	5.132	351	1.490	-	pCi/g
300/500	500-1	BZ43-002	749984.512	2082542.177	14.50	16.50	Uranium-234	5.616	300	2.640	-	pCi/g
300/500	500-1	BZ43-002	749984.512	2082542.177	14.50	16.50	Uranium-235	0.307	8	0.120	-	pCi/g
300/500	500-1	BZ43-002	749984.512	2082542.177	14.50	16.50	Uranium-238	5.616	351	1.490	-	pCi/g
300/500	000-4	BZ43-003	749998.611	2082658.815	12.50	14.50	Uranium, Total	9.900	2750	3.040	-	mg/kg
300/500	000-4	BZ43-003	749998.611	2082658.815	12.50	14.50	Uranium-238	2.950	351	1.490	-	pCi/g
300/500	000-4	BZ43-004	749980.463	2082674.206	12.50	14.50	Uranium-234	4.093	300	2.640	-	pCi/g
300/500	000-4	BZ43-004	749980.463	2082674.206	12.50	14.50	Uranium-235	0.229	8	0.120	-	pCi/g
300/500	000-4	BZ43-004	749980.463	2082674.206	12.50	14.50	Uranium-238	4.093	351	1.490	-	pCi/g
300/500	500-1	BZ43-005	749991.706	2082612.92	6.50	8.50	Uranium-234	3.076	300	2.640	-	pCi/g
300/500	500-1	BZ43-005	749991.706	2082612.92	6.50	8.50	Uranium-235	0.170	8	0.120	-	pCi/g
300/500	500-1	BZ43-005	749991.706	2082612.92	6.50	8.50	Uranium-238	3.076	351	1.490	-	pCi/g
300/500	500-1	BZ43-005	749991.706	2082612.92	8.50	10.50	Uranium-234	3.914	300	2.640	-	pCi/g
300/500	500-1	BZ43-005	749991.706	2082612.92	8.50	10.50	Uranium-235	0.190	8	0.120	-	pCi/g
300/500	500-1	BZ43-005	749991.706	2082612.92	8.50	10.50	Uranium-238	3.914	351	1.490	-	pCi/g
300/500	500-1	BZ43-005	749991.706	2082612.92	10.50	11.00	Uranium-234	4.672	300	2.640	-	pCi/g
300/500	500-1	BZ43-005	749991.706	2082612.92	10.50	11.00	Uranium-235	0.283	8	0.120	-	pCi/g

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
300/500	500-1	BZ43-005	749991.706	2082612.92	10.50	11.00	Uranium-238	4.672	351	1.490	-	pCi/g
300/500	*500-1*	*BZ43-006*	*749996.299*	*2082577.613*	*6.50*	*8.50*	*Uranium-234*	*4.604*	*300*	*2.640*	-	*pCi/g*
300/500	500-1	BZ43-006	749996.299	2082577.613	6.50	8.50	Uranium-235	0.212	8	0.120	-	pCi/g
300/500	500-1	BZ43-006	749996.299	2082577.613	6.50	8.50	Uranium-238	4.604	351	1.490	-	pCi/g
300/500	*500-1*	*BZ43-006*	*749996.299*	*2082577.613*	*8.50*	*10.50*	*Uranium-234*	*5.199*	*300*	*2.640*	-	*pCi/g*
300/500	500-1	BZ43-006	749996.299	2082577.613	8.50	10.50	Uranium-238	5.199	351	1.490	-	pCi/g
300/500	*500-1*	*BZ43-006*	*749996.299*	*2082577.613*	*10.50*	*12.50*	*Uranium-234*	*4.462*	*300*	*2.640*	-	*pCi/g*
300/500	500-1	BZ43-006	749996.299	2082577.613	10.50	12.50	Uranium-235	0.201	8	0.120	-	pCi/g
300/500	500-1	BZ43-006	749996.299	2082577.613	10.50	12.50	Uranium-238	4.462	351	1.490	-	pCi/g
300/500	500-1	BZ43-007	750016.615	2082551.858	2.50	4.50	Arsenic	13.300	22.2	13.140	-	mg/kg
300/500	500-1	BZ43-007	750016.615	2082551.858	2.50	4.50	Barium	1300.000	26400	289.380	-	mg/kg
300/500	500-1	BZ43-007	750016.615	2082551.858	2.50	4.50	Uranium-235	0.127	8	0.120	-	pCi/g
300/500	500-1	BZ43-007	750016.615	2082551.858	4.50	6.50	Barium	1110.000	26400	289.380	-	mg/kg
300/500	500-1	BZ43-008	750052.834	2082543.591	2.50	4.50	Uranium-235	0.145	8	0.120	-	pCi/g
300/500	500-1	BZ43-008	750052.834	2082543.591	4.50	6.50	Uranium-238	1.990	351	1.490	-	pCi/g
300/500	*500-1*	*BZ43-009*	*750089.068*	*2082543.206*	*2.50*	*4.50*	*Uranium-234*	*4.872*	*300*	*2.640*	-	*pCi/g*
300/500	500-1	BZ43-009	750089.068	2082543.206	2.50	4.50	Uranium-235	0.190	8	0.120	-	pCi/g
300/500	500-1	BZ43-009	750089.068	2082543.206	2.50	4.50	Uranium-238	4.872	351	1.490	-	pCi/g
300/500	*500-1*	*BZ43-009*	*750089.068*	*2082543.206*	*4.50*	*6.50*	*Uranium-234*	*3.456*	*300*	*2.640*	-	*pCi/g*
300/500	500-1	BZ43-009	750089.068	2082543.206	4.50	6.50	Uranium-235	0.248	8	0.120	-	pCi/g
300/500	500-1	BZ43-009	750089.068	2082543.206	4.50	6.50	Uranium-238	3.456	351	1.490	-	pCi/g
300/500	500-1	BZ43-010	750124.546	2082537.064	3.00	4.50	Uranium-235	0.217	8	0.120	-	pCi/g
300/500	500-1	BZ43-010	750124.546	2082537.064	3.00	4.50	Uranium-238	1.638	351	1.490	-	pCi/g
300/500	500-1	BZ43-011	750160.767	2082541.063	2.50	4.50	Acetone	6.500	102000000	-	5.200	ug/kg
300/500	000-4	BZ43-028	749993.69	2082550.805	10.00	12.00	Americium-241	0.206	76	0.020	-	pCi/g
300/500	000-4	BZ43-028	749993.69	2082550.805	10.00	12.00	Plutonium-239/240	0.446	50	0.020	-	pCi/g
300/500	000-4	BZ43-029	750091.64	2082545.318	0.00	0.30	Americium-241	1.140	76	0.023	-	pCi/g
300/500	000-4	BZ43-029	750091.64	2082545.318	0.00	0.30	Plutonium-239/240	0.489	50	0.066	-	pCi/g
300/500	000-4	BZ43-029	750091.64	2082545.318	0.00	0.30	Uranium-235	0.445	8	0.094	-	pCi/g
300/500	000-4	BZ43-029	750091.64	2082545.318	0.00	0.30	Uranium-238	2.720	351	2.000	-	pCi/g

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
300/500	000-4	BZ43-029	750091.64	2082545.318	7.00	7.30	Americium-241	0.758	76	0.020	-	pCi/g
300/500	*000-4*	*BZ43-029*	*750091.64*	*2082545.318*	*7.00*	*7.30*	*Plutonium-239/240*	*4.318*	*50*	*0.020*	-	*pCi/g*
300/500	000-4	BZ43-029	750091.64	2082545.318	7.00	7.30	Uranium, Total	8.600	2750	3.040	-	mg/kg
300/500	*000-4*	*BZ43-029*	*750091.64*	*2082545.318*	*7.00*	*7.30*	*Uranium-234*	*5.115*	*300*	*2.640*	-	*pCi/g*
300/500	000-4	BZ43-029	750091.64	2082545.318	7.00	7.30	Uranium-235	0.201	8	0.120	-	pCi/g
300/500	000-4	BZ43-029	750091.64	2082545.318	7.00	7.30	Uranium-238	5.115	351	1.490	-	pCi/g
300/500	*000-4*	*BZ43-030*	*749965.925*	*2082958.28*	*0.00*	*0.50*	*Uranium-234*	*3.939*	*300*	*2.253*	-	*pCi/g*
300/500	000-4	BZ43-030	749965.925	2082958.28	0.00	0.50	Uranium-235	0.188	8	0.094	-	pCi/g
300/500	000-4	BZ43-030	749965.925	2082958.28	0.00	0.50	Uranium-238	3.939	351	2.000	-	pCi/g
300/500	*000-4*	*BZ43-036*	*749983.211*	*2082653.539*	*9.00*	*10.00*	*Uranium-234*	*3.925*	*300*	*2.640*	-	*pCi/g*
300/500	000-4	BZ43-036	749983.211	2082653.539	9.00	10.00	Uranium-235	0.214	8	0.120	-	pCi/g
300/500	000-4	BZ43-036	749983.211	2082653.539	9.00	10.00	Uranium-238	3.925	351	1.490	-	pCi/g
300/500	*000-4*	*BZ43-037*	*749978.049*	*2082584.689*	*17.00*	*18.00*	*Uranium-234*	*3.468*	*300*	*2.640*	-	*pCi/g*
300/500	000-4	BZ43-037	749978.049	2082584.689	17.00	18.00	Uranium-238	3.468	351	1.490	-	pCi/g
300/500	*000-4*	*BZ43-038*	*749935.063*	*2082618.401*	*0.00*	*0.50*	*Uranium-234*	*3.545*	*300*	*2.640*	-	*pCi/g*
300/500	000-4	BZ43-038	749935.063	2082618.401	0.00	0.50	Uranium-235	0.167	8	0.120	-	pCi/g
300/500	000-4	BZ43-038	749935.063	2082618.401	0.00	0.50	Uranium-238	3.545	351	1.490	-	pCi/g
300/500	000-4	BZ43-039	749947.136	2082619.394	0.00	0.50	Americium-241	0.218	76	0.020	-	pCi/g
300/500	*000-4*	*BZ43-039*	*749947.136*	*2082619.394*	*0.00*	*0.50*	*Plutonium-239/240*	*1.240*	*50*	*0.020*	-	*pCi/g*
300/500	000-4	BZ43-040	749957.983	2082621.421	0.00	0.50	Uranium-235	0.213	8	0.120	-	pCi/g
300/500	300-4	BZ45-005	750395.702	2082554.764	6.50	8.50	Barium	822.000	26400	289.380	-	mg/kg
300/500	*300-4*	*BZ45-005*	*750395.702*	*2082554.764*	*6.50*	*8.50*	*Uranium-234*	*5.315*	*300*	*2.640*	-	*pCi/g*
300/500	300-4	BZ45-005	750395.702	2082554.764	6.50	8.50	Uranium-235	0.312	8	0.120	-	pCi/g
300/500	300-4	BZ45-005	750395.702	2082554.764	6.50	8.50	Uranium-238	5.315	351	1.490	-	pCi/g
300/500	300-4	BZ45-005	750395.702	2082554.764	6.50	8.50	Vanadium	137.000	7150	88.490	-	mg/kg
300/500	000-4	CA43-016	749987	2082750.904	6.50	8.50	Barium	769.000	26400	289.380	-	mg/kg
300/500	000-4	CA43-016	749987	2082750.904	8.50	10.50	Barium	1000.000	26400	289.380	-	mg/kg
300/500	000-4	CA43-016	749987	2082750.904	8.50	10.50	Uranium-235	0.135	8	0.120	-	pCi/g
300/500	000-4	CA43-016	749987	2082750.904	8.50	10.50	Vanadium	89.600	7150	88.490	-	mg/kg
300/500	000-4	CA43-016	749987	2082750.904	10.50	12.50	Barium	1110.000	26400	289.380	-	mg/kg

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
300/500	000-4	CA43-016	749987	2082750.904	10.50	12.50	Iron	41200.000	307000	41046.520	-	mg/kg
300/500	000-4	CA43-016	749987	2082750.904	10.50	12.50	Strontium	216.000	613000	211.380	-	mg/kg
300/500	000-4	CA43-016	749987	2082750.904	10.50	12.50	Uranium-238	1.723	351	1.490	-	pCi/g
300/500	000-4	CA43-016	749987	2082750.904	10.50	12.50	Vanadium	98.500	7150	88.490	-	mg/kg
300/500	000-4	CA43-017	749994.256	2082858.148	7.00	8.50	Barium	945.000	26400	289.380	-	mg/kg
300/500	*000-4*	*CA43-017*	*749994.256*	*2082858.148*	*7.00*	*8.50*	*Uranium-234*	*2.826*	*300*	*2.640*	-	*pCi/g*
300/500	000-4	CA43-017	749994.256	2082858.148	7.00	8.50	Uranium-235	0.192	8	0.120	-	pCi/g
300/500	000-4	CA43-017	749994.256	2082858.148	7.00	8.50	Uranium-238	2.826	351	1.490	-	pCi/g
300/500	000-4	CA43-017	749994.256	2082858.148	8.50	10.50	Barium	1210.000	26400	289.380	-	mg/kg
300/500	*000-4*	*CA43-017*	*749994.256*	*2082858.148*	*8.50*	*10.50*	*Uranium-234*	*3.097*	*300*	*2.640*	-	*pCi/g*
300/500	000-4	CA43-017	749994.256	2082858.148	8.50	10.50	Uranium-238	3.097	351	1.490	-	pCi/g
300/500	000-4	CA43-017	749994.256	2082858.148	10.50	12.50	Barium	863.000	26400	289.380	-	mg/kg
300/500	000-4	CA43-017	749994.256	2082858.148	10.50	12.50	Iron	41100.000	307000	41046.520	-	mg/kg
300/500	000-4	CA43-017	749994.256	2082858.148	10.50	12.50	Uranium-235	0.145	8	0.120	-	pCi/g
300/500	000-4	CA43-017	749994.256	2082858.148	10.50	12.50	Vanadium	89.300	7150	88.490	-	mg/kg
300/500	000-4	CA43-022	749991.994	2082932.164	11.00	11.50	1,2,4-Trichlorobenzene	0.880	9230000	-	0.790	ug/kg
300/500	000-4	CA43-022	749991.994	2082932.164	11.00	11.50	Methylene chloride	3.300	2530000	-	0.890	ug/kg
300/500	000-4	CA43-022	749991.994	2082932.164	11.00	11.50	Naphthalene	1.400	3090000	-	0.960	ug/kg
300/500	*000-4*	*CB42-024*	*750004.392*	*2083035.033*	*1.00*	*1.30*	*Uranium-234*	*39.070*	*300*	*2.253*	-	*pCi/g*
300/500	000-4	CB42-024	750004.392	2083035.033	1.00	1.30	Uranium-235	0.370	8	0.094	-	pCi/g
300/500	000-4	CB42-024	750004.392	2083035.033	1.00	1.30	Uranium-238	39.070	351	2.000	-	pCi/g
300/500	000-4	CB43-000	749977.418	2083102.468	12.50	14.50	Barium	847.000	26400	289.380	-	mg/kg
300/500	000-4	CB43-000	749977.418	2083102.468	12.50	14.50	Strontium	217.000	613000	211.380	-	mg/kg
300/500	000-4	CB43-001	749982.101	2083116.535	12.50	14.50	Barium	1200.000	26400	289.380	-	mg/kg
300/500	000-4	CB43-001	749982.101	2083116.535	12.50	14.50	Vanadium	96.200	7150	88.490	-	mg/kg
300/500	000-4	CB43-048	749991.824	2082678.35	9.00	11.00	Antimony	0.720	409	0.470	-	mg/kg
300/500	500-1	CC43-004	749993.004	2083295.733	0.50	2.50	Acetone	15.000	102000000	-	5.000	ug/kg
300/500	500-1	CC43-004	749993.004	2083295.733	2.50	4.50	1,2,4-Trichlorobenzene	0.760	9230000	-	0.740	ug/kg
300/500	500-1	CC43-004	749993.004	2083295.733	2.50	4.50	Naphthalene	2.400	3090000	-	0.890	ug/kg
300/500	500-1	CC43-004	749993.004	2083295.733	2.50	4.50	Tetrachloroethene	1.700	615000	-	1.000	ug/kg

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
300/500	500-1	CC43-004	749993.004	2083295.733	2.50	4.50	Toluene	1.200	31300000	-	0.810	ug/kg
300/500	500-1	CC43-004	749993.004	2083295.733	4.50	6.50	Naphthalene	1.000	3090000	-	0.890	ug/kg
300/500	*500-1*	*CC43-007*	*750000.085*	*2083257.191*	*4.50*	*6.50*	*Uranium-234*	*5.981*	*300*	*2.640*	-	*pCi/g*
300/500	500-1	CC43-007	750000.085	2083257.191	4.50	6.50	Uranium-238	5.981	351	1.490	-	pCi/g
300/500	500-1	CC43-008	749996.579	2083217.175	4.50	6.50	Uranium-235	0.140	8	0.120	-	pCi/g
300/500	500-1	CC43-012	750000.989	2083194.522	4.50	6.50	Uranium-235	0.134	8	0.120	-	pCi/g
300/500	500-1	CC43-017	750005.732	2083160.322	4.50	6.50	Naphthalene	0.970	3090000	-	0.890	ug/kg
300/500	500-1	CC43-017	750005.732	2083160.322	4.50	6.50	Plutonium-239/240	0.446	50	0.020	-	pCi/g
300/500	000-4	CC43-037	749993.099	2083213.455	0.00	0.50	Acetone	5.000	102000000	-	1.600	ug/kg
300/500	000-4	CC43-037	749993.099	2083213.455	0.00	0.50	Carbon Tetrachloride	0.340	81500	-	0.190	ug/kg
300/500	000-4	CC43-037	749993.099	2083213.455	0.00	0.50	Methylene chloride	1.600	2530000	-	0.360	ug/kg
300/500	000-4	CC43-037	749993.099	2083213.455	0.00	0.50	Tetrachloroethene	0.790	615000	-	0.200	ug/kg
300/500	000-4	CC43-037	749993.099	2083213.455	0.00	0.50	Toluene	0.099	31300000	-	0.094	ug/kg
300/500	000-4	CC43-037	749993.099	2083213.455	0.00	0.50	Trichloroethene	0.170	19600	-	0.150	ug/kg
300/500	500-3	CD43-022	750034.7971	2083549.844	17.00	18.00	Americium-241	1.363	76	0.020	-	pCi/g
300/500	*500-3*	*CD43-022*	*750034.7971*	*2083549.844*	*17.00*	*18.00*	*Plutonium-239/240*	*7.769*	*50*	*0.020*	-	*pCi/g*
300/500	500-3	CD43-022	750034.7971	2083549.844	17.00	18.00	Uranium-235	0.173	8	0.120	-	pCi/g
300/500	500-3	CD43-024	750059.3052	2083539.531	20.00	21.00	Americium-241	1.002	76	0.020	-	pCi/g
300/500	*500-3*	*CD43-024*	*750059.3052*	*2083539.531*	*20.00*	*21.00*	*Plutonium-239/240*	*5.711*	*50*	*0.020*	-	*pCi/g*
300/500	500-3	CD43-024	750059.3052	2083539.531	20.00	21.00	Uranium-238	1.675	351	1.490	-	pCi/g
300/500	500-3	CD43-029	750060.129	2083480.533	20.00	22.00	Uranium-238	1.624	351	1.490	-	pCi/g
300/500	500-3	CE43-000	750054.497	2083555.328	6.50	7.10	Uranium-235	0.141	8	0.120	-	pCi/g
300/500	500-3	CE43-000	750054.497	2083555.328	6.50	7.10	Uranium-238	1.817	351	1.490	-	pCi/g
300/500	500-3	CE43-000	750054.497	2083555.328	8.50	10.10	Ethylbenzene	6.460	4250000	-	5.830	ug/kg
300/500	500-3	CE43-000	750054.497	2083555.328	8.50	10.10	Toluene	6.910	31300000	-	5.830	ug/kg
300/500	500-3	CE43-000	750054.497	2083555.328	8.50	10.10	Uranium-235	0.185	8	0.120	-	pCi/g
300/500	500-3	CE43-000	750054.497	2083555.328	8.50	10.10	Xylene	41.700	2040000	-	11.700	ug/kg
300/500	500-3	CE43-000	750054.497	2083555.328	10.50	11.50	Uranium-235	0.159	8	0.120	-	pCi/g
300/500	500-3	CE43-000	750054.497	2083555.328	14.70	15.80	Uranium-235	0.175	8	0.120	-	pCi/g
300/500	500-3	CE43-000	750054.497	2083555.328	16.50	18.50	Uranium-235	0.152	8	0.120	-	pCi/g

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
300/500	*500-3*	*CE43-000*	*750054.497*	*2083555.328*	*18.50*	*20.50*	*Uranium-234*	*4.585*	*300*	*2.640*	-	*pCi/g*
300/500	500-3	CE43-000	750054.497	2083555.328	18.50	20.50	Uranium-235	0.240	8	0.120	-	pCi/g
300/500	500-3	CE43-000	750054.497	2083555.328	18.50	20.50	Uranium-238	4.585	351	1.490	-	pCi/g
300/500	*500-3*	*CE43-000*	*750054.497*	*2083555.328*	*20.50*	*22.40*	*Uranium-234*	*4.066*	*300*	*2.640*	-	*pCi/g*
300/500	500-3	CE43-000	750054.497	2083555.328	20.50	22.40	Uranium-235	0.175	8	0.120	-	pCi/g
300/500	500-3	CE43-000	750054.497	2083555.328	20.50	22.40	Uranium-238	4.066	351	1.490	-	pCi/g
300/500	000-4	CK44-024	750012.106	2082774.164	9.00	10.50	Uranium-235	0.134	8	0.120	-	pCi/g
700	000-4	CE40-003	749386.308	2083693.923	10.00	10.50	Plutonium-239/240	3.370	50	0.020	-	pCi/g
700	000-4	CE41-000	749687.785	2083686.902	0.00	0.30	Acetone	8.300	102000000	-	1.500	ug/kg
700	000-4	CE41-001	749591.811	2083688.335	15.00	15.50	Lead	37.000	1000	24.970	-	mg/kg
700	000-4	CE41-001	749591.811	2083688.335	15.00	15.50	Zinc	160.000	307000	139.100	-	mg/kg
700	000-4	CE41-002	749685.18	2083698.246	4.50	5.00	Uranium-238	1.535	351	1.490	-	pCi/g
700	700-2	CE42-001	749916.871	2083700.012	2.50	4.50	Barium	1210.000	26400	289.380	-	mg/kg
700	700-2	CE42-001	749916.871	2083700.012	2.50	4.50	bis(2-Ethylhexyl)phthalate	96.000	1970000	-	74.000	ug/kg
700	700-2	CE42-001	749916.871	2083700.012	2.50	4.50	Uranium-238	1.631	351	1.490	-	pCi/g
700	700-2	CE42-001	749916.871	2083700.012	4.50	6.50	Barium	989.000	26400	289.380	-	mg/kg
700	700-2	CE42-001	749916.871	2083700.012	4.50	6.50	bis(2-Ethylhexyl)phthalate	96.000	1970000	-	81.000	ug/kg
700	700-2	CE42-001	749916.871	2083700.012	4.50	6.50	Di-n-butylphthalate	130.000	73700000	-	23.000	ug/kg
700	700-2	CE42-001	749916.871	2083700.012	4.50	6.50	Strontium	217.000	613000	211.380	-	mg/kg
700	*700-2*	*CE42-001*	*749916.871*	*2083700.012*	*4.50*	*6.50*	*Uranium-234*	*3.284*	*300*	*2.640*	-	*pCi/g*
700	700-2	CE42-001	749916.871	2083700.012	4.50	6.50	Uranium-235	0.240	8	0.120	-	pCi/g
700	700-2	CE42-001	749916.871	2083700.012	4.50	6.50	Uranium-238	3.284	351	1.490	-	pCi/g
700	000-4	CE42-007	749886.632	2083686.922	8.00	8.50	Acetone	15.000	102000000	-	1.600	ug/kg
700	000-4	CE42-007	749886.632	2083686.922	8.00	8.50	Naphthalene	0.570	3090000	-	0.410	ug/kg
700	000-4	CE42-007	749886.632	2083686.922	8.00	8.50	Trichloroethene	1.600	19600	-	0.150	ug/kg
700	000-4	CE42-008	749787.975	2083687.49	0.00	0.30	Acetone	4.600	102000000	-	1.800	ug/kg
700	000-4	CE43-019	749993.668	2083687.287	8.50	8.80	Lithium	47.000	20400	34.660	-	mg/kg
700	000-4	CE43-019	749993.668	2083687.287	8.50	8.80	Uranium, Total	9.700	2750	3.040	-	mg/kg
700	000-4	CE43-019	749993.668	2083687.287	8.50	8.80	Uranium-238	3.150	351	1.490	-	pCi/g

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
700	700-10	CE44-027	750315.278	2083616.844	12.50	14.50	Trichloroethene	3.300	19600	-	1.100	ug/kg
700	700-10	CE44-027	750315.278	2083616.844	14.50	16.50	1,2,4-Trichlorobenzene	0.850	9230000	-	0.810	ug/kg
700	700-10	CE44-027	750315.278	2083616.844	14.50	16.50	Naphthalene	1.600	3090000	-	0.980	ug/kg
700	700-10	CE44-027	750315.278	2083616.844	14.50	16.50	Trichloroethene	1.300	19600	-	0.990	ug/kg
700	700-10	CE44-027	750315.278	2083616.844	16.50	18.50	Trichloroethene	1.700	19600	-	1.100	ug/kg
700	700-10	CE44-027	750315.278	2083616.844	18.50	20.50	Trichloroethene	1.200	19600	-	1.100	ug/kg
700	700-10	CE44-027	750315.278	2083616.844	18.50	20.50	Uranium-238	1.790	351	1.490	-	pCi/g
700	700-10	CE44-027	750315.278	2083616.844	20.50	22.00	Acetone	6.000	102000000	-	5.700	ug/kg
700	700-10	CE44-027	750315.278	2083616.844	20.50	22.00	Naphthalene	1.300	3090000	-	1.100	ug/kg
700	700-10	CE44-027	750315.278	2083616.844	20.50	22.00	Trichloroethene	3.900	19600	-	1.100	ug/kg
700	700-10	CE44-028	750305.834	2083616.561	12.50	14.50	Acetone	16.000	102000000	-	5.700	ug/kg
700	700-10	CE44-028	750305.834	2083616.561	12.50	14.50	Ethylbenzene	4.500	4250000	-	1.500	ug/kg
700	700-10	CE44-028	750305.834	2083616.561	12.50	14.50	Toluene	36.000	31300000	-	0.960	ug/kg
700	700-10	CE44-028	750305.834	2083616.561	12.50	14.50	Trichloroethene	1.900	19600	-	1.100	ug/kg
700	700-10	CE44-028	750305.834	2083616.561	12.50	14.50	Xylene	16.000	2040000	-	3.400	ug/kg
700	700-10	CE44-028	750305.834	2083616.561	14.50	16.50	Acetone	6.800	102000000	-	5.500	ug/kg
700	700-10	CE44-028	750305.834	2083616.561	20.50	22.50	Uranium-238	1.800	351	1.490	-	pCi/g
700	000-4	CE44-033	750237.774	2083682.974	8.00	8.50	Americium-241	0.693	76	0.020	-	pCi/g
700	000-4	CE44-033	750237.774	2083682.974	8.00	8.50	Uranium-235	0.258	8	0.120	-	pCi/g
700	700-3	CE46-013	750672.685	2083745.663	0.00	0.50	Benzo(a)pyrene	52.000	3490	-	41.000	ug/kg
700	700-3	CE46-013	750672.685	2083745.663	0.00	0.50	Benzo(b)fluoranthene	49.000	34900	-	30.000	ug/kg
700	700-3	CE46-013	750672.685	2083745.663	0.00	0.50	Chrysene	44.000	3490000	-	29.000	ug/kg
700	700-3	CE46-013	750672.685	2083745.663	0.00	0.50	Fluoranthene	69.000	27200000	-	23.000	ug/kg
700	*700-3*	*CE46-013*	*750672.685*	*2083745.663*	*0.00*	*0.50*	*Uranium-234*	*3.952*	*300*	*2.253*	-	*pCi/g*
700	700-3	CE46-013	750672.685	2083745.663	0.00	0.50	Uranium-235	0.197	8	0.094	-	pCi/g
700	700-3	CE46-013	750672.685	2083745.663	0.00	0.50	Uranium-238	3.952	351	2.000	-	pCi/g
700	000-4	CG39-005	749365.098	2083668.014	6.50	7.00	Uranium-235	0.190	8	0.120	-	pCi/g
700	000-4	CG39-005	749365.098	2083668.014	6.50	7.00	Uranium-238	1.966	351	1.490	-	pCi/g
700	700-7	CI46-010	750714.914	2084387.386	0.00	0.50	Americium-241	0.424	76	0.023	-	pCi/g
700	*700-7*	*CI46-010*	*750714.914*	*2084387.386*	*0.00*	*0.50*	*Plutonium-239/240*	*2.415*	*50*	*0.066*	-	*pCi/g*

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
700	700-7	CI46-010	750714.914	2084387.386	0.00	0.50	Uranium-235	0.163	8	0.094	-	pCi/g
700	700-7	CI46-014	750721.531	2084421.63	0.00	0.50	Aluminum	25000.000	228000	16902.000	-	mg/kg
700	700-7	CI46-014	750721.531	2084421.63	0.00	0.50	Americium-241	3.705	76	0.023	-	pCi/g
700	700-7	CI46-014	750721.531	2084421.63	0.00	0.50	Barium	210.000	26400	141.260	-	mg/kg
700	700-7	CI46-014	750721.531	2084421.63	0.00	0.50	Chromium	30.000	268	16.990	-	mg/kg
700	700-7	CI46-014	750721.531	2084421.63	0.00	0.50	Lithium	16.000	20400	11.550	-	mg/kg
700	700-7	CI46-014	750721.531	2084421.63	0.00	0.50	Mercury	0.590	25200	0.134	-	mg/kg
700	700-7	CI46-014	750721.531	2084421.63	0.00	0.50	Nickel	16.000	20400	14.910	-	mg/kg
700	*700-7*	*CI46-014*	*750721.531*	*2084421.63*	*0.00*	*0.50*	*Plutonium-239/240*	*21.119*	*50*	*0.066*	-	*pCi/g*
700	700-7	CI46-014	750721.531	2084421.63	0.00	0.50	Strontium	77.000	613000	48.940	-	mg/kg
700	*700-7*	*CI46-014*	*750721.531*	*2084421.63*	*0.00*	*0.50*	*Uranium-234*	*4.303*	*300*	*2.253*	-	*pCi/g*
700	700-7	CI46-014	750721.531	2084421.63	0.00	0.50	Uranium-235	0.254	8	0.094	-	pCi/g
700	700-7	CI46-014	750721.531	2084421.63	0.00	0.50	Uranium-238	4.303	351	2.000	-	pCi/g
700	700-7	CI46-014	750721.531	2084421.63	0.00	0.50	Vanadium	54.000	7150	45.590	-	mg/kg
700	700-7	CI46-014	750721.531	2084421.630	0.50	2.50	Americium-241	49.950	76	0.020	-	pCi/g
700	**700-7**	**CI46-014**	**750721.531**	**2084421.630**	**0.50**	**2.50**	**Plutonium-239/240**	**284.715**	**50**	**0.020**	-	**pCi/g**
700	*700-7*	*CI46-014*	*750721.531*	*2084421.630*	*0.50*	*2.50*	*Uranium-234*	*4.735*	*300*	*2.640*	-	*pCi/g*
700	700-7	CI46-014	750721.531	2084421.630	0.50	2.50	Uranium-235	0.324	8	0.120	-	pCi/g
700	700-7	CI46-014	750721.531	2084421.630	0.50	2.50	Uranium-238	4.735	351	1.490	-	pCi/g
700	700-7	CJ46-021	750721.296	2084578.532	0.00	0.50	Americium-241	0.601	76	0.023	-	pCi/g
700	700-7	CJ46-021	750721.296	2084578.532	0.00	0.50	Chromium	17.000	268	16.990	-	mg/kg
700	*700-7*	*CJ46-021*	*750721.296*	*2084578.532*	*0.00*	*0.50*	*Plutonium-239/240*	*3.427*	*50*	*0.066*	-	*pCi/g*
700	*700-7*	*CJ46-021*	*750721.296*	*2084578.532*	*0.00*	*0.50*	*Uranium-234*	*4.706*	*300*	*2.253*	-	*pCi/g*
700	700-7	CJ46-021	750721.296	2084578.532	0.00	0.50	Uranium-235	0.168	8	0.094	-	pCi/g
700	700-7	CJ46-021	750721.296	2084578.532	0.00	0.50	Uranium-238	4.706	351	2.000	-	pCi/g
700	700-7	CJ46-021	750721.296	2084578.532	0.50	2.50	Americium-241	1.068	76	0.020	-	pCi/g
700	*700-7*	*CJ46-021*	*750721.296*	*2084578.532*	*0.50*	*2.50*	*Plutonium-239/240*	*6.088*	*50*	*0.020*	-	*pCi/g*
700	700-7	CJ46-021	750721.296	2084578.532	0.50	2.50	Uranium-235	0.131	8	0.120	-	pCi/g
800	000-4	CE35-002	748415.116	2083698.702	7.00	7.50	Aluminum	20000.000	228000	16902.000	-	mg/kg
800	000-4	CE35-002	748415.116	2083698.702	7.00	7.50	Americium-241	0.132	76	0.023	-	pCi/g

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
800	000-4	CE35-002	748415.116	2083698.702	7.00	7.50	Beryllium	1.000	921	0.966	-	mg/kg
800	000-4	CE35-002	748415.116	2083698.702	7.00	7.50	Lithium	15.000	20400	11.550	-	mg/kg
800	000-4	CE35-002	748415.116	2083698.702	7.00	7.50	Plutonium-239/240	0.145	50	0.066	-	pCi/g
800	000-4	CE35-002	748415.116	2083698.702	7.00	7.50	Strontium	93.000	613000	48.940	-	mg/kg
800	000-4	CE36-000	748706.828	2083696.691	6.00	6.50	Plutonium-239/240	0.130	50	0.020	-	pCi/g
800	000-4	CE36-001	748599.467	2083698.729	7.00	7.50	Aluminum	21000.000	228000	16902.000	-	mg/kg
800	000-4	CE36-001	748599.467	2083698.729	7.00	7.50	Beryllium	1.100	921	0.966	-	mg/kg
800	000-4	CE36-001	748599.467	2083698.729	7.00	7.50	Lithium	16.000	20400	11.550	-	mg/kg
800	000-4	CE36-001	748599.467	2083698.729	7.00	7.50	Plutonium-239/240	0.103	50	0.066	-	pCi/g
800	000-4	CE36-001	748599.467	2083698.729	7.00	7.50	Strontium	93.000	613000	48.940	-	mg/kg
800	800-3	CE37-003	748883.176	2083699.002	20.00	22.00	Acetone	10.000	102000000	-	5.900	ug/kg
800	800-3	CE37-003	748883.176	2083699.002	20.00	22.00	Benzo(a)anthracene	48.000	34900	-	31.000	ug/kg
800	800-3	CE37-003	748883.176	2083699.002	20.00	22.00	bis(2-Ethylhexyl)phthalate	99.000	1970000	-	89.000	ug/kg
800	800-3	CE37-003	748883.176	2083699.002	20.00	22.00	Chrysene	47.000	3490000	-	34.000	ug/kg
800	800-3	CE37-003	748883.176	2083699.002	20.00	22.00	Methylene chloride	4.000	2530000	-	1.000	ug/kg
800	800-3	CE37-003	748883.176	2083699.002	20.00	22.00	Naphthalene	10.000	3090000	-	1.100	ug/kg
800	000-4	CE37-011	748854.008	2083702.66	0.00	0.10	Uranium-235	0.142	8	0.094	-	pCi/g
800	**800-5**	**CF33-010**	**748131.956**	**2083867.655**	**5.00**	**5.01**	**Arsenic**	**25.500**	**22.2**	**13.140**	-	**mg/kg**
800	800-5	CF33-010	748131.956	2083867.655	5.00	5.01	Barium	753.000	26400	289.380	-	mg/kg
800	800-5	CF33-010	748131.956	2083867.655	5.00	5.01	Copper	93.900	40900	38.210	-	mg/kg
800	800-5	CF33-010	748131.956	2083867.655	5.00	5.01	Fluoranthene	64.000	27200000	-	46.000	ug/kg
800	800-5	CF33-010	748131.956	2083867.655	5.00	5.01	Lead	30.900	1000	24.970	-	mg/kg
800	*800-5*	*CF33-010*	*748131.956*	*2083867.655*	*5.00*	*5.01*	*Uranium-234*	*4.224*	*300*	*2.640*	-	*pCi/g*
800	800-5	CF33-010	748131.956	2083867.655	5.00	5.01	Uranium-235	0.260	8	0.120	-	pCi/g
800	800-5	CF33-010	748131.956	2083867.655	5.00	5.01	Uranium-238	4.224	351	1.490	-	pCi/g
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Arsenic	12.500	22.2	10.090	-	mg/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Barium	703.000	26400	141.260	-	mg/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Benzo(a)anthracene	160.000	34900	-	46.000	ug/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Benzo(a)pyrene	150.000	3490	-	60.000	ug/kg

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Benzo(b)fluoranthene	110.000	34900	-	74.000	ug/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Benzo(k)fluoranthene	160.000	349000	-	80.000	ug/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Chromium	55.700	268	16.990	-	mg/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Chrysene	180.000	3490000	-	40.000	ug/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Copper	178.000	40900	18.060	-	mg/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Fluoranthene	390.000	27200000	-	46.000	ug/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Indeno(1,2,3-cd)pyrene	90.000	34900	-	51.000	ug/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Iron	30000.000	307000	18037.000	-	mg/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Nickel	40.600	20400	14.910	-	mg/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Pyrene	390.000	22100000	-	65.000	ug/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Strontium	139.000	613000	48.940	-	mg/kg
800	*800-5*	*CF33-011*	*748143.538*	*2083807.896*	*5.00*	*5.50*	*Uranium-234*	*4.256*	*300*	*2.253*	-	*pCi/g*
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Uranium-235	0.292	8	0.094	-	pCi/g
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Uranium-238	4.256	351	2.000	-	pCi/g
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Vanadium	166.000	7150	45.590	-	mg/kg
800	800-5	CF33-011	748143.538	2083807.896	5.00	5.50	Zinc	127.000	307000	73.760	-	mg/kg
800	800-5	CF34-022	748188.61	2083796.23	25.00	25.50	Antimony	7.840	409	0.470	-	mg/kg
800	800-5	CF34-022	748188.61	2083796.23	25.00	25.50	Barium	719.000	26400	141.260	-	mg/kg
800	800-5	CF34-022	748188.61	2083796.23	25.00	25.50	Chromium	49.000	268	16.990	-	mg/kg
800	800-5	CF34-022	748188.61	2083796.23	25.00	25.50	Copper	47.400	40900	18.060	-	mg/kg
800	800-5	CF34-022	748188.61	2083796.23	25.00	25.50	Iron	27200.000	307000	18037.000	-	mg/kg
800	800-5	CF34-022	748188.61	2083796.23	25.00	25.50	Nickel	34.600	20400	14.910	-	mg/kg
800	800-5	CF34-022	748188.61	2083796.23	25.00	25.50	Strontium	146.000	613000	48.940	-	mg/kg
800	*800-5*	*CF34-022*	*748188.61*	*2083796.23*	*25.00*	*25.50*	*Uranium-234*	*3.824*	*300*	*2.253*	-	*pCi/g*
800	800-5	CF34-022	748188.61	2083796.23	25.00	25.50	Uranium-235	0.229	8	0.094	-	pCi/g
800	800-5	CF34-022	748188.61	2083796.23	25.00	25.50	Uranium-238	3.824	351	2.000	-	pCi/g
800	800-5	CF34-022	748188.61	2083796.23	25.00	25.50	Vanadium	168.000	7150	45.590	-	mg/kg
800	800-5	CF34-022	748188.61	2083796.23	25.00	25.50	Zinc	90.100	307000	73.760	-	mg/kg
800	000-2	CF35-040	748428.797	2083736.401	2.50	3.00	Acetone	14.000	102000000	-	5.100	ug/kg
800	000-2	CF35-040	748428.797	2083736.401	2.50	3.00	Methylene chloride	1.100	2530000	-	0.890	ug/kg

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Acenaphthene	74.000	40800000	-	31.000	ug/kg
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Anthracene	110.000	204000000	-	24.000	ug/kg
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Benzo(a)anthracene	200.000	34900	-	25.000	ug/kg
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Benzo(a)pyrene	180.000	3490	-	41.000	ug/kg
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Benzo(b)fluoranthene	120.000	34900	-	29.000	ug/kg
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Benzo(k)fluoranthene	170.000	349000	-	32.000	ug/kg
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Chrysene	230.000	3490000	-	28.000	ug/kg
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Fluoranthene	500.000	27200000	-	23.000	ug/kg
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Indeno(1,2,3-cd)pyrene	83.000	34900	-	23.000	ug/kg
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Pyrene	470.000	22100000	-	140.000	ug/kg
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Uranium-235	0.148	8	0.120	-	pCi/g
800	800-3	CF37-009	748896.138	2083738.837	4.50	6.50	Uranium-238	1.675	351	1.490	-	pCi/g
800	800-1	CF38-009	749098.928	2083885.089	4.50	4.80	Uranium-235	0.158	8	0.120	-	pCi/g
800	800-1	CF38-009	749098.928	2083885.089	4.50	4.80	Uranium-238	1.930	351	1.490	-	pCi/g
800	800-1	CF38-010	749095.829	2083949.459	5.00	5.01	2-Butanone	6.600	192000000	-	4.800	ug/kg
800	800-1	CF38-010	749095.829	2083949.459	5.00	5.01	Acetone	16.000	102000000	-	4.700	ug/kg
800	800-1	CF38-010	749095.829	2083949.459	5.00	5.01	Uranium, Total	3.600	2750	3.040	-	mg/kg
800	800-1	CF38-010	749095.829	2083949.459	5.00	5.01	Uranium-235	0.157	8	0.120	-	pCi/g
800	800-1	CF38-010	749095.829	2083949.459	5.00	5.01	Uranium-238	2.220	351	1.490	-	pCi/g
800	000-2	CF39-000	749172.472	2083848.635	6.00	6.10	Acetone	12.000	102000000	-	5.200	ug/kg
800	000-2	CF39-000	749172.472	2083848.635	6.00	6.10	Plutonium-239/240	0.198	50	0.020	-	pCi/g

Bold denotes AL exceedance.
Italic type denotes values derived from HPGe measurement.

2.3.4 800 Area

The 800 Area includes samples collected as part of the IHSS Group 000-2, 000-4, 800-1, 800-3, and 800-5 ER projects. Twenty-two characterization sampling locations were sampled in the 800 Area. One location contained arsenic at a concentration of 25.5 mg/kg (RFCA WRW soil AL of 22.2 mg/kg).

Soil remediation was not required in the 800 Area based on RFCA because the nonradionuclide contaminant arsenic was detected in subsurface soil at a depth greater than 6-in below the ground surface. Analytical results of soil characterization sampling with concentrations greater than background means plus two standard deviations or RLs are shown on Figure 5.

2.4 SORs

Radionuclide sums of ratios (SORs) for surface soil (0 to 3 ft) were calculated for IHSS Group 000-4 sampling locations based on the accelerated action analytical data for the contaminants of concern (COCs) and RFCA WRW soil ALs. Radionuclide SORs were calculated for all locations with analytical results greater than background means plus two standard deviations for americium-241, plutonium-239/240, uranium-234, uranium-235, and uranium-238. Plutonium-239/240 activities are derived from americium-241 activities (that is, plutonium-239/240 activity = americium-241 gamma spectroscopy activity x 5.7) when americium-241 is measured using high-purity germanium (HPGe) detection analysis. In accordance with RFCA (DOE et al. 2003), the AL of 116 picocuries per gram (pCi/g) plutonium-239/240 is used in the SOR calculation.

As shown on Table 5, one SOR for radionuclides in surface soil in IHSS Group 000-4 was greater than 1. Sample location CI46-014 had an SOR of 3.181; however, this location was remediated as part of the IHSS Group 700-7 (UBC 779) accelerated action.

Table 5
IHSS Group 000-4 Radionuclide SORs for Surface Soil

Location	Starting Depth (ft)	Ending Depth (ft)	Radionuclide SOR
BT38-007	2.50	3.00	0.031
BU38-004	0.00	0.17	0.017
BY37-019	0.00	0.50	0.038
BY37-019	0.50	2.50	0.048
BY38-011	0.50	2.50	0.022
BY44-001	0.00	0.50	0.044
BZ43-029	0.00	0.30	0.083
BZ43-030	0.00	0.50	0.048
BZ43-038	0.00	0.50	0.043
BZ43-039	0.00	0.50	0.014
BZ43-040	0.00	0.50	0.027
CB42-024	1.00	1.30	0.288
CE37-011	0.00	0.10	0.018

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Location	Starting Depth (ft)	Ending Depth (ft)	Radionuclide SOR
CE46-013	0.00	0.50	0.049
CE46-013	0.50	2.50	0.033
CI46-010	0.00	0.50	0.047
CI46-014	0.00	0.50	0.289
CI46-014	0.50	2.50	3.181
CJ46-021	0.00	0.50	0.088
CJ46-021	0.50	2.50	0.083

SORs for nonradionuclides were calculated for all surface soil (0 to 0.5 ft) where analyte concentrations were 10 percent or more of a contaminant's RFCA WRW soil AL. Only one sample, CI46-014 had reportable nonradionuclide SOR of 0.112 and project decisions were not affected.

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3.0 SUMMARY STATISTICS

Summary statistics, by analyte, were calculated for IHSS Group 000-4 surface soil and subsurface soil sampling locations (Tables 6 and 7, respectively). These summaries are based on detected concentrations only for organics and above-background means plus two standard deviations for inorganics.

Table 6
Surface Soil Summary Statistics

Analyte	Number of Samples	Detection Frequency	Average Concentration	Maximum Concentration	WRW AL	Background Mean Plus 2SD	Unit
1,2,4-Trichlorobenzene	5	20.00%	0.880	0.880	9230000	-	ug/kg
Aluminum	21	19.05%	21250.000	25000.000	228000	16902.000	mg/kg
Americium-241	31	19.35%	1.008	3.705	76	0.023	pCi/g
Antimony	23	8.70%	4.280	7.840	409	0.470	mg/kg
Arsenic	23	4.35%	12.500	12.500	22.2	10.090	mg/kg
Barium	23	13.04%	544.000	719.000	26400	141.260	mg/kg
Benzo(a)anthracene	5	20.00%	160.000	160.000	34900	-	ug/kg
Benzo(a)pyrene	5	40.00%	101.000	150.000	3490	-	ug/kg
Benzo(b)fluoranthene	5	40.00%	79.500	110.000	34900	-	ug/kg
Benzo(k)fluoranthene	5	20.00%	160.000	160.000	349000	-	ug/kg
Beryllium	21	9.52%	1.050	1.100	921	0.966	mg/kg
Chromium	23	21.74%	34.140	55.700	268	16.990	mg/kg
Chrysene	5	40.00%	112.000	180.000	3490000	-	ug/kg
Copper	23	13.04%	83.133	178.000	40900	18.060	mg/kg
Fluoranthene	5	40.00%	229.500	390.000	27200000	-	ug/kg
Indeno(1,2,3-cd)pyrene	5	20.00%	90.000	90.000	34900	-	ug/kg
Iron	23	8.70%	28600.000	30000.000	307000	18037.000	mg/kg
Lithium	21	19.05%	15.000	16.000	20400	11.550	mg/kg
Manganese	23	4.35%	460.000	460.000	3480	365.080	mg/kg
Mercury	21	4.76%	0.590	0.590	25200	0.134	mg/kg
Methylene chloride	3	33.33%	3.300	3.300	2530000	-	ug/kg
Naphthalene	5	20.00%	1.400	1.400	3090000	-	ug/kg
Nickel	23	17.39%	26.800	40.600	20400	14.910	mg/kg
Plutonium-239/240	31	19.35%	4.616	21.119	50	0.066	pCi/g
Pyrene	5	20.00%	390.000	390.000	22100000	-	ug/kg
Strontium	23	21.74%	109.600	146.000	613000	48.940	mg/kg
Uranium-234	31	29.03%	7.715	39.070	300	2.253	pCi/g
Uranium-235	31	45.16%	0.224	0.445	8	0.094	pCi/g
Uranium-238	31	32.26%	7.216	39.070	351	2.000	pCi/g
Vanadium	23	13.04%	129.333	168.000	7150	45.590	mg/kg
Zinc	23	13.04%	135.700	190.000	307000	73.760	mg/kg

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Table 7
Subsurface Soil Summary Statistics

Analyte	Number of Samples	Detection Frequency	Average Concentration	Maximum Concentration	WRW AL	Background Mean Plus 2SD	Unit
1,2,4-Trichlorobenzene	95	2.11%	0.805	0.850	9230000	-	ug/kg
2-Butanone	95	1.05%	6.600	6.600	192000000	-	ug/kg
2-Methylnaphthalene	18	5.56%	1100.000	1100.000	20400000	-	ug/kg
Acenaphthene	18	5.56%	74.000	74.000	40800000	-	ug/kg
Acetone	95	21.05%	8.515	16.000	102000000	-	ug/kg
Aluminum	95	5.26%	52000.000	80000.000	228000	35373.170	mg/kg
Americium-241	155	14.19%	31.598	566.500	76	0.020	pCi/g
Anthracene	18	5.56%	110.000	110.000	204000000	-	ug/kg
Arsenic	111	5.41%	18.133	25.500	22.2	13.140	mg/kg
Barium	111	15.32%	1000.706	1300.000	26400	289.380	mg/kg
Benzo(a)anthracene	18	16.67%	97.333	200.000	34900	-	ug/kg
Benzo(a)pyrene	18	5.56%	180.000	180.000	3490	-	ug/kg
Benzo(b)fluoranthene	18	5.56%	120.000	120.000	34900	-	ug/kg
Benzo(k)fluoranthene	18	5.56%	170.000	170.000	349000	-	ug/kg
bis(2-Ethylhexyl)phthalate	18	22.22%	107.750	140.000	1970000	-	ug/kg
Carbon Tetrachloride	95	2.11%	7.270	14.200	81500	-	ug/kg
Chromium	111	0.90%	77.000	77.000	268	68.270	mg/kg
Chrysene	18	16.67%	109.333	230.000	3490000	-	ug/kg
Copper	111	0.90%	93.900	93.900	40900	38.210	mg/kg
Di-n-butylphthalate	18	5.56%	130.000	130.000	73700000	-	ug/kg
Ethylbenzene	95	3.16%	3.787	6.460	4250000	-	ug/kg
Fluoranthene	18	22.22%	179.250	500.000	27200000	-	ug/kg
Fluorene	18	5.56%	57.000	57.000	40800000	-	ug/kg
Indeno(1,2,3-cd)pyrene	18	5.56%	83.000	83.000	34900	-	ug/kg
Iron	111	1.80%	41150.000	41200.000	307000	41046.520	mg/kg
Lead	111	1.80%	33.950	37.000	1000	24.970	mg/kg
Lithium	95	4.21%	43.000	50.000	20400	34.660	mg/kg
Manganese	111	0.90%	950.000	950.000	3480	901.620	mg/kg
Mercury	107	0.93%	13.800	13.800	25200	1.520	mg/kg
Methylene chloride	95	4.21%	1.923	4.000	2530000	-	ug/kg
Naphthalene	95	14.74%	102.221	1400.000	3090000	-	ug/kg
Plutonium-239/240	156	14.74%	160.894	3229.050	50	0.020	pCi/g
Pyrene	18	11.11%	290.000	470.000	22100000	-	ug/kg
Strontium	111	2.70%	216.667	217.000	613000	211.380	mg/kg
Tetrachloroethene	95	3.16%	0.913	1.700	615000	-	ug/kg
Toluene	95	9.47%	6.378	36.000	31300000	-	ug/kg
Trichloroethene	95	13.68%	1.500	3.900	19600	-	ug/kg
Uranium, Total	91	4.40%	7.950	9.900	2750	3.040	mg/kg
Uranium-234	156	26.92%	53.270	2056.000	300	2.640	pCi/g
Uranium-235	156	40.38%	0.650	27.410	8	0.120	pCi/g
Uranium-238	156	42.31%	36.677	2056.000	351	1.490	pCi/g
Vanadium	111	5.41%	105.100	137.000	7150	88.490	mg/kg
Xylene	95	6.32%	12.773	41.700	2040000	-	ug/kg
Zinc	111	0.90%	160.000	160.000	307000	139.100	mg/kg

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4.0 ACCELERATED ACTION

Accelerated action objectives were developed for IHSS Group 000-4 and are described in ER RSOP Notification #05-01 (DOE 2004n) and RSOP Notifications for other IHSS Groups listed in Table 1. Based on historical information, potential contaminants of concern (PCOCs) include acids, bases, solvents, radionuclides, metals, nitrate/nitrite, oils, and photographic chemicals (DOE 1999). Depending on the requirements of IA SAP Addenda listed on Table 1, samples were analyzed for metals, nitrate, PCBs, radionuclides, semivolatile compounds (SVOCs), and volatile organic compounds (VOCs). The ER RSOP remedial action objectives (RAOs) included the following:

- Provide a remedy consistent with the RFETS goal of protection of human health and the environment;
- Provide a remedy that minimizes the need for long-term maintenance and institutional or engineering controls; and
- Minimize the spread of contaminants during implementation of accelerated actions.

The accelerated action remediation goals for IHSS Group 000-4 included the following:

- Conduct soil sampling at valve vaults and pipelines that were not clean-closed. Soil samples will be collected at valve vaults as they are removed. It is anticipated that valve vaults 8, 9, 10, 11, 12, and 13 will be removed. Confirmation samples will be collected along pipelines at the following locations:
  - Breaks in the pipeline containment, and
  - Areas of stained soil.
- Remove soil with plutonium-239/240 or americium-241 activities greater than the RFCA WRW ALs to a depth of 3 feet, or to less than the applicable AL, which ever comes first. If concentrations are greater than 3 nanocuries per gram (nCi/g) between 3 and 6 feet, characterize and remediate in accordance with RFCA Attachment 5 (DOE et al 2003). Conduct the SSRS to evaluate the need for additional action.
- If contaminated soil is removed, collect confirmation soil samples in accordance with the IABZSAP (DOE 2004o).
- Remediation targets will be identified based on ER characterization sampling conducted as part of other IHSS Group characterization or on Decommissioning information. It is anticipated that after remediation there may be areas with concentrations of metals, radionuclides, and organics greater than background means plus two standard deviations or detection limits, but below RFCA ALs between 0 and 3 feet in depth.

ER accelerated action activities were conducted at IHSS Group 000-4 between January 2002 and July 2005. Starting and ending dates of significant activities are listed in

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Table 8. Photographs of site activities are presented in Appendix B. All accelerated action objectives were achieved. Removal activities are described below.

Table 8
IHSS Group 000-4 and Other IHSS Groups
Approximate Dates of Accelerated Action Activities

Activity	Starting Date	Ending Date	Duration
Accelerated action characterization sampling	January 2002	July 2005	3 years 6 months (not continuous)
Accelerated action soil removal activities in conjunction with characterization, in-process, and confirmation sampling	January 2002	July 2005	3 years 6 months (not continuous)
Excavation backfilling and regrading activities	January 2002	July 2005	3 years 6 months (not continuous)

4.1 NPWL Pipe Cutting Process

The NPWL between valve vaults and between valve vaults and buildings were installed in a double pipe configuration. The inside pipe, generally a 3 or 4 inch diameter fiberglass pipe, was the primary pipe used to transfer liquid process waste from the buildings to Building 374 for processing. The outer pipe, generally a 6 or 8 inch diameter ABS plastic pipe, provided secondary containment in the event the inner primary pipe failed. NPWL not below 3 ft of final grade, regardless of RCRA closure status, and NPWL that did not meet RCRA closure status were removed and disposed of as Low Level Waste (LLW), Low Level Mixed Waste (LLMW), or transuranic (TRU) waste depending on contamination levels. IP-1 waste containers, either the large Intermodal type or the smaller type metal boxes, were approved and used exclusively to collect waste for shipment to approved waste depositories. The presence of sludge in the pipe mandated the use of the smaller IP-1 container. NPWL containing sludge were cut in 4 ft sections to fit into the smaller IP-1 waste container. NPWL without sludge were cut into 14 ft sections to fit into the larger Intermodal waste container. Because the NPWL are known to be internally contaminated, once the exterior of the NPWL were exposed, the area around the NPWL was considered a Contamination Area (CA). As such, a Radiological Work Permit (RWP) was prepared and approved outlining the training requirements for personnel working in the CA, the work controls to contain the potential contamination, and the personal protective equipment (PPE) required to protect workers from receiving a personal contamination. Once the NPWL were exposed, RWP work controls mandated that a Radiological Control Technician (RCT) be present and oversee the work 100 percent of the time.

In general, all pipe-cutting evolutions were performed from inside of a sealed containment bag or inside a containment box attached to a high efficiency particulate (HEPA) air filtration system to provided negative air flow away from the workers performing the pipe cutting evolution. Both of these systems were supported by secondary containment in the event residual potentially contaminated liquid spilled from the primary containment. The secondary containment provided an extra layer of protection from potentially contaminated liquid leaking to the soil. There were isolated instances where small amounts of liquid from the NPWL leaked into the soil. During these events, samples of the liquid tainted soil were collected and analyzed using gamma

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spectroscopy methods. In all instances, gamma spectroscopy measurements indicated that no contamination migrated from the potentially contaminated liquid to the soil.

NPWL pipe segments were excavated and exposed primarily using excavator and backhoe type equipment. Soil excavated from around the NPWL was piled on the sides of the excavation and, as much as physical conditions allowed, soil which was in direct contact with the NPWL was kept isolated until radiological surveys could be conducted on the outside of the NPWL. In all cases, NPWL were found to be, at a minimum, below 6 ft from final elevation and no contamination was detected from surveys of the exterior of the NPWL. There were a relatively small number of instances where the NPWL was inadvertently breached during excavation. When this occurred, RCTs performed an immediate survey of the breached pipe and a sample of the soil around the breached area was collected to determine if there was any release of contamination to the soil. In every case where this occurred, no contamination was detected in the soil.

All of the NPWL were suspected to contain residual liquid from the rinsing evolution performed under a different project. As a result, each of the NPWL were tapped and drained prior to performing any pipe cuts. Equipment for the tap and drain evolution was set up in a completely contained configuration. Once the tap equipment was installed, a plastic tube was attached to the tap equipment and extended into a 5-gallon plastic container and sealed. A HEPA type filter was attached to the 5-gallon container to allow the air inside the container to vent. Another plastic tube was inserted into the 5-gallon container and connected through a peristaltic pump to a 55-gallon drum or larger poly tank, in the event the primary 5-gallon container did not provide enough capacity to collect the liquid drained from the NPWL. A plastic secondary containment was placed under the pipe tap equipment as well as under the 5-gallon plastic container to prevent leaks from making contact with the surrounding soil.

Given the composition of the NPWL, pipe cuts were made using a "sawsall" type cutting tool. Dressed in proper PPE, an accompanied by an RCT, workers prepared the pipes for the pipe cutting evolution by installing and applying the selected containment systems. The pipes were then sectioned; RCTs performed surveys of the exposed ends of the pipe, the equipment used to cut the pipe, and the personnel performing the evolution to determine levels of contamination and to determine if there was any potential for the spread of contamination. The sectioned ends of the pipes were then bagged and taped inside the pipe cutting containment. The pipe sections were then staged inside the excavation prior to removal and waste packaging with an excavator. Exposed pipe ends to be left in place and meeting RCRA closure criteria were grout plugged to the maximum extent possible.

Part of the RCRA Closure of NPWL included rinsing lines between valve vaults with a high-pressure water and soap mixture. The rinsate collected at the discharge side of the NPWL was analyzed for RCRA constituents and isotopic radiological constituents. The data from rinsing activities in the 400 area (with the exception of the NPWL between VV2 and VV3 where rinsate analytical results were less than those analyzed for the 400 area) were collected over a period of time and analyzed. The results show that the highest levels of contamination were as follows:

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- Am-241 0.06 pCi/L
- Pu-239/240 0.24 pCi/L
- U-233/234 3.6 pCi/L
- U-235/236 0.39 pCi/L
- U-238 24 pCi/L

Based on these low levels of radiological contamination, an agreement was reached with CDPHE to begin using gross alpha/gross beta analytical results and if the analytical results indicated levels below 313 pCi/L (the combined Tier I Groundwater Standard), then no additional sampling would be conducted. If the results were above this level, then additional sampling would be used provide additional source characterization data. This agreement was documented in a contact record dated February 12, 2003 (Appendix A). An evaluation of the gross alpha/gross beta rinsate results for NPWLs left in place and rinsate results for valve vaults left in place as reflected in Tables 9 and 10 indicates that the rinsate results were well below the 313 pCi/L action level. The pCi/L value listed in the tables essentially becomes an upper bound of the contamination that could be potentially left in the NPWL and/or in the valve vaults. A summary of NPWL removal is presented in Table 9.

Table 9
NPWL Pipe Summary

NPWL Line Segment	Disposition	Left in Place NPWL Rinsate Results for Radionuclides* (pCi/L)
B881 to VV1	Completely removed	
VV1 to VV2	Completely removed	
VV2 to VV3	RCRA clean closed. Left in place	3.72E+01
B883 to VV2	Completely removed	
VV3 to VV4	RCRA clean closed. Left in place	4.55E+00
VV4 to B889	Completely removed	
VV4 to VV5	RCRA clean closed. Left in place	6.96E+00
VV5 to VV6	RCRA clean closed. Left in place	4.13E+00
B889 to B865	Completely removed	
B865 to VV6	Completely removed	
VV3 to VV7	Completely removed	
VV7 to VV8	Completely removed	
VV8 to VV9	Completely removed	
VV9 to B778	Completely removed	
B778 to B732	Completely removed	
B732 to B566	Left in place. Not part of RCRA Unit 374.3	** (see note)
VV9 to B707	Completely removed	
B778 to B776	Completely removed	
B776 to B771	Completely removed	
B771 to B774	Completely removed	
B774 to B910	Completely removed	
VV8 to VV10	Completely removed	
VV10 to B528	Completely removed	

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NPWL Line Segment	Disposition	Left in Place NPWL Rinsate Results for Radionuclides* (pCi/L)
B528 to B559	Completely removed	
VV10 to VV11	Completely removed	
VV11 to VV12	Completely removed	
VV12 to B231	Completely removed	
B231 to T231	Completely removed	
VV12 to VV13	Completely removed	
VV13 to B371	Completely removed	
VV13 to VV14	RCRA clean closed. Left in place	7.43E+01
VV14 to VV15	RCRA clean closed. Left in place	3.32E+00
VV15 to VV16	VV15 to S. side of Central Ave RCRA clean closed. Remains in place. South of Central to VV16 completely removed.	Total U233/234/235/236=4.87E-01 Total Pu/Am=1.88E-02 Both expressed in pCi/g
VV16 to B443	Completely removed	
VV16 to VV20	VV16 to B428 tank pit, completely removed. B428 to VV20 RCRA clean closed in place.	Total U233/234/235/236=1.16E-00 Total Pu/Am=3.99E-3 Both expressed in pCi/g
VV20 to VV19	RCRA clean closed. Left in place	Total U233/234/235/236=1.64E-01 Total Pu/Am=1.15E-02 Both expressed in pCi/g
VV19 to B444	Completely removed	
VV16 to VV17	Completely removed	
VV17 to VV18	RCRA clean closed. Left in place	4.33E+00
VV18 to B122	Completely removed	
VV18 to B123	Completely removed	
VV18 to B460	Completely removed	
Inside B771/774	Completely removed during building demolition	
Inside B776/777	Completely removed during building demolition	
Inside B707	Completely removed during building demolition	
Inside B559	Completely removed during building demolition	
Inside B231	Completely removed during building demolition	
Inside B371/374	Completely removed during building demolition	
Inside B883	Completely removed during building demolition	
Inside B865	Completely removed during building demolition	
Inside B889	Completely removed during building demolition	

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NPWL Line Segment	Disposition	Left in Place NPWL Rinsate Results for Radionuclides* (pCi/L)
Inside B881	Completely removed during building demolition	
B881 to B887	Completely removed during building demolition	
Inside B887	Completely removed during building demolition	
Inside B123	Completely removed during building demolition	
Inside B460	Completely removed during building demolition	
Inside B444	Completely removed during building demolition	
Inside B443	Completely removed during building demolition	

Notes:

* Unless otherwise stated, radionuclide results are given in pCi/L combined gross alpha/gross beta from analysis of rinsate from NPWL and VVs to achieve RCRA closure. VVs 3, 8, and 9, were each documented in a contact record. Total values for Pu/Am and for U233/234/235/236, where available, are provided in this table. Per Contact Record dated 2/12/2003, a threshold of 313 pCi/L was established (the combined Tier I Groundwater Standard) before additional action should be considered. Although not a direct measurement of the inside of the NPWL or inside of the VV, it provides a qualitative measure of radionuclide contamination that may have been left in place.

** The B561 laundry never contained RCRA constituents; therefore, RCRA waste was never generated. Pipe ends were scanned and radiological contamination was not found. The pipe was epoxied as a precaution because, at the time of excavation, there was an unusual odor associated with the pipe. This laundry waste line originally connected to the sanitary sewer system and had the potential to be contaminated. To prevent potential contamination of the sanitary sewer, the B561 laundry line was separated from the sanitary sewer system and connected to the NPWL.

4.2 NPWL Valve Vault Removal Process

Twenty valve vaults were part of the NPWL system. An effort was made to rinse and decontaminate all of these valve vaults to satisfy RCRA closure criteria. As a result of this effort, 14 valve vaults were RCRA clean closed. Of these 14 valve vaults, 3 valve vaults contained elevated fixed radiological contamination which were deep inside the valve vaults. An agreement was reached with CDPHE to leave these three valve vaults in place and contain the fixed contamination by completely filling the valve vault with flow fill. The tops of 14 valve vaults were removed to assure that the remaining portion of the valve vaults were at least 4 ft below final grade. The remaining 6 valve vaults were completely removed. The NPWL and supporting valves, pumps, and other equipment contained inside all valve vaults were completely removed. NPWL penetrating through the walls of all valve vaults were grout plugged from inside the valve vault, at the valve vault wall during valve vault strip out. The main structure of all valve vaults were 15 to 18 ft deep including an approximately 2 by 2 ft sump pit in the bottom of each vault.

For a number of the partially excavated valve vaults, the NPWL penetrating the valve vaults were also RCRA clean closed. The combined gross alpha and gross beta analysis of the rinsate from these NPWL fell below the 313 pCi/L radiological threshold established in agreement with CDPHE in a December 12, 2003 contact record (Appendix A). These NPWL were allowed to be left in place; however, the exposed ends

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of the NPWL were required to be grout plugged to minimize the potential for a groundwater migration pathway. The remaining 6 valve vaults that required complete removal were first completely exposed by excavating the soil from around valve vault structure, completely exposing the base. The NPWL penetrating the manways and valve vaults which did not meet the criteria for RCRA clean closure were cut off as close to the valve vault as possible (in general, approx. 4 to 8 in of stub remained) and isolated to facilitate the demolition of the structure without breaching the associated NPWL. The pipe stub sections of the NPWL penetrating the valve vault was grout plugged to contain any contamination remaining in the pipe. The valve vaults were demolished using heavy equipment hammers, processors, and excavators, taking care not to breach the NPWL remaining in the valve vault walls. Once demolition was complete, the concrete debris and remaining sections of NPWL penetrating the walls of the valve vaults were removed by excavators and the waste deposited into an approved waste container. Soil confirmation samples were collected and following an initial field screen gamma spectroscopy measurement, the excavation was backfilled at risk pending final official laboratory analytical results from the confirmation sample.

All valve vaults that were left in place were RCRA clean closed and free of any removable beryllium contamination. With the exception of a few isolated areas within these vault where fixed and/or removable contamination levels were slightly above unrestricted release criteria, the majority of the valve vaults met unrestricted release criteria. All of the valve vaults were well below RFCA WRW soil ALs and the isolated contaminated areas were well below 4 ft of final grade. For those vaults where the isolated areas contained removable contamination above free release criteria, the vaults were completely filled with flow fill to a minimum of 1 ft above any contaminated area to contain the contamination. For those vaults where the isolated contamination above unrestricted release criteria was limited to fixed contamination, i.e., the removable contamination if any met unrestricted release criteria, the vault was demolished to a minimum of 4 ft below final grade and backfilled with clean soil.

Providing these structures are not disturbed in the future though institutional controls, it was agreed that the valve vaults could be left in place and do not pose a significant environmental risk in the future because of the following:

- The isolated areas of contamination were well below RFCA WRW soil ALs,
- Contamination was below 4 ft of final grade, and
- Remaining valve vaults were either flow fill or backfilled with clean soil.

A summary of NPWL valve vault removal is presented in Table 10.

Table 10
NPWL Valve Vault Summary

Valve Vault	Disposition	Left in Place NPWL Rinsate Results for Radionuclides* (pCi/L)	Comment

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Number			
1	Top 4' removed and backfilled with existing soil	3.08E+01	
2	Top 4' removed and flowfilled	Total U233/234/235=3.86E-01 Total Pu/Am=6.90E-07 Both expressed in grams	
3	Top 4' removed and backfilled with existing soil	Total U233/234/235=3.57E-02 Total Pu/Am=7.30E-06 Both expressed in grams	Appendix A - Contact Record 12/8/04
4	Top 4' removed and backfilled with existing soil	2.39E+01	
5	Top 4' removed and backfilled with existing soil	9.01E+01	
6	Top 4' removed and backfilled with existing soil	5.24E+00	
7	Completely Removed		
8	Top 4' removed and flowfilled	Total U233/234/235=1.48E-02 Total Pu/Am=1.24E-04 Both expressed in grams	Appendix A - Contact Record 11/18/04
9	Top 4' removed and flowfilled	Total U233/234/235=1.51E-02 Total Pu/Am=1.51E-05 Both expressed in grams	Appendix A - Contact Record 10/27/04
10	Top 4' removed and backfilled with existing soil	1.01E+02	
11	Completely Removed		
12	Completely Removed		
13	Completely Removed		
14	Top 4' removed and backfilled with existing soil	1.08E+01	
15	Top 4' removed and backfilled with existing soil	1.42E+01	
16	Completely Removed		
17	Top 4' removed and backfilled with existing soil	2.48E+01	
18	Top 4' removed and backfilled with existing soil	7.08E+00	
19	Top 4' removed and backfilled with existing soil	2.90E+01	
20	Top 4' removed and backfilled with existing soil	6.81E+00	
B231**	Completely Removed		
B428**	Top 4' removed and backfilled with existing soil	Total U233/234/235/236=9.78E-01 Total Pu/Am=1.80E-01 Both expressed in pCi/g	
B732**	Completely Removed		

Notes:

* Unless otherwise stated, radionuclide results are given in pCi/L combined gross alpha/gross beta from analysis of rinsate from NPWL and VVs to achieve RCRA closure. VVs 3, 8, and 9, were each documented in a contact record. Total values for Pu/Am and for U233/234/235/236, where available, are provided in this table. Per Contact Record dated 2/12/2003, a threshold of 313 pCi/L was established (the combined Tier I Groundwater Standard) before additional action should be considered. Although not a direct measurement of the inside of the NPWL or inside of the VV, it provides a qualitative measure of radionuclide contamination that may have been left in place.

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** Although B231, B428, and B732 were not labeled as valve vaults, they are considered the same as valve vaults for purposes of completeness because both were pass through structures containing NPWL (Figure 1).

4.3 NPWL Disposition

The majority of NPWL and associated valve vaults was dispositioned as part of IHSS Group 000-4 and was conducted following the guidelines described in Section 4.1 and 4.2. Other IHSS Group accelerated actions. NPWL dispositioned as part of other IHSS Group accelerated actions is described in the following sections. In, addition, some NPWL, while not associated with a specific IHSS Group, were removed as part of nearby accelerated actions.

4.3.1 IHSS Group 000-1 – Solar Evaporation Ponds

The above ground NPWL that were present south of the SEP and transferred waste from the Building 991 to Building 774 were removed in 2003 (DOE 2003a).

4.3.2 IHSS Group 800-1 – UBC 865 – Materials Process Building

Two NPWL sections located west of Building 865 were tapped and drained, filled with epoxy, and removed. These sections were packaged and sent off site for disposal as low-level mixed waste. The northernmost line was removed up to Valve Vault 6, and all of the line to the Building 889 area was removed (there was no remaining end to grout) (DOE 2004k).

4.3.3 IHSS Group 800-3

NPWL from Valve Vault 2 to Building 883 and from Valve Vault 2 to Valve Vault 1 were removed. NPWL from Valve Vault 2 to Valve Vault 3 were not removed, but were clean-closed in accordance with the RCRA Part B permit (DOE 2005h). Valve Vault 2 was removed to greater than 4 feet (ft) below ground surface and grouted.

4.3.4 IHSS Group 800-6

An 8-foot section of metal housing around the NPWL (RCRA Unit 40) adjacent to Building 889 was removed. The housing was disposed of as low level radioactive waste. The remaining line consists of a high-density polyethylene (HDPE) line in which the actual waste line resides. The waste line is PVC pipe. The waste line was capped, and the space between the waste line and the HDPE line was filled with grout (DOE 2003p). The line was removed as part of the Building 865 Decontamination & Decommissioning (D&D) Project.

4.4 Soil Removal Activities

Only one soil removal action was taken to remediate contaminated soil as part of the IHSS Group 000-4 project. During excavation operations, a section of NPWL with a stainless steel patch sleeve (used to repair process lines) was observed between Valve

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Vaults 12 and 13. Stained soil was apparent at one of the sleeve; therefore, a soil sample was collected (BX44-001) from the stained area. Analytical results indicated the soil contained radionuclide contamination and required remediation. The area, approximately 5 ft by 7 ft and 8 ft deep, was excavated to remove contaminated soil (Figure 6). Approximately 2 cubic yards (yd^3) of contaminated soil was disposed of from this location. Following the removal of contaminated soil, confirmation sampling indicated radionuclide activities in the remaining soil were below RFCA WRW soil ALs.

The NPWL extending north out of VV16 to the south side of Central Avenue, east out of VV16 through the B428 pit to VV20, south to VV17, and west to B443, as well as VV16 itself were all RCRA clean closed and could have remained in place. They were removed, however, because of the size of the fuel oil contamination excavation area associated with the fuel oil tanks that leaked over the years at Building 443 (IHSS Group 400-7) (DOE 2004b).

4.5 Site Reclamation

The excavation described in Section 4.4 was backfilled with clean onsite soil. Excavations to remove NPWL were backfilled with the native soil originally removed from the excavation. The excavation areas were regraded and revegetated.

5.0 CONFIRMATION SAMPLING

The RSOP Notification #05-01 remediation plan for IHSS Group 000-4 (DOE 2004n) included objectives for confirmation sampling. The RSOP Notification #05-01 stated that soils samples were to be collected at valve vaults that were not clean closed, at breaks in the pipeline containment, and at areas of stained soil. In addition, if contaminated soil is removed, collect confirmation soil samples in accordance with the IABZSAP (DOE 2004o).

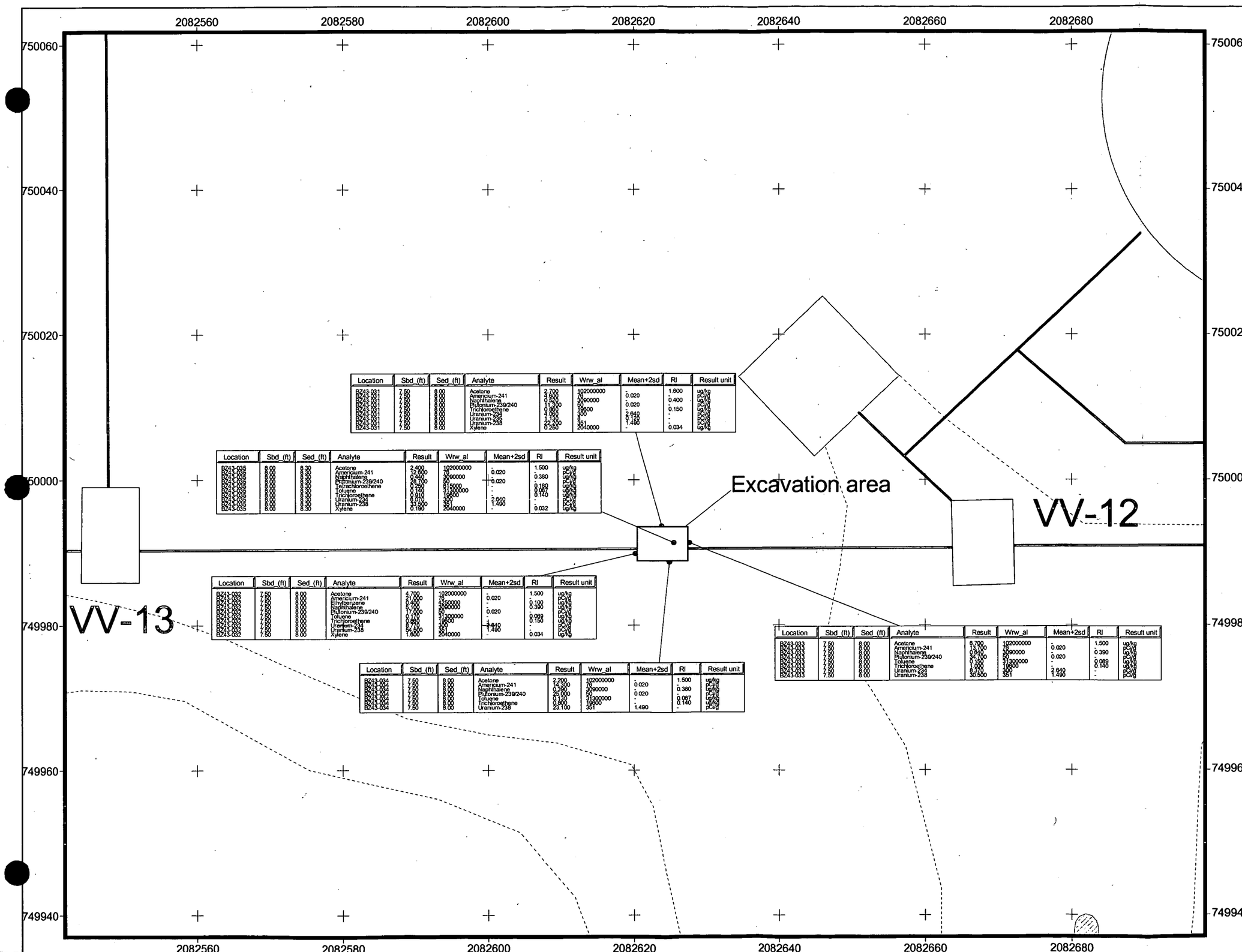
At each of the valve vaults that were completely removed (Valve Vaults 7, 10, 11, 12, 13, and 16), at least one soil sample was collected for laboratory analysis (Figures 2 through 4). The samples collected from the valve vault areas are classified as characterization samples because no soil remediation was required during their removal (Table 4).

Confirmation sampling in the 100/400 Area was conducted as part of the IHSS Group 400-7 project (DOE 2004b). Contaminated soil from this area was excavated to remediate petroleum hydrocarbon contamination not related to NPWL; however, Valve Vault 16 was removed as a result of this action. In the 300/500 Area, between Valve Vaults 12 and 13, only one leak/stained soil location was identified during IHSS Group 000-4 project activities. The contaminated soil in this area was remediated, and confirmation samples were collected to verify the remediation was complete. Confirmation sampling locations and analytical results with activities or concentrations greater than background means plus two standard deviations or RLs are shown on Figure 7 and analytical results are listed in Table 11.

7/

Figure 6

300/500 Area Excavation and Confirmation Soil Sampling Results



Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
B243-031	7.50	8.00	Acetone	2.700	102000000	-	1.600	ug/kg
B243-031	7.50	8.00	Americium-241	4.600	70	0.020	-	pCi/g
B243-031	7.50	8.00	Naphthalene	0.520	3090000	-	0.400	ug/kg
B243-031	7.50	8.00	Plutonium-239/240	11.500	50	0.020	-	pCi/g
B243-031	7.50	8.00	Trichloroethene	0.880	19600	-	0.150	ug/kg
B243-031	7.50	8.00	Uranium-234	4.000	300	2.640	-	pCi/g
B243-031	7.50	8.00	Uranium-235	1.130	8	0.130	-	pCi/g
B243-031	7.50	8.00	Uranium-238	22.600	351	1.490	-	pCi/g
B243-031	7.50	8.00	Xylene	0.250	2040000	-	0.034	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
B243-035	8.00	8.30	Acetone	2.400	102000000	-	1.500	ug/kg
B243-035	8.00	8.30	Americium-241	12.600	70	0.020	-	pCi/g
B243-035	8.00	8.30	Naphthalene	0.440	3090000	-	0.380	ug/kg
B243-035	8.00	8.30	Plutonium-239/240	28.700	50	0.020	-	pCi/g
B243-035	8.00	8.30	Tetrachloroethene	0.250	815000	-	0.180	ug/kg
B243-035	8.00	8.30	Toluene	0.120	31300000	-	0.067	ug/kg
B243-035	8.00	8.30	Trichloroethene	0.910	19600	-	0.140	ug/kg
B243-035	8.00	8.30	Uranium-234	3.010	300	2.640	-	pCi/g
B243-035	8.00	8.30	Uranium-238	15.500	351	1.490	-	pCi/g
B243-035	8.00	8.30	Xylene	0.180	2040000	-	0.032	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
B243-032	7.50	8.00	Acetone	4.700	102000000	-	1.500	ug/kg
B243-032	7.50	8.00	Americium-241	21.000	70	0.020	-	pCi/g
B243-032	7.50	8.00	Ethylbenzene	0.400	4250000	-	0.100	ug/kg
B243-032	7.50	8.00	Naphthalene	5.700	3090000	-	0.390	ug/kg
B243-032	7.50	8.00	Plutonium-239/240	17.000	50	0.020	-	pCi/g
B243-032	7.50	8.00	Toluene	0.170	31300000	-	0.088	ug/kg
B243-032	7.50	8.00	Trichloroethene	0.860	19600	-	0.150	ug/kg
B243-032	7.50	8.00	Uranium-234	8.970	300	2.640	-	pCi/g
B243-032	7.50	8.00	Uranium-238	54.600	351	1.490	-	pCi/g
B243-032	7.50	8.00	Xylene	1.600	2040000	-	0.034	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
B243-034	7.50	8.00	Acetone	2.200	102000000	-	1.500	ug/kg
B243-034	7.50	8.00	Americium-241	14.300	70	0.020	-	pCi/g
B243-034	7.50	8.00	Naphthalene	0.380	3090000	-	0.380	ug/kg
B243-034	7.50	8.00	Plutonium-239/240	45.000	50	0.020	-	pCi/g
B243-034	7.50	8.00	Toluene	0.130	31300000	-	0.067	ug/kg
B243-034	7.50	8.00	Trichloroethene	0.800	19600	-	0.140	ug/kg
B243-034	7.50	8.00	Uranium-238	23.100	351	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
B243-033	7.50	8.00	Acetone	6.700	102000000	-	1.500	ug/kg
B243-033	7.50	8.00	Americium-241	13.100	70	0.020	-	pCi/g
B243-033	7.50	8.00	Naphthalene	0.340	3090000	-	0.390	ug/kg
B243-033	7.50	8.00	Plutonium-239/240	34.700	50	0.020	-	pCi/g
B243-033	7.50	8.00	Toluene	0.150	31300000	-	0.089	ug/kg
B243-033	7.50	8.00	Trichloroethene	1.000	19600	-	0.140	ug/kg
B243-033	7.50	8.00	Uranium-234	6.970	300	2.640	-	pCi/g
B243-033	7.50	8.00	Uranium-238	30.500	351	1.490	-	pCi/g

KEY

- Detection less than WRW AL
- Excavation
- Tank - removed
- Building/structure
- Demolished structure
- Paved area
- Dirt road
- Stream, ditch, or other drainage feature
- NPWL - removed (below ground)
- NPWL - removed (above ground)
- NPWL - left in place (clean closed)
- NPWL - left in place (not part of RCRA Unit 374.3)
- Valve Vault - removed
- Valve Vault - partially removed and flow filled
- Valve Vault - partially removed and backfilled

N W E S

10 0 10 Feet

Scale = 1:150

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Date: 09/28/05

RADMS

Prepared for:

KAISER•HILL COMPANY

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Table 11
IHSS Group 000-4 Soil Confirmation Results
Greater Than Background Means Plus Two Standard Deviations or RLs

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
300/500	000-4	BZ43-031	749993.612	2082623.816	7.50	8.00	Acetone	2.700	102000000	-	1.600	ug/kg
300/500	000-4	BZ43-031	749993.612	2082623.816	7.50	8.00	Americium-241	4.600	76	0.020	-	pCi/g
300/500	000-4	BZ43-031	749993.612	2082623.816	7.50	8.00	Naphthalene	0.520	3090000	-	0.400	ug/kg
300/500	000-4	BZ43-031	749993.612	2082623.816	7.50	8.00	Plutonium-239/240	11.300	50	0.020	-	pCi/g
300/500	000-4	BZ43-031	749993.612	2082623.816	7.50	8.00	Trichloroethene	0.860	19600	-	0.150	ug/kg
300/500	000-4	BZ43-031	749993.612	2082623.816	7.50	8.00	Uranium-234	4.060	300	2.640	-	pCi/g
300/500	000-4	BZ43-031	749993.612	2082623.816	7.50	8.00	Uranium-235	1.130	8	0.120	-	pCi/g
300/500	000-4	BZ43-031	749993.612	2082623.816	7.50	8.00	Uranium-238	22.200	351	1.490	-	pCi/g
300/500	000-4	BZ43-031	749993.612	2082623.816	7.50	8.00	Xylene	0.250	2040000	-	0.034	ug/kg
300/500	000-4	BZ43-032	749989.828	2082620.197	7.50	8.00	Acetone	4.700	102000000	-	1.500	ug/kg
300/500	000-4	BZ43-032	749989.828	2082620.197	7.50	8.00	Americium-241	21.000	76	0.020	-	pCi/g
300/500	000-4	BZ43-032	749989.828	2082620.197	7.50	8.00	Ethylbenzene	0.400	4250000	-	0.100	ug/kg
300/500	000-4	BZ43-032	749989.828	2082620.197	7.50	8.00	Naphthalene	5.100	3090000	-	0.390	ug/kg
300/500	000-4	BZ43-032	749989.828	2082620.197	7.50	8.00	Plutonium-239/240	17.000	50	0.020	-	pCi/g
300/500	000-4	BZ43-032	749989.828	2082620.197	7.50	8.00	Toluene	0.170	31300000	-	0.089	ug/kg
300/500	000-4	BZ43-032	749989.828	2082620.197	7.50	8.00	Trichloroethene	0.860	19600	-	0.150	ug/kg
300/500	000-4	BZ43-032	749989.828	2082620.197	7.50	8.00	Uranium-234	8.770	300	2.640	-	pCi/g
300/500	000-4	BZ43-032	749989.828	2082620.197	7.50	8.00	Uranium-238	54.500	351	1.490	-	pCi/g
300/500	000-4	BZ43-032	749989.828	2082620.197	7.50	8.00	Xylene	1.600	2040000	-	0.034	ug/kg
300/500	000-4	BZ43-033	749991.319	2082627.596	7.50	8.00	Acetone	6.700	102000000	-	1.500	ug/kg
300/500	000-4	BZ43-033	749991.319	2082627.596	7.50	8.00	Americium-241	13.700	76	0.020	-	pCi/g
300/500	000-4	BZ43-033	749991.319	2082627.596	7.50	8.00	Naphthalene	0.640	3090000	-	0.390	ug/kg
300/500	000-4	BZ43-033	749991.319	2082627.596	7.50	8.00	Plutonium-239/240	34.700	50	0.020	-	pCi/g
300/500	000-4	BZ43-033	749991.319	2082627.596	7.50	8.00	Toluene	0.150	31300000	-	0.089	ug/kg
300/500	000-4	BZ43-033	749991.319	2082627.596	7.50	8.00	Trichloroethene	1.000	19600	-	0.140	ug/kg
300/500	000-4	BZ43-033	749991.319	2082627.596	7.50	8.00	Uranium-234	8.370	300	2.640	-	pCi/g
300/500	000-4	BZ43-033	749991.319	2082627.596	7.50	8.00	Uranium-238	30.500	351	1.490	-	pCi/g
300/500	000-4	BZ43-034	749988.668	2082624.879	7.50	8.00	Acetone	2.200	102000000	-	1.500	ug/kg

Area	IHSS Group	Location	Actual Northing	Actual Easting	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
300/500	000-4	BZ43-034	749988.668	2082624.879	7.50	8.00	Americium-241	14.300	76	0.020	-	pCi/g
300/500	000-4	BZ43-034	749988.668	2082624.879	7.50	8.00	Naphthalene	0.390	3090000	-	0.380	ug/kg
300/500	000-4	BZ43-034	749988.668	2082624.879	7.50	8.00	Plutonium-239/240	25.000	50	0.020	-	pCi/g
300/500	000-4	BZ43-034	749988.668	2082624.879	7.50	8.00	Toluene	0.130	31300000	-	0.087	ug/kg
300/500	000-4	BZ43-034	749988.668	2082624.879	7.50	8.00	Trichloroethene	0.800	19600	-	0.140	ug/kg
300/500	000-4	BZ43-034	749988.668	2082624.879	7.50	8.00	Uranium-238	23.100	351	1.490	-	pCi/g
300/500	000-4	BZ43-035	749991.322	2082625.491	8.00	8.30	Acetone	2.400	102000000	-	1.500	ug/kg
300/500	000-4	BZ43-035	749991.322	2082625.491	8.00	8.30	Americium-241	12.600	76	0.020	-	pCi/g
300/500	000-4	BZ43-035	749991.322	2082625.491	8.00	8.30	Naphthalene	0.440	3090000	-	0.380	ug/kg
300/500	000-4	BZ43-035	749991.322	2082625.491	8.00	8.30	Plutonium-239/240	28.700	50	0.020	-	pCi/g
300/500	000-4	BZ43-035	749991.322	2082625.491	8.00	8.30	Tetrachloroethene	0.250	615000	-	0.180	ug/kg
300/500	000-4	BZ43-035	749991.322	2082625.491	8.00	8.30	Toluene	0.140	31300000	-	0.087	ug/kg
300/500	000-4	BZ43-035	749991.322	2082625.491	8.00	8.30	Trichloroethene	0.910	19600	-	0.140	ug/kg
300/500	000-4	BZ43-035	749991.322	2082625.491	8.00	8.30	Uranium-234	6.070	300	2.640	-	pCi/g
300/500	000-4	BZ43-035	749991.322	2082625.491	8.00	8.30	Uranium-238	33.500	351	1.490	-	pCi/g
300/500	000-4	BZ43-035	749991.322	2082625.491	8.00	8.30	Xylene	0.190	2040000	-	0.032	ug/kg

Figure 7

100/400 and 300/500 Area Confirmation Soil Sampling Results

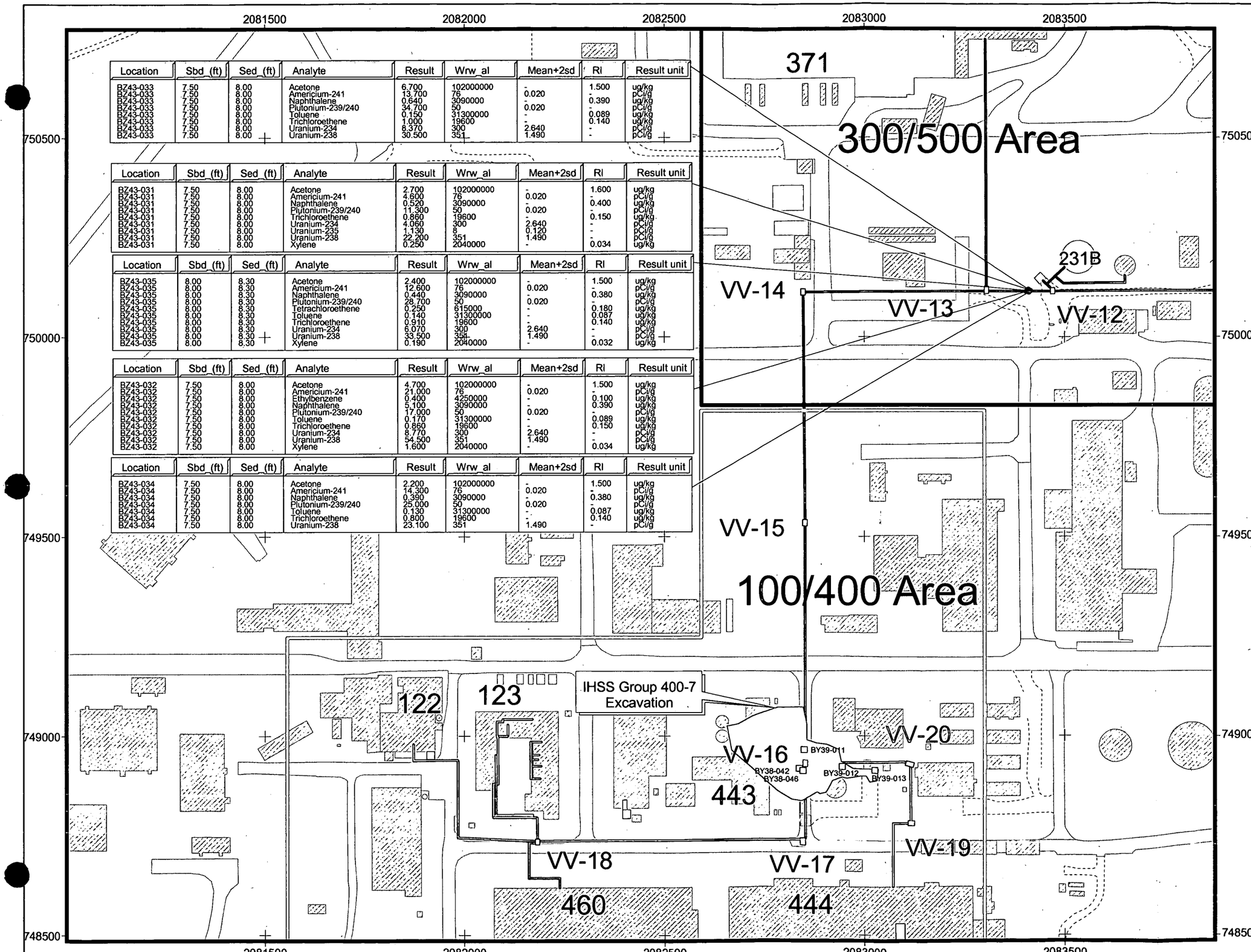
Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BZ43-033	7.50	8.00	Acetone	6.700	102000000	-	1.500	ug/kg
BZ43-033	7.50	8.00	Americium-241	13.700	76	0.020	-	pCi/g
BZ43-033	7.50	8.00	Naphthalene	0.640	3090000	-	0.390	ug/kg
BZ43-033	7.50	8.00	Plutonium-239/240	34.700	50	0.020	-	pCi/g
BZ43-033	7.50	8.00	Toluene	0.150	31300000	-	0.089	ug/kg
BZ43-033	7.50	8.00	Trichloroethene	1.000	19600	-	0.140	ug/kg
BZ43-033	7.50	8.00	Uranium-234	8.370	300	2.640	-	pCi/g
BZ43-033	7.50	8.00	Uranium-238	30.500	351	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BZ43-031	7.50	8.00	Acetone	2.700	102000000	-	1.600	ug/kg
BZ43-031	7.50	8.00	Americium-241	4.600	76	0.020	-	pCi/g
BZ43-031	7.50	8.00	Naphthalene	0.520	3090000	-	0.400	ug/kg
BZ43-031	7.50	8.00	Plutonium-239/240	11.300	50	0.020	-	pCi/g
BZ43-031	7.50	8.00	Trichloroethene	0.860	19600	-	0.150	ug/kg
BZ43-031	7.50	8.00	Uranium-234	4.060	300	2.640	-	pCi/g
BZ43-031	7.50	8.00	Uranium-235	1.130	8	0.120	-	pCi/g
BZ43-031	7.50	8.00	Uranium-238	22.200	351	1.490	-	pCi/g
BZ43-031	7.50	8.00	Xylene	0.250	2040000	-	0.034	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BZ43-035	8.00	8.30	Acetone	2.400	102000000	-	1.500	ug/kg
BZ43-035	8.00	8.30	Americium-241	12.600	76	0.020	-	pCi/g
BZ43-035	8.00	8.30	Naphthalene	0.440	3090000	-	0.380	ug/kg
BZ43-035	8.00	8.30	Plutonium-239/240	28.700	50	0.020	-	pCi/g
BZ43-035	8.00	8.30	Tetrachloroethene	0.250	615000	-	0.180	ug/kg
BZ43-035	8.00	8.30	Toluene	0.140	31300000	-	0.087	ug/kg
BZ43-035	8.00	8.30	Trichloroethene	0.910	19600	-	0.140	ug/kg
BZ43-035	8.00	8.30	Uranium-234	6.070	300	2.640	-	pCi/g
BZ43-035	8.00	8.30	Uranium-238	33.500	351	1.490	-	pCi/g
BZ43-035	8.00	8.30	Xylene	0.190	2040000	-	0.032	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BZ43-032	7.50	8.00	Acetone	4.700	102000000	-	1.500	ug/kg
BZ43-032	7.50	8.00	Americium-241	21.000	76	0.020	-	pCi/g
BZ43-032	7.50	8.00	Ethylbenzene	0.400	4250000	-	0.100	ug/kg
BZ43-032	7.50	8.00	Naphthalene	5.100	3090000	-	0.390	ug/kg
BZ43-032	7.50	8.00	Plutonium-239/240	17.000	50	0.020	-	pCi/g
BZ43-032	7.50	8.00	Toluene	0.170	31300000	-	0.089	ug/kg
BZ43-032	7.50	8.00	Trichloroethene	0.860	19600	-	0.150	ug/kg
BZ43-032	7.50	8.00	Uranium-234	8.770	300	2.640	-	pCi/g
BZ43-032	7.50	8.00	Uranium-238	54.500	351	1.490	-	pCi/g
BZ43-032	7.50	8.00	Xylene	1.600	2040000	-	0.034	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BZ43-034	7.50	8.00	Acetone	2.200	102000000	-	1.500	ug/kg
BZ43-034	7.50	8.00	Americium-241	14.300	76	0.020	-	pCi/g
BZ43-034	7.50	8.00	Naphthalene	0.390	3090000	-	0.380	ug/kg
BZ43-034	7.50	8.00	Plutonium-239/240	25.000	50	0.020	-	pCi/g
BZ43-034	7.50	8.00	Toluene	0.130	31300000	-	0.087	ug/kg
BZ43-034	7.50	8.00	Trichloroethene	0.800	19600	-	0.140	ug/kg
BZ43-034	7.50	8.00	Uranium-238	23.100	351	1.490	-	pCi/g



KEY

- Detection less than WRW AL
- Below background or MDL/RL
- Excavation
- Tank - removed
- Building/structure
- Demolished structure
- Paved area
- Dirt road
- Stream, ditch, or other drainage feature
- NPWL - removed (below ground)
- NPWL - removed (above ground)
- NPWL - left in place (clean closed)
- NPWL - left in place (not part of RCRA Unit 374.3)
- Valve Vault - removed
- Valve Vault - partially removed and flow filled
- Valve Vault - partially removed and backfilled

N W E S

100 0 100 Feet

Scale = 1:2,000

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: RADMS Date: 09/28/05

Prepared for: KAISER•HILL COMPANY

File:W:\Projects\Fy2005\000-4\NPWL cor gpp.apr

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6.0 RCRA UNIT CLOSURE

NPWL is RCRA Unit 374.3 and was closed in accordance with approved RCRA closure description documents (CDDs) (DOE 2002i and 2003q) and the RFETS RCRA Part B Permit (CO-097-05-03-01), Part X, Closure (CDPHE 1997 and 2004). Closure of the unit is described in the Closure Summary Report for the 700/800 Process Waste Transfer System, RCRA Unit 374.3 (DOE 2005h).

7.0 SUBSURFACE SOIL RISK SCREEN

The SSRS follows the steps identified on Figure 3 in Attachment 5 of RFCA (DOE et al. 2003).

Screen 1 – Are the COC concentrations below Table 3 RFCA WRW soil ALs?

No. One sampling location contains arsenic at a concentration greater than the RFCA WRW soil AL. This location (CF33-010) did not require remediation because the nonradionuclide contaminant was detected at a depth greater than 6 in below the surface (5 ft bgs).

Screen 2 – Is there potential for subsurface soil to become surface soil (landslide and erosion areas identified on Figure 1)?

No. While some NPWL sampling locations are in an area mapped as prone to landslides (south of Building 881), residual contamination related to NPWL in this area is at least 5 ft bgs and greater. Additionally, regrading, compacting, and revegetating activities conducted as part of the final land configuration will further reduce the likelihood of erosion. Other areas of the Site containing NPWL are not considered to pose a significant landslide risk.

Screen 3 – Does subsurface soil radiological contamination exceed criteria in Section 5.3?

No. No radionuclide contamination greater than 1 nCi/g exists at depths between 3 and 6 ft bgs and activities of residual radionuclides do not exceed RFCA WRW soil ALs. In addition, no radiological contamination exceeds RFCA WRW soil ALs at valve vaults (Figures 2 through 5).

Screen 4 – Is there an environmental pathway and sufficient quantity of COCs that would cause exceedance of the surface water standards?

No. Contaminant migration via groundwater is the primary pathway whereby surface water could be impacted by residual contamination from IHSS Group 000-4. As described in Screen 2, most locations containing NPWL are stable areas that are not prone to landslides or high erosion.

The potential for exceedances of surface water standards via the groundwater pathway should be minimal for the following reasons:

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- All of the NPWL were flushed and rinsate analyzed under a different project.
- Twenty valve vaults were part of the NPWL network. An effort was made to rinse and decontaminate all of these valve vaults to satisfy RCRA closure criteria. As a result of this effort, 14 valve vaults were RCRA clean closed and 6 valve vaults were completely removed.
- The tops of 14 RCRA clean closed valve vaults were partially excavated to at least 4 ft bgs.
- Of the 14 RCRA clean closed valve vaults, 3 valve vaults contained elevated fixed radiological contamination deep inside the valve vaults. An agreement was reached with CDPHE to leave these three valve vaults in place and contain the fixed contamination by completely filling the valve vault with flow fill. The remaining 11 valve vaults were backfilled with soil.
- The NPWL and supporting valves, pumps, and other equipment contained inside all valve vaults were completely removed.
- Major portions of NPWL has been removed, reducing the potential for future contaminant releases from these areas.
- Remaining NPWL has been rinsed, sampled for RCRA constituents, and shown to be RCRA-clean, further eliminating potential future releases of contamination.
- Soil contaminated from NPWL was excavated from one location (Figure 6) and confirmation results indicate that the source of contamination has been removed, thereby reducing potential continuing sources to groundwater contamination.
- One sample location CI46014 had an SOR of 3.181; however, This location was remediated as part of the IHSS Group 700-7 (UBC 779) accelerated action.
- One sampling location, CF33-010 in the 800 Area, contains residual arsenic at a concentration of 25.5 mg/kg (RFCA WRW AL equal 22.2 mg/kg). This location did not require remediation because the nonradionuclide contaminant was detected at a depth greater than 6 in below the surface (5 ft bgs).
- Results for organics were below RFCA WRW soil ALs; and
- Erosion controls will be incorporated as part of the final ground surface reconfiguration, and ongoing surface water and groundwater quality monitoring will continue to ensure the long-term effectiveness of the accelerated action for protecting surface water.

8.0 STEWARDSHIP ANALYSIS

The IHSS Group 000-4 stewardship evaluation was conducted through ongoing consultation with the regulatory agencies. Throughout the project, informal project updates from the Field Project Manager were provided through e-mails, telephone conversations, and personal contacts. Copies of Regulatory Contact Records are provided in Appendix A.

8.1 Current Site Conditions

As discussed in Section 2.3, accelerated actions at IHSS Group 000-4 consisted of characterization sampling of soil, excavation of radionuclide contaminated soil, and in-process and confirmation sampling of soil. Based upon the accelerated actions performed and analytical results of sampling, conditions at IHSS Group 000-4 include the following:

- Approximately 15,300 ft of NPWL were removed and disposed of from the Site.
- Approximately 6,200 ft of NPWL was grouted and left in place.
- Twenty valve vaults were part of the NPWL network. Six valve vaults were completely removed, three valve vaults were partially excavated to at least 4 ft bgs and flow filled in agreement with the CDPHE, and eleven valve vaults were partially excavated to at least 4 ft bgs and backfilled with soil.
- The potential sources of contamination related to NPWL that existed at concentrations greater than RFCA WRW soil ALs were removed unless remediation was not required based on RFCA (DOE et al. 2003).
- Residual radionuclide contaminant activities, related to or near former or left in place NPWL, are below RFCA WRW soil ALs.
- Arsenic is the only residual contaminant remaining at a concentration greater than the RFCA WRW soil AL; however, remediation was not required according to RFCA (DOE et al. 2003) because the contaminant is located at a depth greater than 6 inches from the surface (5 ft bgs).
- Backfilling of excavations and regrading has been completed. Final grading, surface stabilization, and revegetation of areas containing NPWL will be conducted as part of other projects.

8.2 Near-Term Management Recommendations

Because residual contaminant concentrations are low and potential contaminant sources have been identified or removed according to accelerated action objectives, no specific near-term management actions are required. Contaminant concentrations in soil remaining at IHSS Group 000-4 do not trigger any further accelerated action.

Near-term recommendations include the following:

- Excavation at the site will continue to be controlled through the Site Soil Disturbance Permit process;
- Access will be restricted; and
- Site access and the Soil Disturbance Permit process will remain in place pending implementation of long-term controls.

8.3 Long-Term Stewardship Recommendations

Based on remaining environmental conditions at IHSS Group 000-4, no IHSS Group-specific long-term stewardship activities are recommended beyond the generally applicable Site requirements. Institutional controls that may be used as appropriate for this area include the following:

- Prohibitions on construction of buildings;
- Restrictions on excavation or other soil disturbance; and
- Prohibition on groundwater pumping in the area of IHSS Group 000-4 and other IHSS Groups.

Currently, no Group-specific engineering controls or environmental monitoring are recommended as a result of the conditions remaining at IHSS Group 000-4. Likewise, no specific institutional or physical controls are recommended as a result of the conditions remaining at IHSS Group 000-4.

IHSS Group 000-4 will be evaluated as part of the Sitewide Comprehensive Risk Assessment (CRA). The CRA is part of the RI/FS that will be conducted for the Site.

The need for and extent of any more general, long-term stewardship activities will also be analyzed in the RI/FS and proposed as part of the preferred alternative in the Proposed Plan for the Site. Institutional controls and other long-term stewardship requirements for the Site will ultimately be contained in the Corrective Action Decision/Record of Decision (CAD/ROD). This Closeout Report and associated documentation will be retained as part of the Rocky Flats Administrative Record (AR) file.

9.0 DEVIATIONS FROM THE ER RSOP

There were no deviations from ER RSOP Notification #05-01 (DOE 2004n) or other ER RSOP Notifications listed in Table 1.

10.0 POST-ACCELERATED ACTION CONDITIONS

Residual contaminant concentrations at valve vaults and NPWL are below RFCA WRW soil ALs at IHSS Group 000-2, with the exception of arsenic at one location (CF33-010

in the 800 Area). This location did not require remediation based on RFCA (DOE et al. 2003).

11.0 WASTE MANAGEMENT

NPWL derived waste was classified as LLW and LLMW. Waste consisted of soil, pipe, concrete, and debris generated during NPWL excavations and removal operations. Waste from both the NPWL and OPWL projects were occasionally combined in the same waste containers. NPWL lines and valve vaults that did not meet RCRA clean closure and were removed, are covered under the RCRA Closure Summary Report (DOE 2005h).

12.0 SITE RECLAMATION

Final regrading and revegetation of the area is being conducted as part of other projects.

13.0 NLR SAMPLING LOCATIONS

The sampling location designated NLR for IHSS Group 000-4 is listed in Table 12. NLR locations are flagged in the RFETS Soil Water Database (SWD) to ensure they will not be incorporated into the Sitewide CRA or other Site analyses.

Table 12
IHSS Group 000-4 and Other IHSS Groups NLR Sampling Locations

Area	Location	Northing	Easting	Media	Starting Depth (ft)	Ending Depth (ft)
300/500	BX44-001	749990.711	2082622.966	Soil	7.0	7.5

14.0 DATA QUALITY ASSESSMENT

The DQOs for this project are described in the IASAP (DOE 2001c). All DQOs for this project were achieved based on the following:

- Regulatory agency-approved sampling program design in accordance with the IASAP (DOE 2001c) and IABZSAP(DOE 2004o);
- Collection of samples in accordance with the sampling design;
- Implementation of remediation activities in accordance with ER RSOP Notification #05-01 (DOE 2004n); and
- Results of the DQA, as described in the following sections.

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14.1 Data Quality Assessment Process

The DQA process ensures that the type, quantity, and quality of environmental data used in decision making are defensible, and is based on the following guidance and requirements:

- U.S. Environmental Protection Agency (EPA), 1994a, Guidance for the Data Quality Objective Process, QA/G-4;
- EPA, 1998, Guidance for the Data Quality Assessment Process, Practical Methods for Data Analysis, QA/G-9; and
- U.S. Department of Energy (DOE), 1999, Quality Assurance, Order 414.1A.

Verification and validation (V&V) of data are the primary components of the DQA. The final data are compared with original project DQOs and evaluated with respect to project decisions; uncertainty within the decisions; and quality criteria required for the data, specifically precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS). Validation criteria are consistent with the following RFETS-specific documents and industry guidelines:

- EPA, 1994b, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, 540/R-94/012;
- EPA, 1994c, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, 540/R-94/013;
- Kaiser-Hill Company, L.L.C. (K-H), 2002a, General Guidelines for Data Verification and Validation, DA-GR01-v2, October;
- K-H, 2002b, V&V Guidelines for Isotopic Determinations by Alpha Spectrometry, DA-RC01-v2, October;
- K-H, 2002c, V&V Guidelines for Volatile Organics, DA-SS01-v3, October;
- K-H, 2002d, V&V Guidelines for Semivolatile Organics, DA-SS02-v3, October;
- K-H, 2002e, V&V Guidelines for Metals, DA-SS05-v3, October; and
- Lockheed-Martin, 1997, Evaluation of Radiochemical Data Usability, ES/ER/MS-5.

This report will be submitted to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) AR for permanent storage 30 days after being provided to CDPHE and/or EPA.

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14.2 Verification and Validation of Results

Verification ensures that data produced and used by the project are documented and traceable in accordance with quality requirements. Validation consists of a technical review of all data that directly support the project decisions so that any limitations of the data relative to project goals are delineated and the associated data are qualified accordingly. The V&V process defines the criteria that constitute data quality, namely PARCCS parameters. Data traceability and archival are also addressed. V&V criteria include the following:

- Chain-of-custody;
- Preservation and hold times;
- Instrument calibrations;
- Preparation blanks;
- Interference check samples (metals);
- Matrix spikes/matrix spike duplicates (MS/MSDs);
- Laboratory control samples (LCSs);
- Field duplicate measurements;
- Chemical yield (radiochemistry);
- Required quantitation limits/minimum detectable activities (sensitivity of chemical and radiochemical measurements, respectively); and
- Sample analysis and preparation methods.

Evaluation of V&V criteria ensures that PARCCS parameters are satisfactory (that is, within tolerances acceptable to the project). Satisfactory V&V of laboratory quality controls are captured through application of validation "flags" or qualifiers to individual records.

Raw hard-copy data (for example, individual analytical data packages) are currently filed by report identification number (RIN) and maintained by K-H Analytical Services Division (ASD). Older hard copies may reside in the Federal Center in Lakewood, Colorado. Electronic data are stored in the RFETS SWD. Standardized real and QC data are included on the enclosed CD.

14.2.1 Accuracy

The following measures of accuracy were evaluated:

- LCSs;

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- Surrogates;
- Field blanks; and
- Sample MSs.

Results are compared to method requirements and project goals. The results of these comparisons are summarized for RFCA COCs where the results could impact project decisions. Particular attention is paid to those values near ALs when QC results could indicate unacceptable levels of uncertainty for decision-making purposes.

Laboratory Control Sample Evaluation

As indicated in Table 13, LCS analyses were run for all methods except gamma spectroscopy. When the In-Situ Counting System (ISOCS) technique is used for gamma spectroscopy, an internal standard approach is used instead of LCSs. The onsite laboratory that performs gamma spectroscopy is therefore not required to provide LCS data.

Table 13
LCS Summary

Test Method	Laboratory Batch	LCS Run?
ALPHA SPEC	134601	Yes
ALPHA SPEC	134603	Yes
ALPHA SPEC	134604	Yes
ALPHA SPEC	150814	Yes
ALPHA SPEC	150816	Yes
ALPHA SPEC	150818	Yes
ALPHA SPEC	155458	Yes
ALPHA SPEC	155459	Yes
ALPHA SPEC	155460	Yes
ALPHA SPEC	157408	Yes
ALPHA SPEC	157410	Yes
ALPHA SPEC	157414	Yes
ALPHA SPEC	3351162	Yes
ALPHA SPEC	3351171	Yes
ALPHA SPEC	3351176	Yes
ALPHA SPEC	353989	Yes
ALPHA SPEC	353991	Yes
ALPHA SPEC	358819	Yes
ALPHA SPEC	358841	Yes
ALPHA SPEC	358844	Yes
ALPHA SPEC	361428	Yes
ALPHA SPEC	4092576	Yes
ALPHA SPEC	4092577	Yes
ALPHA SPEC	4092580	Yes
ALPHA SPEC	4111247	Yes
ALPHA SPEC	4111253	Yes

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Test Method	Laboratory Batch	LCS Run?
ALPHA SPEC	4111262	Yes
ALPHA SPEC	4121231	Yes
ALPHA SPEC	4121241	Yes
ALPHA SPEC	4121245	Yes
ALPHA SPEC	4160453	Yes
ALPHA SPEC	4160456	Yes
ALPHA SPEC	4160458	Yes
ALPHA SPEC	4167250	Yes
ALPHA SPEC	4167252	Yes
ALPHA SPEC	4167258	Yes
ALPHA SPEC	4183145	Yes
ALPHA SPEC	4183146	Yes
ALPHA SPEC	4183147	Yes
ALPHA SPEC	4211368	Yes
ALPHA SPEC	4211370	Yes
ALPHA SPEC	4211371	Yes
ALPHA SPEC	4216498	Yes
ALPHA SPEC	4216499	Yes
ALPHA SPEC	4216500	Yes
ALPHA SPEC	4219331	Yes
ALPHA SPEC	4219344	Yes
ALPHA SPEC	4219356	Yes
ALPHA SPEC	4289356	Yes
ALPHA SPEC	4289359	Yes
ALPHA SPEC	4289363	Yes
ALPHA SPEC	4296316	Yes
ALPHA SPEC	4296320	Yes
ALPHA SPEC	4296321	Yes
ALPHA SPEC	4317491	Yes
ALPHA SPEC	4317528	Yes
ALPHA SPEC	4317532	Yes
ALPHA SPEC	4328194	Yes
ALPHA SPEC	4328196	Yes
ALPHA SPEC	4328197	Yes
ALPHA SPEC	4334398	Yes
ALPHA SPEC	4334400	Yes
ALPHA SPEC	4334403	Yes
ALPHA SPEC	4336464	Yes
ALPHA SPEC	4336467	Yes
ALPHA SPEC	4336470	Yes
ALPHA SPEC	4342446	Yes
ALPHA SPEC	4342448	Yes
ALPHA SPEC	4342450	Yes
ALPHA SPEC	4345481	Yes

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Test Method	Laboratory Batch	LCS Run?
ALPHA SPEC	4345482	Yes
ALPHA SPEC	4345483	Yes
ALPHA SPEC	4352580	Yes
ALPHA SPEC	4352586	Yes
ALPHA SPEC	4352588	Yes
ALPHA SPEC	5054408	Yes
ALPHA SPEC	5054413	Yes
ALPHA SPEC	5054416	Yes
ALPHA SPEC	5055549	Yes
ALPHA SPEC	5055551	Yes
ALPHA SPEC	5055553	Yes
ALPHA SPEC	5069439	Yes
ALPHA SPEC	5069442	Yes
ALPHA SPEC	5069446	Yes
ALPHA SPEC	5081546	Yes
ALPHA SPEC	5081548	Yes
ALPHA SPEC	5081549	Yes
ALPHA SPEC	5082474	Yes
ALPHA SPEC	5082477	Yes
ALPHA SPEC	5082480	Yes
ALPHA SPEC	5084143	Yes
ALPHA SPEC	5084146	Yes
ALPHA SPEC	5084148	Yes
ALPHA SPEC	5099077	Yes
ALPHA SPEC	5099078	Yes
ALPHA SPEC	5099079	Yes
ALPHA SPEC	5113101	Yes
ALPHA SPEC	5116456	Yes
ALPHA SPEC	5116459	Yes
ALPHA SPEC	5117611	Yes
ALPHA SPEC	5117612	Yes
ALPHA SPEC	5117614	Yes
ALPHA SPEC	5125579	Yes
ALPHA SPEC	5125580	Yes
ALPHA SPEC	5125582	Yes
ALPHA SPEC	5146298	Yes
ALPHA SPEC	5146303	Yes
ALPHA SPEC	5146306	Yes
ALPHA SPEC	5151612	Yes
ALPHA SPEC	5151616	Yes
ALPHA SPEC	5151618	Yes
ALPHA SPEC	5157541	Yes
ALPHA SPEC	5157542	Yes
ALPHA SPEC	5157543	Yes

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Test Method	Laboratory Batch	LCS Run?
ALPHA SPEC	5166524	Yes
ALPHA SPEC	5166526	Yes
ALPHA SPEC	5166528	Yes
ALPHA SPEC	5174568	Yes
ALPHA SPEC	5174570	Yes
ALPHA SPEC	5174573	Yes
ALPHA SPEC	5195494	Yes
ALPHA SPEC	5195496	Yes
ALPHA SPEC	5195498	Yes
SW-846 1311,6010,7470	5056523	Yes
SW-846 1311,6010,7470	5059173	Yes
SW-846 1311,6010,7470	5062313	Yes
SW-846 1311/ 8260	5061555	Yes
SW-846 6010	3248347	Yes
SW-846 6010	3248379	Yes
SW-846 6010	3259526	Yes
SW-846 6010	3259550	Yes
SW-846 6010	3268610	Yes
SW-846 6010	3268617	Yes
SW-846 6010	3295497	Yes
SW-846 6010	3295521	Yes
SW-846 6010	3324287	Yes
SW-846 6010	3324288	Yes
SW-846 6010	3350508	Yes
SW-846 6010	3350510	Yes
SW-846 6010	3365402	Yes
SW-846 6010	3365409	Yes
SW-846 6010	4002141	Yes
SW-846 6010	4002142	Yes
SW-846 6010	4015467	Yes
SW-846 6010	4015468	Yes
SW-846 6010	4016264	Yes
SW-846 6010	4091618	Yes
SW-846 6010	4092267	Yes
SW-846 6010	4104163	Yes
SW-846 6010	4104248	Yes
SW-846 6010	4105563	Yes
SW-846 6010	4107218	Yes
SW-846 6010	4114446	Yes
SW-846 6010	4118156	Yes
SW-846 6010	4119276	Yes
SW-846 6010	4119291	Yes
SW-846 6010	4119306	Yes
SW-846 6010	4119316	Yes

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Test Method	Laboratory Batch	LCS Run?
SW-846 6010	4120557	Yes
SW-846 6010	4121379	Yes
SW-846 6010	4153599	Yes
SW-846 6010	4155256	Yes
SW-846 6010	4156465	Yes
SW-846 6010	4157058	Yes
SW-846 6010	4169554	Yes
SW-846 6010	4170201	Yes
SW-846 6010	4176245	Yes
SW-846 6010	4176376	Yes
SW-846 6010	4189537	Yes
SW-846 6010	4194372	Yes
SW-846 6010	4210685	Yes
SW-846 6010	4210686	Yes
SW-846 6010	4213081	Yes
SW-846 6010	4215253	Yes
SW-846 6010	4217180	Yes
SW-846 6010	4217533	Yes
SW-846 6010	4220111	Yes
SW-846 6010	4220116	Yes
SW-846 6010	4232455	Yes
SW-846 6010	4232611	Yes
SW-846 6010	4288655	Yes
SW-846 6010	4289427	Yes
SW-846 6010	4294553	Yes
SW-846 6010	4299180	Yes
SW-846 6010	4321211	Yes
SW-846 6010	4321553	Yes
SW-846 6010	4328406	Yes
SW-846 6010	4329319	Yes
SW-846 6010	4329640	Yes
SW-846 6010	4335511	Yes
SW-846 6010	4338277	Yes
SW-846 6010	4343666	Yes
SW-846 6010	4345160	Yes
SW-846 6010	4349535	Yes
SW-846 6010	4350224	Yes
SW-846 6010	4351669	Yes
SW-846 6010	4352502	Yes
SW-846 6010	5040298	Yes
SW-846 6010	5040335	Yes
SW-846 6010	5048463	Yes
SW-846 6010	5049282	Yes
SW-846 6010	5067499	Yes

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Test Method	Laboratory Batch	LCS Run?
SW-846 6010	5069192	Yes
SW-846 6010	5069615	Yes
SW-846 6010	5070396	Yes
SW-846 6010	5075592	Yes
SW-846 6010	5075658	Yes
SW-846 6010	5082546	Yes
SW-846 6010	5083361	Yes
SW-846 6010	5095549	Yes
SW-846 6010	5096167	Yes
SW-846 6010	5109586	Yes
SW-846 6010	5111217	Yes
SW-846 6010	5116122	Yes
SW-846 6010	5116290	Yes
SW-846 6010	5123534	Yes
SW-846 6010	5126214	Yes
SW-846 6010	5144484	Yes
SW-846 6010	5144522	Yes
SW-846 6010	5147523	Yes
SW-846 6010	5151263	Yes
SW-846 6010	5153595	Yes
SW-846 6010	5154247	Yes
SW-846 6010	5165200	Yes
SW-846 6010	5165583	Yes
SW-846 6010	5173538	Yes
SW-846 6010	5174214	Yes
SW-846 6010	5193524	Yes
SW-846 6010	5194457	Yes
SW-846 6010/6010B	2184209	Yes
SW-846 6010/6010B	2186325	Yes
SW-846 8082	4105525	Yes
SW-846 8082	4107424	Yes
SW-846 8082	4114653	Yes
SW-846 8082	4153605	Yes
SW-846 8260	2189455	Yes
SW-846 8260	3218284	Yes
SW-846 8260	4092330	Yes
SW-846 8260	4106271	Yes
SW-846 8260	4116262	Yes
SW-846 8260	4155145	Yes
SW-846 8260	4177180	Yes
SW-846 8260	4210697	Yes
SW-846 8260	4217265	Yes
SW-846 8260	4218570	Yes
SW-846 8260	4219154	Yes

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Test Method	Laboratory Batch	LCS Run?
SW-846 8260	4233251	Yes
SW-846 8260	4299228	Yes
SW-846 8260	4355369	Yes
SW-846 8260	5049324	Yes
SW-846 8260	5068294	Yes
SW-846 8260	5073331	Yes
SW-846 8260	5077350	Yes
SW-846 8260	MS1 VOA_030401B	Yes
SW-846 8260	MS1 VOA_040412A	Yes
SW-846 8260	MS1 VOA_040415A	Yes
SW-846 8260	MS1 VOA_040517A	Yes
SW-846 8260	MS1 VOA_040518A	Yes
SW-846 8260	MS1 VOA_040519A	Yes
SW-846 8260	MS1 VOA_040630A	Yes
SW-846 8260	MS1 VOA_041012A	Yes
SW-846 8260	MS1 VOA_041025A	Yes
SW-846 8260	MS1 VOA_041209A	Yes
SW-846 8260	MS1 VOA_050208A	Yes
SW-846 8260	MS2 VOA_030924A	Yes
SW-846 8260	MS2 VOA_031211A	Yes
SW-846 8260	MS2 VOA_040113A	Yes
SW-846 8260	MS2 VOA_040413A	Yes
SW-846 8260	MS2 VOA_040505A	Yes
SW-846 8260	MS2 VOA_040519A	Yes
SW-846 8260	MS2 VOA_040602A	Yes
SW-846 8260	MS2 VOA_040722A	Yes
SW-846 8260	MS3 VOA_030407B	Yes
SW-846 8260	MS3 VOA_030514B	Yes
SW-846 8260	MS3 VOA_030905A	Yes
SW-846 8260	MS3 VOA_030914B	Yes
SW-846 8260	MS3 VOA_031021A	Yes
SW-846 8260	MS3 VOA_031031A	Yes
SW-846 8260	MS3 VOA_031104A	Yes
SW-846 8260	MS3 VOA_031224A	Yes
SW-846 8260	MS3 VOA_040407A	Yes
SW-846 8260	MS3 VOA_040518A	Yes
SW-846 8260	MS3 VOA_040520A	Yes
SW-846 8270	3096146	Yes
SW-846 8270	3136440	Yes
SW-846 8270	3248545	Yes
SW-846 8270	3350376	Yes
SW-846 8270	4103698	Yes
SW-846 8270	4105542	Yes
SW-846 8270	4131667	Yes

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Test Method	Laboratory Batch	LCS Run?
SW-846 8270	4189096	Yes
SW-846 8270	4299438	Yes
SW-846 8270	4350443	Yes
SW-846 8270	4352635	Yes
SW-846 8270	5046401	Yes
SW-846 8270B	2185110	Yes
SW9056 OR E300.0 PREP E300.0	4219389	Yes
SW9056 OR E300.0 PREP E300.0	4219390	Yes
SW9056 OR E300.0 PREP E300.0	4349296	Yes
SW9056 OR E300.0 PREP E300.0	4349297	Yes
SW9056 OR E300.0 PREP E300.0	5152357	Yes
SW9056 OR E300.0 PREP E300.0	5158564	Yes
SW9056 OR E300.0 PREP E300.0	5166251	Yes
SW9056 OR E300.0 PREP E300.0	5174535	Yes

The minimum and maximum LCS results are tabulated, by chemical, for the entire project in Table 14. LCS results outside of tolerances were reviewed to determine whether a potential bias might be indicated. LCS recoveries are not indicative of matrix effects because they are not prepared using site samples. LCS results do indicate whether the laboratory may be introducing a bias in the results. Recoveries reported above the upper limit may indicate the actual sample results are less than reported. Because this is environmentally conservative, no further action is needed.

The analytes with unacceptably low recoveries were evaluated. If the highest sample result divided by the lowest LCS recovery for that analyte is less than the AL, no further action is taken because any indicated bias is not great enough to affect project decisions. Based on this analysis, the LCS recoveries for this project did not affect project decisions.

Table 14
LCS Evaluation Summary

Test Method	CAS No.	Analyte	Minimum Percent Recovery	Maximum Percent Recovery
SW-846 8260	71-55-6	1,1,1-Trichloroethane	77.46	117.8
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	74	119
SW-846 8260	79-00-5	1,1,2-Trichloroethane	77.08	112
SW-846 8260	75-34-3	1,1-Dichloroethane	82.51	116.4
SW-846 8260	75-35-4	1,1-Dichloroethene	85	131.2
SW-846 8270	120-82-1	1,2,4-Trichlorobenzene	60	78
SW-846 8270B	120-82-1	1,2,4-Trichlorobenzene	56	56
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	74	134.6
SW-846 8260	95-50-1	1,2-Dichlorobenzene	75	124.8
SW-846 8260	107-06-2	1,2-Dichloroethane	79.77	121
SW-846 8260	78-87-5	1,2-Dichloropropane	80.27	114.4

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Test Method	CAS No.	Analyte	Minimum Percent Recovery	Maximum Percent Recovery
SW-846 8270B	106-46-7	1,4-Dichlorobenzene	56	56
SW-846 8260	106-46-7	1,4-Dichlorobenzene	78	129.2
SW-846 8270	95-95-4	2,4,5-Trichlorophenol	60	83
SW-846 8270	88-06-2	2,4,6-Trichlorophenol	62	79
SW-846 8270	120-83-2	2,4-Dichlorophenol	62	77
SW-846 8270	105-67-9	2,4-Dimethylphenol	59	77
SW-846 8270	51-28-5	2,4-Dinitrophenol	25	97
SW-846 8270B	121-14-2	2,4-Dinitrotoluene	64	64
SW-846 8270	121-14-2	2,4-Dinitrotoluene	65	88
SW-846 8270	606-20-2	2,6-Dinitrotoluene	63	87
SW-846 8260	78-93-3	2-Butanone	51.54	121
SW-846 8270	91-58-7	2-Chloronaphthalene	61	80
SW-846 8270	95-57-8	2-Chlorophenol	63	77
SW-846 8270B	95-57-8	2-Chlorophenol	63	63
SW-846 8270	91-57-6	2-Methylnaphthalene	62	78
SW-846 8270	95-48-7	2-Methylphenol	64	77
SW-846 8270	88-74-4	2-Nitroaniline	64	86
SW-846 8270	91-94-1	3,3'-Dichlorobenzidine	45	68
SW-846 8270	534-52-1	4,6-Dinitro-2-methylphenol	35	100
SW-846 8270	106-47-8	4-Chloroaniline	30	63
SW-846 8260	108-10-1	4-Methyl-2-pentanone	64.74	121
SW-846 8270	106-44-5	4-Methylphenol	64	79
SW-846 8270	100-02-7	4-Nitrophenol	59	93
SW-846 8270B	100-02-7	4-Nitrophenol	59	59
SW-846 8270	83-32-9	Acenaphthene	60	80
SW-846 8270B	83-32-9	Acenaphthene	58	58
SW-846 8260	67-64-1	Acetone	30.88	131.7
SW-846 6010	7429-90-5	Aluminum	84	108
SW-846 6010/6010B	7429-90-5	Aluminum	97	97
ALPHA SPEC	14596-10-2	Americium-241	102	102
SW-846 8270	120-12-7	Anthracene	59	86
SW-846 6010/6010B	7440-36-0	Antimony	99	99
SW-846 6010	7440-36-0	Antimony	80	102
SW-846 8082	12674-11-2	Aroclor-1016	72	87
SW-846 8082	11096-82-5	Aroclor-1260	72	105
SW-846 6010	7440-38-2	Arsenic	81	102
SW-846 6010/6010B	7440-38-2	Arsenic	99	99
SW-846 6010/6010B	7440-39-3	Barium	107	107
SW-846 6010	7440-39-3	Barium	88	106
SW-846 8260	71-43-2	Benzene	82.96	119.7
SW-846 8270	56-55-3	Benzo(a)anthracene	58	81
SW-846 8270	50-32-8	Benzo(a)pyrene	59	83
SW-846 8270	205-99-2	Benzo(b)fluoranthene	58	86

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Test Method	CAS No.	Analyte	Minimum Percent Recovery	Maximum Percent Recovery
SW-846 8270	207-08-9	Benzo(k)fluoranthene	57	87
SW-846 8270	65-85-0	Benzoic Acid	29	59
SW-846 8270	100-51-6	Benzyl Alcohol	64	78
SW-846 6010	7440-41-7	Beryllium	89	106
SW-846 6010/6010B	7440-41-7	Beryllium	101	101
SW-846 8270	111-44-4	bis(2-Chloroethyl)ether	59	79
SW-846 8270	39638-32-9	bis(2-Chloroisopropyl)ether	60	76
SW-846 8270	117-81-7	bis(2-Ethylhexyl)phthalate	60	93
SW-846 8260	75-27-4	Bromodichloromethane	80.62	119.4
SW-846 8260	75-25-2	Bromoform	79.24	125
SW-846 8260	74-83-9	Bromomethane	58.06	164.3
SW-846 8270	85-68-7	Butylbenzylphthalate	58	89
SW-846 6010/6010B	7440-43-9	Cadmium	104	104
SW-846 6010	7440-43-9	Cadmium	84	104
SW-846 8260	75-15-0	Carbon Disulfide	57	153.8
SW-846 8260	56-23-5	Carbon Tetrachloride	74.84	122
SW-846 8260	108-90-7	Chlorobenzene	84.47	124.6
SW-846 8260	75-00-3	Chloroethane	75.1	155.2
SW-846 8260	67-66-3	Chloroform	78.43	117.2
SW-846 8260	74-87-3	Chloromethane	45.13	239.6
SW-846 6010	7440-47-3	Chromium	86	106
SW-846 6010/6010B	7440-47-3	Chromium	105	105
SW-846 8270	218-01-9	Chrysene	57	84
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	75.39	119.1
SW-846 6010/6010B	7440-48-4	Cobalt	102	102
SW-846 6010	7440-48-4	Cobalt	83	104
SW-846 6010	7440-50-8	Copper	86	105
SW-846 6010/6010B	7440-50-8	Copper	105	105
SW-846 8270	84-74-2	Di-n-butylphthalate	60	90
SW-846 8270	117-84-0	Di-n-octylphthalate	55	85
SW-846 8270	53-70-3	Dibenz(a,h)anthracene	56	92
SW-846 8270	132-64-9	Dibenzofuran	60	85
SW-846 8260	124-48-1	Dibromochloromethane	82	120
SW-846 8270	84-66-2	Diethylphthalate	63	85
SW-846 8270	131-11-3	Dimethylphthalate	61	83
SW-846 8260	100-41-4	Ethylbenzene	84.72	125.1
SW-846 8270	206-44-0	Fluoranthene	55	82
SW-846 8270	86-73-7	Fluorene	60	81
SW-846 8270	118-74-1	Hexachlorobenzene	62	87
SW-846 8260	87-68-3	Hexachlorobutadiene	74	138.4
SW-846 8270	87-68-3	Hexachlorobutadiene	59	85
SW-846 8270	77-47-4	Hexachlorocyclopentadiene	41	100
SW-846 8270	67-72-1	Hexachloroethane	62	75

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Test Method	CAS No.	Analyte	Minimum Percent Recovery	Maximum Percent Recovery
SW-846 8270	193-39-5	Indeno(1,2,3-cd)pyrene	58	84
SW-846 6010/6010B	7439-89-6	Iron	100	100
SW-846 6010	7439-89-6	Iron	90	112
SW-846 8270	78-59-1	Isophorone	63	99
SW-846 6010	7439-92-1	Lead	85	104
SW-846 6010/6010B	7439-92-1	Lead	104	104
SW-846 6010/6010B	7439-93-2	Lithium	99	99
SW-846 6010	7439-93-2	Lithium	89	107
SW-846 6010	7439-96-5	Manganese	86	105
SW-846 6010/6010B	7439-96-5	Manganese	105	105
SW-846 6010/6010B	7439-97-6	Mercury	98	98
SW-846 6010	7439-97-6	Mercury	84	112
SW-846 8260	75-09-2	Methylene chloride	59	135.9
SW-846 6010	7439-98-7	Molybdenum	82	104
SW-846 6010/6010B	7439-98-7	Molybdenum	101	101
SW-846 8270	86-30-6	n-Nitrosodiphenylamine	71	91
SW-846 8270	621-64-7	n-Nitrosodipropylamine	60	77
SW-846 8270B	621-64-7	n-Nitrosodipropylamine	58	58
SW-846 8270	91-20-3	Naphthalene	59	75
SW-846 8260	91-20-3	Naphthalene	70	118.1
SW-846 6010/6010B	7440-02-0	Nickel	104	104
SW-846 6010	7440-02-0	Nickel	85	105
SW9056 OR E300.0 PREP E300.0	14797-55-8	Nitrate	92	97
SW9056 OR E300.0 PREP E300.0	14797-65-0	Nitrite	95	97
SW-846 8270	98-95-3	Nitrobenzene	63	75
SW-846 8270	87-86-5	Pentachlorophenol	33	78
SW-846 8270B	87-86-5	Pentachlorophenol	47	47
SW-846 8270B	108-95-2	Phenol	62	62
SW-846 8270	108-95-2	Phenol	63	77
ALPHA SPEC	10-12-8	Plutonium-239/240	101	101
SW-846 8270	129-00-0	Pyrene	56	88
SW-846 8270B	129-00-0	Pyrene	68	68
SW-846 6010/6010B	7782-49-2	Selenium	95	95
SW-846 6010	7782-49-2	Selenium	81	105
SW-846 6010	7440-22-4	Silver	86	113
SW-846 6010/6010B	7440-22-4	Silver	102	102
SW-846 6010/6010B	7440-24-6	Strontium	107	107
SW-846 6010	7440-24-6	Strontium	88	105
SW-846 8260	100-42-5	Styrene	84.23	121.9
SW-846 8260	127-18-4	Tetrachloroethene	80	127.4
SW-846 6010	7440-31-5	Tin	81	104
SW-846 6010/6010B	7440-31-5	Tin	101	101

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Test Method	CAS No.	Analyte	Minimum Percent Recovery	Maximum Percent Recovery
SW-846 8260	108-88-3	Toluene	79	134.6
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	83	119
SW-846 8260	79-01-6	Trichloroethene	82.81	121.3
SW-846 6010/6010B	11-09-6	Uranium, Total	111	111
SW-846 6010	11-09-6	Uranium, Total	91	112
ALPHA SPEC	7440-61-1	Uranium-238	83	83
SW-846 6010/6010B	7440-62-2	Vanadium	106	106
SW-846 6010	7440-62-2	Vanadium	86	106
SW-846 8260	75-01-4	Vinyl chloride	55.87	194.6
SW-846 8260	1330-20-7	Xylene	84.27	123.8
SW-846 6010	7440-66-6	Zinc	82	108
SW-846 6010/6010B	7440-66-6	Zinc	100	100

Surrogate Evaluation

The frequency of surrogate measurements, relative to each laboratory batch, is given in Table 15. Surrogate frequency was adequate based on at least one set per sample. The minimum and maximum surrogate results are also tabulated, by chemical, for the entire project. Surrogates are added to every sample, and, therefore, surrogate recoveries only impact individual samples. Unacceptable surrogate recoveries can indicate potential matrix effects.

Surrogate recoveries for VOCs were acceptable and project decisions were not affected. The minimum surrogate recoveries for SVOCs were low. Therefore, a comparison of all SVOC detections to corresponding RFCA WRW soil ALs was made. Results of this comparison indicated that all SVOC detected concentrations were well below one-tenth their corresponding AL. The maximum ratio observed was approximately one-twentieth the corresponding AL for benzo(a)pyrene, reported at a concentration of 180 ug/kg (RFCA WRW soil AL = 3, 490 ug/kg). Therefore, project decisions were not affected by the low SVOC surrogate recoveries.

Table 15
Surrogate Recovery Summary

VOC Surrogate Recoveries				
Number of Samples	Analyte	Minimum Recovery	Maximum Recovery	Unit
98	4-Bromofluorobenzene	85	124	%REC
98	Deuterated 1,2-dichloroethane	81	130.4	%REC
98	Deuterated Toluene	85.85	114.4	%REC
SVOC Surrogate Recoveries				
Number of Samples	Analyte	Minimum Recovery	Maximum Recovery	Unit
22	2-Fluorobiphenyl	47	74	%REC
22	2-Fluorophenol	55	81	%REC
22	Deuterated Nitrobenzene	54	84	%REC

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22	p-Terphenyl-d14	56	98	%REC

% REC – percent recovery

Field Blank Evaluation

Results of the field blank analyses are listed in Table 16. Detectable amounts of contaminants within the blanks, which could indicate possible cross-contamination of samples, are evaluated if the same contaminant is detected in the associated real samples. When the real result is less than 10 times the blank result for laboratory contaminants and 5 times the result for non-laboratory contaminants, the real result is eliminated. None of the chemicals were detected in the blanks at concentrations greater than one-tenth the AL. Therefore, blank contamination did not adversely impact project decisions.

Table 16
Field Blank Summary

Laboratory	CAS No.	Analyte	Sample QC Code	Detected Result	Unit
ESTLDEN	120-82-1	1,2,4-Trichlorobenzene	FB	0.22	ug/L
STLDEN	78-93-3	2-Butanone	FB	5.4	ug/L
ESTLDEN	78-93-3	2-Butanone	RNS	2.2	ug/L
ESTLDEN	78-93-3	2-Butanone	TB	10	ug/L
GEL	78-93-3	2-Butanone	TB	6.1	ug/L
STLDEN	78-93-3	2-Butanone	TB	5.5	ug/L
ESTLDEN	78-93-3	2-Butanone	FB	2.4	ug/L
ESTLDEN	67-64-1	Acetone	TB	120	ug/L
ESTLDEN	67-64-1	Acetone	RNS	3.5	ug/L
ESTLDEN	67-64-1	Acetone	FB	32	ug/L
GEL	67-64-1	Acetone	TB	9.1	ug/L
STLDEN	67-64-1	Acetone	FB	7.8	ug/L
URS	67-64-1	Acetone	FB	42	ug/L
URS	67-64-1	Acetone	TB	28	ug/L
STLDEN	67-64-1	Acetone	TB	8.1	ug/L
ESTLDEN	7429-90-5	Aluminum	FB	0.13	mg/L
STLDEN	7429-90-5	Aluminum	RNS	17.2	ug/L
ESTLDEN	7429-90-5	Aluminum	RNS	0.2	mg/L
ESTLDEN	14596-10-2	Americium-241	FB	0.0444	pCi/L
GEL	14596-10-2	Americium-241	RNS	0.0576	pCi/L
ESTLDEN	7440-36-0	Antimony	FB	0.0043	mg/L
ESTLDEN	7440-36-0	Antimony	RNS	0.0051	mg/L
ESTLDEN	7440-39-3	Barium	RNS	0.0068	mg/L
STLDEN	7440-39-3	Barium	RNS	2.1	ug/L
ESTLDEN	7440-39-3	Barium	FB	0.0018	mg/L
URS	71-43-2	Benzene	TB	2	ug/L
ESTLDEN	7440-41-7	Beryllium	RNS	0.00076	mg/L
ESTLDEN	75-27-4	Bromodichloromethane	TB	1.7	ug/L
URS	75-27-4	Bromodichloromethane	FB	1.4	ug/L
URS	75-27-4	Bromodichloromethane	TB	1.6	ug/L
ESTLDEN	7440-43-9	Cadmium	RNS	0.00028	mg/L

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Laboratory	CAS No.	Analyte	Sample QC Code	Detected Result	Unit
ESTLDEN	75-15-0	Carbon Disulfide	TB	0.28	ug/L
ESTLDEN	108-90-7	Chlorobenzene	TB	0.24	ug/L
ESTLDEN	67-66-3	Chloroform	TB	2.1	ug/L
URS	67-66-3	Chloroform	FB	1.7	ug/L
URS	67-66-3	Chloroform	TB	2	ug/L
ESTLDEN	7440-47-3	Chromium	RNS	0.0021	mg/L
ESTLDEN	7440-50-8	Copper	RNS	0.025	mg/L
ESTLDEN	7440-50-8	Copper	FB	0.025	mg/L
ESTLDEN	124-48-1	Dibromochloromethane	TB	0.76	ug/L
ESTLDEN	100-41-4	Ethylbenzene	FB	0.2	ug/L
ESTLDEN	100-41-4	Ethylbenzene	TB	0.18	ug/L
STLDEN	7439-89-6	Iron	RNS	45.8	ug/L
ESTLDEN	7439-89-6	Iron	RNS	0.34	mg/L
ESTLDEN	7439-89-6	Iron	FB	0.24	mg/L
ESTLDEN	7439-92-1	Lead	RNS	0.073	mg/L
ESTLDEN	7439-93-2	Lithium	RNS	0.0031	mg/L
ESTLDEN	7439-93-2	Lithium	FB	0.0039	mg/L
ESTLDEN	7439-96-5	Manganese	FB	0.0028	mg/L
STLDEN	7439-96-5	Manganese	RNS	1.5	ug/L
ESTLDEN	7439-96-5	Manganese	RNS	0.0081	mg/L
ESTLDEN	7439-97-6	Mercury	RNS	0.00008	mg/L
ESTLDEN	7439-97-6	Mercury	FB	0.00007	mg/L
ESTLDEN	75-09-2	Methylene chloride	FB	0.34	ug/L
ESTLDEN	75-09-2	Methylene chloride	TB	0.65	ug/L
STLDEN	7439-98-7	Molybdenum	RNS	1.7	ug/L
ESTLDEN	7439-98-7	Molybdenum	RNS	0.003	mg/L
ESTLDEN	91-20-3	Naphthalene	FB	0.57	ug/L
URS	91-20-3	Naphthalene	TB	2.5	ug/L
URS	91-20-3	Naphthalene	FB	1.7	ug/L
URS	91-20-3	Naphthalene	RNS	2	ug/L
ESTLDEN	91-20-3	Naphthalene	TB	0.75	ug/L
ESTLDEN	10-12-8	Plutonium-239/240	FB	0.082	pCi/L
GEL	10-12-8	Plutonium-239/240	RNS	0.0116	pCi/L
ESTLDEN	7782-49-2	Selenium	FB	0.0054	mg/L
ESTLDEN	7440-22-4	Silver	RNS	0.0012	mg/L
ESTLDEN	7440-22-4	Silver	FB	0.0011	mg/L
STLDEN	7440-24-6	Strontium	RNS	2.4	ug/L
ESTLDEN	7440-24-6	Strontium	RNS	0.0033	mg/L
ESTLDEN	7440-24-6	Strontium	FB	0.002	mg/L
ESTLDEN	7440-31-5	Tin	RNS	0.0082	mg/L
STLDEN	7440-31-5	Tin	RNS	3.8	ug/L
ESTLDEN	7440-31-5	Tin	FB	0.0075	mg/L
URS	108-88-3	Toluene	TB	4.5	ug/L
URS	108-88-3	Toluene	RNS	1.8	ug/L

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Laboratory	CAS No.	Analyte	Sample QC Code	Detected Result	Unit
ESTLDEN	108-88-3	Toluene	TB	3.8	ug/L
ESTLDEN	108-88-3	Toluene	FB	3.8	ug/L
URS	108-88-3	Toluene	FB	2.2	ug/L
STLDEN	108-88-3	Toluene	RNS	0.44	ug/L
STLDEN	108-88-3	Toluene	FB	0.53	ug/L
STLDEN	108-88-3	Toluene	TB	0.5	ug/L
ESTLDEN	79-01-6	Trichloroethene	TB	0.25	ug/L
GEL	11-08-5	Uranium-234	RNS	0.0996	pCi/L
ESTLDEN	11-08-5	Uranium-234	FB	0.101	pCi/L
URS	15117-96-1	Uranium-235	FB	0.214	pCi/g
ESTLDEN	15117-96-1	Uranium-235	FB	0.205	pCi/L
URS	15117-96-1	Uranium-235	RNS	0.234	pCi/g
URS	7440-61-1	Uranium-238	RNS	3.85	pCi/g
URS	7440-61-1	Uranium-238	FB	3.38	pCi/g
ESTLDEN	7440-61-1	Uranium-238	FB	0.0657	pCi/L
ESTLDEN	1330-20-7	Xylene	FB	0.72	ug/L
URS	1330-20-7	Xylene	TB	2.6	ug/L
ESTLDEN	1330-20-7	Xylene	TB	0.64	ug/L
ESTLDEN	7440-66-6	Zinc	RNS	0.033	mg/L
STLDEN	7440-66-6	Zinc	RNS	9.6	ug/L
ESTLDEN	7440-66-6	Zinc	FB	0.014	mg/L

Field blank (EB = equipment, FB = field, RNS = rinse, TB = trip)
results greater than detection limits (not "U" qualified).

Sample Matrix Spike Evaluation

The minimum and maximum MS results are summarized by chemical for the entire project in Table 17. Organic analytes with unacceptably low recoveries resulted in a review of the LCS recoveries. According to the EPA data validation guidelines (EPA 1994b), if organic MS recoveries are low, the data reviewer may use the MS and MSD results in conjunction with other QC criteria. For this project, the LCS recoveries were checked, and these checks indicate no decisions were impacted for organic analytes. For inorganics, the associated maximum sample results were divided by the lowest percent recovery for each analyte. If the resulting number was less than the AL, decisions were not impacted, and no action was taken. For this project, all results were acceptable. Low recoveries of barium, iron, manganese, silver, and zinc did not affect project decisions.

Table 17
Sample MS Evaluation Summary

Test Method	CAS No.	Analyte	Minimum Percent Recovery	Maximum Percent Recovery	No. of Samples	No. of Lab Batches
SW-846 8260	71-55-6	1,1,1-Trichloroethane	78.25	118	18	17
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	46.17	143.4	18	17
SW-846 8260	79-00-5	1,1,2-Trichloroethane	69.6	110	18	17

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Test Method	CAS No.	Analyte	Minimum Percent Recovery	Maximum Percent Recovery	No. of Samples	No. of Lab Batches
SW-846 8260	75-34-3	1,1-Dichloroethane	77.91	115	18	17
SW-846 8260	75-35-4	1,1-Dichloroethene	66.26	106	19	18
SW-846 8270	120-82-1	1,2,4-Trichlorobenzene	54	77	8	8
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	32.01	94	18	17
SW-846 8260	95-50-1	1,2-Dichlorobenzene	57.22	99.28	18	17
SW-846 8260	107-06-2	1,2-Dichloroethane	72.64	127	18	17
SW-846 8260	78-87-5	1,2-Dichloropropane	70.42	111.2	18	17
SW-846 8260	106-46-7	1,4-Dichlorobenzene	57.38	101	18	17
SW-846 8270	95-95-4	2,4,5-Trichlorophenol	55	80	8	8
SW-846 8270	88-06-2	2,4,6-Trichlorophenol	51	80	8	8
SW-846 8270	120-83-2	2,4-Dichlorophenol	52	78	8	8
SW-846 8270	105-67-9	2,4-Dimethylphenol	55	77	8	8
SW-846 8270	51-28-5	2,4-Dinitrophenol	35	62	8	8
SW-846 8270	121-14-2	2,4-Dinitrotoluene	61	84	8	8
SW-846 8270	606-20-2	2,6-Dinitrotoluene	56	82	8	8
SW-846 8260	78-93-3	2-Butanone	68.73	164.2	18	17
SW-846 8270	91-58-7	2-Chloronaphthalene	53	78	8	8
SW-846 8270	95-57-8	2-Chlorophenol	56	81	8	8
SW-846 8270	91-57-6	2-Methylnaphthalene	56	79	8	8
SW-846 8270	95-48-7	2-Methylphenol	56	81	8	8
SW-846 8270	88-74-4	2-Nitroaniline	59	83	8	8
SW-846 8270	91-94-1	3,3'-Dichlorobenzidine	46	69	8	8
SW-846 8270	534-52-1	4,6-Dinitro-2-methylphenol	38	69	8	8
SW-846 8270	106-47-8	4-Chloroaniline	45	74	8	8
SW-846 8260	108-10-1	4-Methyl-2-pentanone	69.27	122	18	17
SW-846 8270	106-44-5	4-Methylphenol	59	85	8	8
SW-846 8270	100-02-7	4-Nitrophenol	50	82	8	8
SW-846 8270	83-32-9	Acenaphthene	54	77	8	8
SW-846 8260	67-64-1	Acetone	65	195.8	18	17
SW-846 6010	7429-90-5	Aluminum	208	10800	30	30
SW-846 8270	120-12-7	Anthracene	58	83	8	8
SW-846 6010	7440-36-0	Antimony	28	72	30	30
SW-846 8082	12674-11-2	Aroclor-1016	80	80	1	1
SW-846 8082	11096-82-5	Aroclor-1260	79	79	1	1
SW-846 6010	7440-38-2	Arsenic	81	101	30	30
SW-846 6010	7440-39-3	Barium	0	141	30	30
SW-846 8260	71-43-2	Benzene	72.15	106.2	19	18
SW-846 8270	56-55-3	Benzo(a)anthracene	53	80	8	8
SW-846 8270	50-32-8	Benzo(a)pyrene	55	79	8	8
SW-846 8270	205-99-2	Benzo(b)fluoranthene	59	81	8	8
SW-846 8270	207-08-9	Benzo(k)fluoranthene	54	91	8	8
SW-846 8270	65-85-0	Benzoic Acid	0	62	8	8
SW-846 8270	100-51-6	Benzyl Alcohol	55	87	8	8

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Test Method	CAS No.	Analyte	Minimum Percent Recovery	Maximum Percent Recovery	No. of Samples	No. of Lab Batches
SW-846 6010	7440-41-7	Beryllium	84	106	29	29
SW-846 8270	111-44-4	bis(2-Chloroethyl)ether	53	75	8	8
SW-846 8270	39638-32-9	bis(2-Chloroisopropyl)ether	53	77	8	8
SW-846 8270	117-81-7	bis(2-Ethylhexyl)phthalate	57	87	8	8
SW-846 8260	75-27-4	Bromodichloromethane	67.67	119	18	17
SW-846 8260	75-25-2	Bromoform	67.95	129	18	17
SW-846 8260	74-83-9	Bromomethane	58.97	142.4	18	17
SW-846 8270	85-68-7	Butylbenzylphthalate	57	83	8	8
SW-846 6010	7440-43-9	Cadmium	58	102	30	30
SW-846 8260	75-15-0	Carbon Disulfide	51	91	18	17
SW-846 8260	56-23-5	Carbon Tetrachloride	70.12	118	18	17
SW-846 8260	108-90-7	Chlorobenzene	65.71	136.2	19	18
SW-846 8260	75-00-3	Chloroethane	52.24	111.3	18	17
SW-846 8260	67-66-3	Chloroform	71.8	119	18	17
SW-846 8260	74-87-3	Chloromethane	40.13	159.5	18	17
SW-846 6010	7440-47-3	Chromium	77	169	30	30
SW-846 8270	218-01-9	Chrysene	54	78	8	8
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	68.65	113	18	17
SW-846 6010	7440-48-4	Cobalt	78	104	30	30
SW-846 6010	7440-50-8	Copper	77	109	30	30
SW-846 8270	84-74-2	Di-n-butylphthalate	59	87	8	8
SW-846 8270	117-84-0	Di-n-octylphthalate	52	75	8	8
SW-846 8270	53-70-3	Dibenz(a,h)anthracene	51	78	8	8
SW-846 8270	132-64-9	Dibenzofuran	56	81	8	8
SW-846 8260	124-48-1	Dibromochloromethane	66.36	120	18	17
SW-846 8270	84-66-2	Diethylphthalate	56	81	8	8
SW-846 8270	131-11-3	Dimethylphthalate	57	81	8	8
SW-846 8260	100-41-4	Ethylbenzene	68.07	125.7	18	17
SW-846 8270	206-44-0	Fluoranthene	55	80	8	8
SW-846 8270	86-73-7	Fluorene	54	80	8	8
SW-846 8270	118-74-1	Hexachlorobenzene	57	84	8	8
SW-846 8260	87-68-3	Hexachlorobutadiene	31.49	96	18	17
SW-846 8270	87-68-3	Hexachlorobutadiene	55	78	8	8
SW-846 8270	77-47-4	Hexachlorocyclopentadiene	38	96	8	8
SW-846 8270	67-72-1	Hexachloroethane	53	79	8	8
SW-846 8270	193-39-5	Indeno(1,2,3-cd)pyrene	52	80	8	8
SW-846 6010	7439-89-6	Iron	0	6370	30	30
SW-846 8270	78-59-1	Isophorone	57	93	8	8
SW-846 6010	7439-92-1	Lead	63	104	30	30
SW-846 6010	7439-93-2	Lithium	80	112	29	29
SW-846 6010	7439-96-5	Manganese	0	299	30	30
SW-846 6010	7439-97-6	Mercury	10	113	30	30
SW-846 6010/6010B	7439-97-6	Mercury	95	95	1	1

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Test Method	CAS No.	Analyte	Minimum Percent Recovery	Maximum Percent Recovery	No. of Samples	No. of Lab Batches
SW-846 8260	75-09-2	Methylene chloride	71.49	109	18	17
SW-846 6010	7439-98-7	Molybdenum	75	98	30	30
SW-846 8270	86-30-6	n-Nitrosodiphenylamine	63	86	8	8
SW-846 8270	621-64-7	n-Nitrosodipropylamine	53	77	8	8
SW-846 8270	91-20-3	Naphthalene	55	73	8	8
SW-846 8260	91-20-3	Naphthalene	54.53	102	18	17
SW-846 6010	7440-02-0	Nickel	76	111	30	30
SW9056 OR E300.0 PREP E300.0	14797-55-8	Nitrate	90	107	6	6
SW9056 OR E300.0 PREP E300.0	14797-65-0	Nitrite	90	95	2	2
SW-846 8270	98-95-3	Nitrobenzene	58	82	8	8
SW-846 8270	87-86-5	Pentachlorophenol	43	70	8	8
SW-846 8270	108-95-2	Phenol	58	83	8	8
SW-846 8270	129-00-0	Pyrene	55	83	8	8
SW-846 6010	7782-49-2	Selenium	80	101	30	30
SW-846 6010	7440-22-4	Silver	0	108	30	30
SW-846 6010	7440-24-6	Strontium	66	114	30	30
SW-846 8260	100-42-5	Styrene	63.16	116.3	18	17
SW-846 8260	127-18-4	Tetrachloroethene	67.48	107.7	18	17
SW-846 6010	7440-31-5	Tin	77	97	30	30
SW-846 8260	108-88-3	Toluene	70.05	109	19	18
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	61.49	119	18	17
SW-846 8260	79-01-6	Trichloroethene	79.94	136.7	19	18
SW-846 6010	11-09-6	Uranium, Total	80	107	30	30
SW-846 6010	7440-62-2	Vanadium	75	151	30	30
SW-846 8260	75-01-4	Vinyl chloride	45.03	124.9	18	17
SW-846 8260	1330-20-7	Xylene	64.46	115.3	18	17
SW-846 6010	7440-66-6	Zinc	0	386	30	30

14.2.2 Precision

Precision is measured by evaluated both MSDs and field duplicates, as described in the following sections.

Sample Matrix Spike Duplicate Evaluation

Laboratory precision is measured through use of MSDs, as summarized in Table 18. Analytes with the highest relative percent differences (RPDs) were reviewed by comparing the highest sample result to the RFCA WRW soil AL. For analytes with RPDs greater than 35 percent, if the highest sample concentrations were sufficiently below the AL, no further action is needed. Review of analytes listed on Table 16 with a RPD of greater than 35 percent indicated decisions were not impacted.

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Table 18
Sample MSD Evaluation Summary

Test Method	CAS No.	Analyte	Max RPD (%)
SW-846 8260	71-55-6	1,1,1-Trichloroethane	25.26
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	24.15
SW-846 8260	79-00-5	1,1,2-Trichloroethane	20.00
SW-846 8260	75-34-3	1,1-Dichloroethane	27.32
SW-846 8260	75-35-4	1,1-Dichloroethene	37.59
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	32.87
SW-846 8270	120-82-1	1,2,4-Trichlorobenzene	24.82
SW-846 8260	95-50-1	1,2-Dichlorobenzene	30.59
SW-846 8260	107-06-2	1,2-Dichloroethane	29.86
SW-846 8260	78-87-5	1,2-Dichloropropane	23.46
SW-846 8260	106-46-7	1,4-Dichlorobenzene	28.57
SW-846 8270	95-95-4	2,4,5-Trichlorophenol	8.70
SW-846 8270	88-06-2	2,4,6-Trichlorophenol	12.84
SW-846 8270	120-83-2	2,4-Dichlorophenol	11.11
SW-846 8270	105-67-9	2,4-Dimethylphenol	10.96
SW-846 8270	51-28-5	2,4-Dinitrophenol	20.51
SW-846 8270	121-14-2	2,4-Dinitrotoluene	6.45
SW-846 8270	606-20-2	2,6-Dinitrotoluene	11.76
SW-846 8260	78-93-3	2-Butanone	34.60
SW-846 8270	91-58-7	2-Chloronaphthalene	12.24
SW-846 8270	95-57-8	2-Chlorophenol	23.53
SW-846 8270	91-57-6	2-Methylnaphthalene	16.67
SW-846 8270	95-48-7	2-Methylphenol	16.44
SW-846 8270	88-74-4	2-Nitroaniline	9.68
SW-846 8270	91-94-1	3,3'-Dichlorobenzidine	24.76
SW-846 8270	534-52-1	4,6-Dinitro-2-methylphenol	15.93
SW-846 8270	106-47-8	4-Chloroaniline	8.51
SW-846 8260	108-10-1	4-Methyl-2-pentanone	32.06
SW-846 8270	106-44-5	4-Methylphenol	14.77
SW-846 8270	100-02-7	4-Nitrophenol	16.30
SW-846 8270	83-32-9	Acenaphthene	10.53
SW-846 8260	67-64-1	Acetone	37.35
SW-846 6010	7429-90-5	Aluminum	200.00
SW-846 8270	120-12-7	Anthracene	8.26
SW-846 6010	7440-36-0	Antimony	22.61
SW-846 8082	12674-11-2	Aroclor-1016	8.38
SW-846 8082	11096-82-5	Aroclor-1260	4.94
SW-846 6010	7440-38-2	Arsenic	4.60
SW-846 6010	7440-39-3	Barium	200.00
SW-846 8260	71-43-2	Benzene	23.46
SW-846 8270	56-55-3	Benzo(a)anthracene	17.24
SW-846 8270	50-32-8	Benzo(a)pyrene	8.70
SW-846 8270	205-99-2	Benzo(b)fluoranthene	11.27
SW-846 8270	207-08-9	Benzo(k)fluoranthene	10.53
SW-846 8270	65-85-0	Benzoic Acid	18.18
SW-846 8270	100-51-6	Benzyl Alcohol	16.06

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Test Method	CAS No.	Analyte	Max RPD (%)
SW-846 6010	7440-41-7	Beryllium	27.18
SW-846 8270	111-44-4	bis(2-Chloroethyl)ether	26.55
SW-846 8270	39638-32-9	bis(2-Chloroisopropyl)ether	27.20
SW-846 8270	117-81-7	bis(2-Ethylhexyl)phthalate	11.57
SW-846 8260	75-27-4	Bromodichloromethane	26.67
SW-846 8260	75-25-2	Bromoform	43.22
SW-846 8260	74-83-9	Bromomethane	29.53
SW-846 8270	85-68-7	Butylbenzylphthalate	10.00
SW-846 6010	7440-43-9	Cadmium	7.23
SW-846 8260	75-15-0	Carbon Disulfide	26.21
SW-846 8260	56-23-5	Carbon Tetrachloride	26.00
SW-846 8260	108-90-7	Chlorobenzene	28.52
SW-846 8260	75-00-3	Chloroethane	39.11
SW-846 8260	67-66-3	Chloroform	27.75
SW-846 8260	74-87-3	Chloromethane	35.40
SW-846 6010	7440-47-3	Chromium	33.51
SW-846 8270	218-01-9	Chrysene	13.79
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	28.28
SW-846 6010	7440-48-4	Cobalt	13.19
SW-846 6010	7440-50-8	Copper	63.37
SW-846 8270	84-74-2	Di-n-butylphthalate	9.68
SW-846 8270	117-84-0	Di-n-octylphthalate	12.61
SW-846 8270	53-70-3	Dibenz(a,h)anthracene	11.11
SW-846 8270	132-64-9	Dibenzofuran	10.17
SW-846 8260	124-48-1	Dibromochloromethane	26.83
SW-846 8270	84-66-2	Diethylphthalate	16.39
SW-846 8270	131-11-3	Dimethylphthalate	11.57
SW-846 8260	100-41-4	Ethylbenzene	26.01
SW-846 8270	206-44-0	Fluoranthene	11.97
SW-846 8270	86-73-7	Fluorene	12.17
SW-846 8270	118-74-1	Hexachlorobenzene	13.11
SW-846 8270	87-68-3	Hexachlorobutadiene	28.15
SW-846 8260	87-68-3	Hexachlorobutadiene	45.58
SW-846 8270	77-47-4	Hexachlorocyclopentadiene	17.78
SW-846 8270	67-72-1	Hexachloroethane	34.92
SW-846 8270	193-39-5	Indeno(1,2,3-cd)pyrene	10.91
SW-846 6010	7439-89-6	Iron	200.00
SW-846 8270	78-59-1	Isophorone	16.54
SW-846 6010	7439-92-1	Lead	17.58
SW-846 6010	7439-93-2	Lithium	23.20
SW-846 6010	7439-96-5	Manganese	200.00
SW-846 6010	7439-97-6	Mercury	152.38
SW-846 6010/6010B	7439-97-6	Mercury	3.11
SW-846 8260	75-09-2	Methylene chloride	33.71
SW-846 6010	7439-98-7	Molybdenum	4.82
SW-846 8270	86-30-6	n-Nitrosodiphenylamine	10.53
SW-846 8270	621-64-7	n-Nitrosodipropylamine	18.98
SW-846 8270	91-20-3	Naphthalene	22.90

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Test Method	CAS No.	Analyte	Max RPD (%)
SW-846 8260	91-20-3	Naphthalene	25.41
SW-846 6010	7440-02-0	Nickel	10.31
SW9056 OR E300.0 PREP E300.0	14797-55-8	Nitrate	5.71
SW9056 OR E300.0 PREP E300.0	14797-65-0	Nitrite	2.08
SW-846 8270	98-95-3	Nitrobenzene	22.22
SW-846 8270	87-86-5	Pentachlorophenol	11.94
SW-846 8270	108-95-2	Phenol	18.98
SW-846 8270	129-00-0	Pyrene	10.34
SW-846 6010	7782-49-2	Selenium	5.65
SW-846 6010	7440-22-4	Silver	44.60
SW-846 6010	7440-24-6	Strontium	27.45
SW-846 8260	100-42-5	Styrene	23.66
SW-846 8260	127-18-4	Tetrachloroethene	20.77
SW-846 6010	7440-31-5	Tin	5.99
SW-846 8260	108-88-3	Toluene	21.71
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	25.90
SW-846 8260	79-01-6	Trichloroethene	28.89
SW-846 6010	11-09-6	Uranium, Total	9.52
SW-846 6010	7440-62-2	Vanadium	68.97
SW-846 8260	75-01-4	Vinyl chloride	45.30
SW-846 8260	1330-20-7	Xylene	24.06
SW-846 6010	7440-66-6	Zinc	99.12

Field Duplicate Evaluation

- Field duplicate results reflect sampling precision, or overall repeatability of the sampling process. The frequency of field duplicate collection should exceed 1 field duplicate per 20 real samples, or 5 percent. As shown on Table 19, the required frequency of field duplicates was met and project decisions were not impacted.

Table 19
Field Duplicate Sample Frequency Summary

Test Method	No. of Real Samples	No. of Duplicate Samples	% Duplicate Samples
ALPHA SPEC	81	12	14.81%
GAMMA SPECTROSCOPY	159	15	9.43%
SW-846 6010/6010B	116	9	7.76%
SW-846 6200	22	6	27.27%
SW-846 8082	8	4	50.00%
SW-846 8260	98	15	15.31%
SW-846 8270/8270B	23	5	21.74%
SW8440 PREP SW3560(9)	39	12	30.77%
SW9056 OR E300.0 PREP E300.0	13	1	7.69%

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The field duplicate RPD values indicate how much variation exists in the field duplicate analyses. EPA data validation guidelines state "there are no required review criteria for field duplicate analyses comparability" (EPA 1994b). For the DQA, the highest RPD values were reviewed and listed in Table 20. For this project, project decisions were not impacted.

Table 20
RPD Evaluation Summary

Lab Code	Test Method	Analyte	Max RPD (%)
ESTLDEN	SW-846 6010	Aluminum	66.67
ESTLDEN	SW-846 6010	Arsenic	61.39
URS	SW-846 6200	Arsenic	0.00
URS	SW-846 6200	Barium	30.12
ESTLDEN	SW-846 6010	Barium	66.67
ESTLDEN	SW-846 6010	Beryllium	37.84
ESTLDEN	SW-846 6010	Cadmium	7.14
ESTLDEN	SW-846 6010	Chromium	113.51
ESTLDEN	SW-846 6010	Cobalt	98.99
URS	SW-846 6200	Cobalt	38.81
URS	SW-846 6200	Copper	27.46
ESTLDEN	SW-846 6010	Copper	56.00
ESTLDEN	SW-846 8270	Fluoranthene	131.88
ESTLDEN	SW-846 6010	Iron	46.15
URS	SW-846 6200	Iron	26.63
ESTLDEN	SW-846 6010	Lead	55.81
ESTLDEN	SW-846 6010	Lithium	54.78
ESTLDEN	SW-846 6010	Manganese	112.73
ESTLDEN	SW-846 6010	Mercury	37.68
ESTLDEN	SW-846 6010	Molybdenum	172.55
ESTLDEN	SW-846 6010	Nickel	55.81
URS	SW-846 6200	Nickel	20.26
ESTLDEN	SW-846 8270	Pyrene	134.73
ESTLDEN	SW-846 6010	Strontium	35.56
URS	SW-846 6200	Strontium	5.35
ESTLDEN	SW-846 6010	Uranium, Total	25.00
ESTLDEN	ALPHA SPEC	Uranium-238	28.49
ESTLDEN	SW-846 6010	Vanadium	50.00
ESTLDEN	SW-846 6010	Zinc	58.82
URS	SW-846 6200	Zinc	17.92

14.2.3 Completeness

Based on original project DQOs, a minimum of 25 percent of ER Program analytical (and radiological) results must be formally verified and validated. Of that percentage, no more than 10 percent of the results may be rejected, which ensures that analytical laboratory

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practices are consistent with quality requirements. The number and percentage of validated records (codes without "1"), the number and percentage of verified records (codes with "1"), and the percentage of rejected records for each analyte group for this project are listed in Table 21.

Two records, one for alpha spectroscopy and one for metals (SW-846 6010), out of 2,940 (0.02 percent) validated records were rejected. None of rejected records affected project decisions. For this project, 31.48 percent of the analyses were validated. This exceeds the overall ER Program V&V goal of 25 percent.

14.2.4 Sensitivity

Reporting limits, in units of ug/kg for organics, mg/kg for metals, and picocuries per gram (pCi/g) for radionuclides, were compared with RFCA WRW soil ALs. Adequate sensitivities of analytical methods were attained for all COCs that affect remediation decisions. "Adequate" sensitivity is defined as an RL less than an analyte's associated AL, typically less than one-half the AL.

14.3 Summary of Data Quality

The ER Program V&V goal of 25 percent is being met for all analyses. RPDs greater than 35 percent indicate the sampling precision limits of some analytes have been exceeded and surrogate recoveries for SVOCs were low. However, additional checks indicated that project decisions were not impacted. Data collected and used for IHSS Group 000-4 are adequate for decision making.

15.0 CONCLUSIONS

Results of the accelerated action justify No Further Accelerated Action (NFAA) for IHSS Group 000-4. Justification is based on the following:

- The potential sources of contamination existing in soil at concentrations greater than RFCA WRW soil ALs, with the exception of arsenic at one location were removed, which did not require remediation based on RFCA.
- All valve vaults associated with NPWL were either partially excavated and backfilled or flow filled, or were completely removed, thereby reducing the potential of future contaminant releases from these areas.
- Remaining NPWL has been rinsed, sampled for RCRA constituents, and shown to be RCRA-clean as identified in the RCRA Unit 374.3 Closure Report (DOE 2005h), further eliminating potential future releases of contamination.
- Residual radionuclide contaminant activities, related to or near former or left in place NPWL, are below RFCA WRW soil ALs.

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- In accordance with the SSRS, subsurface soil in the area is not subject to significant erosion.

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Table 21
Validation and Verification Summary

Validation Qualifier Code	Total No. of Records	No. of Alpha Spectroscopy Records	No. of Gamma Spec	No. of Gamma Spectroscopy Records	No. of SW-846 6010 Records	No. of SW-846 6010/6010B Records	No. of SW-846 6200 Records	No. of SW-846 8082 Records	No. of SW-846 8260 Records	No. of SW-846 8270 Records	No. of SW-846 8270B Records	SW9056 or E300_0 Prep E300_0 Records
No V&V	90	0	0	15	0	0	0	0	72	3	0	0
1	2	0	0	2	0	0	0	0	0	0	0	0
J	185	3	0	0	147	0	32	0	3	0	0	0
J1	426	2	0	0	416	4	3	0	1	0	0	0
JB	10	0	0	0	0	0	0	0	7	3	0	0
JB1	26	0	0	0	0	0	0	0	26	0	0	0
R	2	1	0	0	1	0	0	0	0	0	0	0
U1	1	0	0	0	0	0	0	0	1	0	0	0
UJ	109	1	0	0	36	0	32	0	34	0	0	6
UJ1	193	0	0	0	94	2	5	0	79	10	3	0
V	2634	105	3	129	457	0	310	56	1108	466	0	0
V1	5662	293	0	328	1490	17	30	0	2773	666	51	14
Total	9340	405	3	474	2641	23	412	56	4104	1148	54	20
Validated	2940	110	3	129	641	0	374	56	1152	469	0	6
% Validated	31.48%	27.16%	100.00%	27.22%	24.27%	0.00%	90.78%	100.00%	28.07%	40.85%	0.00%	30.00%
Verified	6310	295	0	330	2000	23	38	0	2880	676	54	14
% Verified	67.56%	72.84%	0.00%	69.62%	75.73%	100.00%	9.22%	0.00%	70.18%	58.89%	100.00%	70.00%
Rejected	2	1	0	0	1	0	0	0	0	0	0	0
% Rejected	0.02%	0.25%	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Validated codes: J, V, JB, UJ

Verified codes: 1, J1, V1, JB1, UJ1

16.0 REFERENCES

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DOE, 2002i, Closure Description Document for Partial Closure of Unit 374.3; 400 Area Process Waste Transfer System, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

DOE, 2003a, Closeout Report for IHSS Group 000-1 Solar Evaporation Ponds Area of Concern, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2003b, Industrial Area Sampling and Analysis Plan FY03 Addendum #IA-03-11 IHSS Group 000-2, Original Process Waste Lines, Rocky Flats Environmental Technology Site, Golden, Colorado, August.

DOE, 2003c, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation FY03 Notification #03-14, IHSS Group 000-2, Original Process Waste Lines, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

DOE, 2003d, Closeout Report for IHSS Group 100-4 (UBC 123, IHSS 148, PAC 100-611 and 100-5 (PAC 100-609), Rocky Flats Environmental Technology Site, Golden, Colorado, March.

DOE, 2003e, Industrial Area Sampling and Analysis Plan FY03 Addendum #IA-03-01 IHSS Groups 300-3, 300-4, 400-8, 700-4, 800-1, and 900-3, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2003f, Data Summary Report IHSS Groups 300-3 and 300-4, Rocky Flats Environmental Technology Site, Golden, Colorado, August.

DOE, 2003g, Industrial Area Sampling and Analysis Plan FY03 Addendum #IA-03-14 IHSS Groups 400-5 and 400-6, Rocky Flats Environmental Technology Site, Golden, Colorado, August.

DOE, 2003h, Industrial Area Sampling and Analysis Plan FY04 Addendum #IA-04-03 IHSS Groups 500-1 and 500-5, Rocky Flats Environmental Technology Site, Golden, Colorado, November.

DOE, 2003i, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation FY04 Notification #04-03 IHSS Groups 500-1 and 500-5, Rocky Flats Environmental Technology Site, Golden, Colorado, November.

DOE, 2003j, Industrial Area Sampling and Analysis Plan FY03 Addendum #IA-03-12 IHSS Group 500-3, Rocky Flats Environmental Technology Site, Golden, Colorado, August.

DOE, 2003k, Industrial Area Sampling and Analysis Plan FY04 Addendum #IA-03-04 IHSS Group 700-3, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2003l, Industrial Area Sampling and Analysis Plan FY03 Addendum #IA-03-15 IHSS Group 700-7, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

DOE, 2003m, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation FY03 Notification #03-10 IHSS Group 700-7, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

DOE, 2003n, Final Industrial Area Sampling and Analysis Plan FY03 Addendum #IA-03-01 IHSS Groups 300-3, 300-4, 400-8, 700-4, 800-1, and 900-3, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2003o, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation FY03 Notification #03-12 IHSS Group 800-1, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2003p, Closeout Report for IHSS Group 800-6, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

DOE, 2003q, Closure Description Document for Partial Closure of Unit 374.3; 700 and 800 Area Process Waste Transfer System, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2003r Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

DOE, 2004a, Data Summary Report IHSS Groups 400-5 and 400-6, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004b, Closeout Report for IHSS Group 400-7, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004c, Data Summary Report for IHSS Group 500-1, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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DOE, 2004d, Industrial Area Sampling and Analysis Plan FY04 Addendum #IA-04-02 IHSS Group 700-2, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004e, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation FY04 Notification #04-05 IHSS Group 700-2, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004f, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation FY04 Notification #04-04 IHSS Group 700-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

DOE, 2004g, Closeout Report for IHSS Group 700-7, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004h, Industrial Area Sampling and Analysis Plan FY04 Addendum #IA-04-07 IHSS Group 700-10, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2004i, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation FY04 Notification #04-07 IHSS Group 700-10, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2004j, Data Summary Report for IHSS Group 700-10, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2004k, Closeout Report for IHSS Group 800-1, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

DOE, 2004l, Industrial Area Sampling and Analysis Plan FY04 Addendum #IA-04-06 IHSS Group 800-3, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2004m, Data Summary Report for IHSS Group 800-5, Rocky Flats Environmental Technology Site, Golden, Colorado, July.

DOE, 2004n, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation FY04 Notification #05-01 IHSS Group 000-4, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

DOE, 2004o, Industrial Area and Buffer Zone Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

DOE, 2005a, Closeout Report for IHSS Group 000-2, Original Process Waste Lines (OPWL), Rocky Flats Environmental Technology Site, Golden, Colorado, in process.

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DOE, 2005b, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation FY05 Notification #05-02 IHSS Group 500-3, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 2005c, Closeout Report for IHSS Group 500-3, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2005d, Closeout Report for IHSS Group 700-2, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

DOE, 2005e, Closeout Report for IHSS Group 700-3, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2005f, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation FY05 Notification #05-04 IHSS Group 800-3, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE 2005g, Closeout Report for IHSS Group 800-3, UBC 883, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2005h, Closure Summary Report for the 700/800 Process Waste Transfer System, RCRA Unit 374.3 Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, CDPHE, and EPA, 2003, RFCA Modification, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

EPA, 1994a, Guidance for the Data Quality Objective Process, QA/G-4.

EPA, 1994b, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, 540/R-94/012.

EPA, 1994c, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, 540/R-94/013.

EPA, 1998, Guidance for the Data Quality Assessment Process; Practical Methods for Data Analysis, QA/G-9.

K-H, 2002a, General Guidelines for Data Verification and Validation, DA-GR01-v1, October.

K-H, 2002b, V&V Guidelines for Isotopic Determinations by Alpha Spectrometry, DA-RC01-v1, October.

K-H, 2002c, V&V Guidelines for Volatile Organics, DA-SS01-v1, October.

K-H, 2002d, V&V Guidelines for Semivolatile Organics, DA-SS02-v1, October.

K-H, 2002e, V&V Guidelines for Metals, DA-SS05-v1, October.

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Lockheed-Martin, 1997, Evaluation of Radiochemical Data Usability, ES/ER/MS-5.

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Appendix A

Correspondence

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
REGULATORY CONTACT RECORD

Date/Time: February 12, 2003/ 2:00 pm.

Site Contact(s): Alec Cameron
Phone: (303) 966-4787

Regulatory Contact: David Kruchek
Phone: (303) 966-6728

Agency: Colorado Department of Public Health and Environment

Purpose of Contact: Evaluation of Radiological Results from NPWL Closure

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Discussion
The purpose of the meeting was to discuss the radiological results from NPWL closure activities and come to agreement on future radiological sampling requirements.

History
The 400 area New Process Waste Lines (NPWL) are being clean closed in accordance with the approved Closure Description Document (CDD) (May 24, 2002 Letter from CDPHE to DOE). As part of the approved CDD, CDPHE requested that radiological contaminants be evaluated in accordance with the consultative process described in RFCA. The purpose of the meeting and contact record were to document the consultative process.

Results
Seventeen samples have been taken from the 400 area and analyzed for Isotopic Radiological constituents. The highest results from these sampling events are summarized and compared to various standards in the attached table and graph. The results show that the highest levels of contamination are:

- U_{238} 24 pCi/L
- $U_{235/236}$ 0.39 pCi/L
- $U_{233/234}$ 3.6 pCi/L
- $Pu_{239/240}$ 0.24 pCi/L
- Am_{241} 0.06 pCi/L

Based on these low levels of radiological constituents, KH plans to scale down the analytical method for determining radiological contaminants in the remainder of the Process Waste Line cleaning and characterization activities. Specifically, rinseate from

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lines will be analyzed for gross alpha/beta instead of isotopic analysis. The total gross alpha/beta analysis from each line will be compared to 313 pCi/L to determine if further analysis is required.

Agreement

Mr. Kruchek agreed with the following:

- Process waste line rinseate will be analyzed for Gross Alpha/Beta to determine if further analysis is required:
  - If Gross Alpha/Beta results from the sample are higher than 313 pCi/L (the combined Tier I Groundwater Standard), then additional sampling and/or analysis will be used to further understand the source of contamination. Results will be presented to CDPHE and the consultative process will be used to determine if further action is required.
  - If Gross Alpha/Beta results from the sample are less than 313 pCi/L, then no further sampling and analysis will be required for closure.

Contact Record Prepared By: Alec Cameron

Required Distribution:

P. Arnold, K-H 371
C. Deck, K-H
R. DiSalvo
C. Gilbreath, K-H 771
S. Gunderson, CDPHE
T. Hopkins, K-H 776
L. Kilpatrick, RFFO
J. Legare, DOE
R. Leitner, K-H 371
J. Mead, K-H ESS
S. Nesta, K-H RISS
K. North, K-H ESS/MS
B. Prymak, DOE
T. Rehder, USEPA
D. Shelton, K-H

Additional Distribution:

K. Wiemelt, K-H RISS
S. Dieterle, K-H RISS
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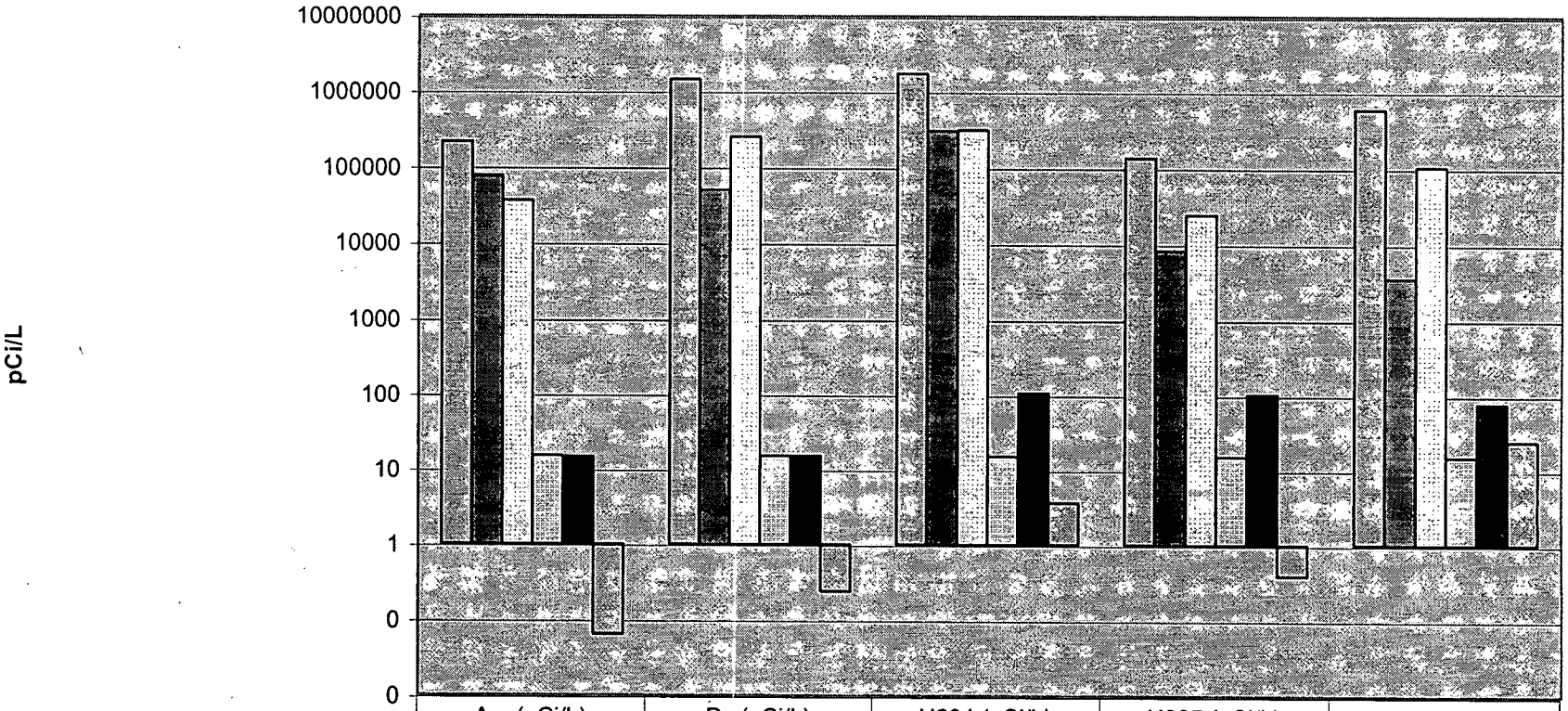
_____
_____
_____
_____

Rad Levels for NPWL



	Am (pCi/L)	Pu (pCi/L)	U234 (pCi/L)	U235 (pCi/L)	U238 (pCi/L)
Surface Soil Tier I (Open Space)	215,000	1,429,000	1,736,000	135,000	586,000
Proposed Soil Action Levels	76,000	50,000	300,000	8,000	3,510
Surface Soil Tier II	36,000	252,000	307,000	24,000	103,000
Drinking Water Standard	15	15	15	15	15
Groundwater Tier I	14.5	15.1	106	101	76.8
NPWL Samples (max. so far)	0.06	0.24	3.6	0.39	24

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
REGULATORY CONTACT RECORD

Date/Time: 08/10/04 – 1315

Site Contact(s): C. J. Freiboth (KH) – (CJF-077)
Phone: (303) 966-2823

Regulatory Contact: David Kruchek, CDPHE
Phone: (303) 692-3328

Agency: CDPHE

Purpose of Contact: Valve Vault 02 Demolition

Meeting Attendance:

C. J. Freiboth, KH PM
M. D. Flannery, KH
S. M. Nesta, KH
David Kruchek, CDPHE
H. Linsinbigler, KH
A. Cameron, KH

Discussion

On August 10, 2004, at 1315, a walkdown of Valve Vault (VV) 02 was conducted with the State (Kruchek). This vault has been RCRA clean closed, and demolition and removal of the entire vault was required because of residual fixed uranium contamination on the bottom walls of the vault and in the floor sump. The fixed levels on the walls are as high as 19,482 dpm/100 cm^2, and the sump has 45,000 dpm /100 cm^2 of fixed contamination. There is no removable radiological contamination in the vault.

Demolition activities on the vault were initiated, and included removal of the vault roof and portions of the walls. In order to remove the entire vault, a large excavation around the vault was initiated. The excavation on the outside of the vault continues to fill up with ground water (the water in the excavation has been pumped out three (3) times), due to the proximity of the vault to Building 883, where the footer drain system has been rendered inoperable. In addition, a retaining wall is located above the vault to the east, and in order to excavate around the vault for removal, an even larger excavation would be required. This large of an excavation would take out a significant portion of the retaining wall and could undermine much of the road next to Building 883. A significantly sized excavation creates additional safety concerns due to the sloping requirements. Based on the continued infusion of ground water into the excavation, and because of the size of the vault and required excavation, complete removal of the vault is very difficult.

A proposal was presented to the State (Kruchek), where the debris in the vault would be removed and the bottom portion of the vault would be flow-filled to ensure the fixed contamination is locked in place. Once this has been completed the vault would be removed to the flow-fill, ensuring the two (2) pipe penetrations from the lines from VV-1 are removed, as well as the two (2) lines from Building 883. The excavation around the vault that is filled with water would be pumped one more time and then backfilled.

The State (Kruchek) concurred with the approach that was presented.

Contact Record Prepared By: C. J. Freiboth

Required Distribution:
M. Aguilar, USEPA
S. Bell, DOE
R. Birk, DOE
C. Deck, KH
D. Foss, KH
S. Garcia, EPA
C. Gilbreath, KH
S. Gunderson, CDPHE
D. Kruchek, CDPHE
J. Legare, RFFO
R. Leitner, KH
J. Mead, KH
G. Morgan, DOE
S. Nesta, KH
K. North, KH
R. Schassburger, DOE
D. Shelton, KH
C. Zahm, KH

Additional Distribution:
H. Ainscough, CDPHE
A. Cameron, KH
C. J. Freiboth, KH
M. D. Flannery, KH
H. Linsinbigler, KH

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
REGULATORY CONTACT RECORD

Date/Time: 10/27/04 - 1000

Site Contact(s): Karen Wiemelt
Phone: (303) 966-9883

Regulatory Contact: David Kruchek, CDPHE
Phone: (303) 692-3328

Agency: CDPHE

Purpose of Contact: Valve Vault 09 Demolition

Meeting Attendance:

C. J. Freiboth, KH PM
K. L. Wiemelt, KH
David Kruchek, CDPHE
D. Parsons, D&DSC

Discussion

On October 27, 2004, at 1000, a meeting regarding Valve Vault (VV) 09 was conducted with the State (Kruchek). VV 09 is located at the northwest corner of Building 707. The vault's dimensions are 8' by 12' by 11'8" deep. There is also a sump below the bottom of the vault. Additionally, the final grade in this area will be approximately 5 feet higher than current grade.

VV 09 was pressure washed to decontaminate it. Results show that this vault has been RCRA clean closed and has no removable Be contamination. The majority of the valve vault meets radiological unrestricted release criteria for both alpha and beta. However, there are a few elevated levels of alpha activity above the unrestricted release levels for both removable and fixed contamination in the lower 4 feet and sump of the valve vault

Conservative calculations were done to determine the levels of radiological contamination that would be left in the ground if the valve vault were left in place. The estimated levels of remaining radiological material that would be left is as follows:

- 1.47 pCi/g Pu-239
- 0.33 pCi/g Pu-240
- 1.65 pCi/g Am-241
- 0.06 pCi/g U-234
- 0.05 pCi/g U-235
- 1.45 pCi/g U-238

The calculations show that the residual contamination left is well below Wildlife Refuge Worker Action Levels.

A proposal was presented to the State (Kruchek) where the vault would be removed to four feet below final grade and the remainder of the valve vault would be flow-filled to ensure the fixed

contamination is locked in place. Associated NPWL that have not been RCRA clean closed will still be removed. It was also proposed to apply this process to other valve vaults that are RCRA clean-closed but have some contamination above the unrestricted release criteria.

The State (Kruchek) concurred with the approach that was presented and also requested that flow fill be added to a minimum of one foot above the highest (in elevation) level of contamination above the unrestricted release criteria. The State also requested that the removable contamination be fixed prior to flow filling the vault. Site representatives agreed to these items (Freiboth, Parsons, Wiemelt). Results for each valve vault that is a candidate for this approach will be presented and documented in a Contact Record. Additionally, the Closeout Report will also include the estimated amount of transuranic material that is left in place.

Contact Record Prepared By: Karen Wiemelt

Required Distribution:
M. Aguilar, USEPA
S. Bell, DOE
R. Birk, DOE
C. Deck, KH
D. Foss, KH
S. Garcia, EPA
C. Gilbreath, KH
S. Gunderson, CDPHE
D. Kruchek, CDPHE
J. Legare, RFFO
R. Leitner, KH
J. Mead, KH
G. Morgan, DOE
S. Nesta, KH
K. North, KH
R. Schassburger, DOE
D. Shelton, KH
C. Zahm, KH

Additional Distribution:
H. Ainscough, CDPHE
A. Cameron, KH
C. J. Freiboth, KH
G. Carnival, KH
D. Parsons, KH

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
REGULATORY CONTACT RECORD

Date/Time: 11/18/04 - 1200

Site Contact(s): Karen Wiemelt
Phone: (303) 966-9883

Regulatory Contact: David Kruchek, CDPHE
Phone: (303) 692-3328

Agency: CDPHE

Purpose of Contact: Valve Vault 08 Demolition

Meeting Attendance: K. L. Wiemelt, KH David Kruchek, CDPHE

Discussion
On November 18, 2004, David Kruchek/CDPHE and Karen Wiemelt/KH discussed the disposition of Valve Vault (VV) 08. VV 08 is located to the west of Building 707. The vault's dimensions are 13' by 12' by 9'6" deep. There is also a sump that extends 4' below the bottom of the vault. Additionally, the final grade in this area will be approximately 3½ feet higher than current grade.

VV 08 was pressure washed to decontaminate it. Results show that this vault has been RCRA clean closed and has no removable Be contamination. The majority of the valve vault meets radiological unrestricted release criteria for both alpha and beta. However, there are a few elevated levels of alpha activity above the unrestricted release levels for fixed contamination in the sump of the valve vault and 2 NPWL stubs located in the lower 4 feet of the valve vault. The sump also has an elevated level of alpha activity slightly above the unrestricted release levels for removable contamination (32 dpm/100 cm^2 vs. 20 dpm/100 cm^2).

Conservative calculations were done to determine the levels of radiological contamination that would be left in the ground if the valve vault were left in place. The estimated levels of remaining radiological material that would be left are as follows:

- 1.21 pCi/g Pu-239
- 0.27 pCi/g Pu-240
- 1.36 pCi/g Am-241
- 0.05 pCi/g U-234
- 0.05 pCi/g U-235
- 1.43 pCi/g U-238

The calculations show that the residual contamination left is well below Wildlife Refuge Worker Action Levels.

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Based on the approach agreed to for VV 09, VV 08 will be flow-filled to the top of the valve vault. None of the valve vault will be removed since approximately 3½ feet of fill will be added to this area to achieve final configuration. The flow fill will be several feet higher than any level of contamination above the unrestricted release criteria. Associated NPWL outside the valve vault that have not been RCRA clean closed will be removed. However, the NPWL stubs that penetrate the valve vault wall with the elevated readings will remain in place. Additionally, the Closeout Report will include the estimated amount of transuranic material that is left in place.

Contact Record Prepared By: Karen Wiemelt

Required Distribution:
M. Aguilar, USEPA
S. Bell, DOE
R. Birk, DOE
C. Deck, KH
D. Foss, KH
S. Garcia, EPA
C. Gilbreath, KH
S. Gunderson, CDPHE
D. Kruchek, CDPHE
J. Legare, RFFO
R. Leitner, KH
J. Mead, KH
G. Morgan, DOE
S. Nesta, KH
K. North, KH
R. Schassburger, DOE
D. Shelton, KH
C. Zahm, KH

Additional Distribution:
H. Ainscough, CDPHE
C. J. Freiboth, KH
G. Carnival, KH
D. Parsons, KH

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ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
REGULATORY CONTACT RECORD

Date/Time: 12/08/04 - 1400

Site Contact(s): Karen Wiemelt
Phone: (303) 966-9883

Regulatory Contact: David Kruchek, CDPHE
Phone: (303) 692-3328

Agency: CDPHE

Purpose of Contact: Valve Vault 03 Demolition

Meeting Attendance: K. L. Wiemelt, KH David Kruchek, CDPHE

Discussion
On December 8, 2004, David Kruchek/CDPHE and Karen Wiemelt/KH discussed the disposition of Valve Vault (VV) 03. VV 03 is located to the northwest of Building 883. The vault's dimensions are 9'9" by 9'9" by 13'6" deep. There is also a sump that extends 4' below the bottom of the vault. Current grade is representative of final grade for this area.

VV 03 was pressure washed to decontaminate it. Results show that this vault has been RCRA clean closed and has no removable Be contamination. The majority of the valve vault meets radiological unrestricted release criteria for both alpha and beta. However, there are a few elevated levels of alpha and beta activity above the unrestricted release levels for fixed contamination in the bottom 6 feet of the valve vault and the sump. All removable levels are below the unrestricted release levels.

Conservative calculations were done to determine the levels of radiological contamination that would be left in the ground if the valve vault were left in place. The estimated levels of remaining radiological material that would be left are as follows:

- 0.71 pCi/g Pu-239
- 0.16 pCi/g Pu-240
- 0.80 pCi/g Am-241
- 0.03 pCi/g U-234
- 0.12 pCi/g U-235
- 3.45 pCi/g U-238

The calculations show that the residual contamination left is well below Wildlife Refuge Worker Action Levels.

Based on the approach agreed to for VV 09, VV 03 will be back-filled to the top of the valve vault. Six feet of the top of the valve vault has already been removed. Debris from this removal

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that is in the bottom of the valve vault will be removed to the extent practicable. Since removable levels meet the unrestricted release levels, the valve vault will be backfilled with dirt. Associated NPWL outside the valve vault that have not been RCRA clean closed will be removed. Additionally, the Closeout Report will include the estimated amount of transuranic material that is left in place.

Contact Record Prepared By: Karen Wiemelt

Required Distribution:
M. Aguilar, USEPA
S. Bell, DOE
R. Birk, DOE
C. Deck, KH
D. Foss, KH
S. Garcia, EPA
C. Gilbreath, KH
S. Gunderson, CDPHE
D. Kruchek, CDPHE
J. Legare, RFFO
R. Leitner, KH
J. Mead, KH
G. Morgan, DOE
S. Nesta, KH
K. North, KH
R. Schassburger, DOE
D. Shelton, KH
C. Zahm, KH

Additional Distribution:
H. Ainscough, CDPHE
C. J. Freiboth, KH
G. Carnival, KH
D. Parsons, KH

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Appendix B

Project Photographs

Enclosure

CD Containing Standardized Real and QC Accelerated Action Data

(6) IA-A-002878

Figure 1

IHSS Group 000-4 New Process Waste Lines (NPWL) and Valve Vault Locations

KEY

- NPWL - removed (below ground)
- NPWL - removed (above ground)
- NPWL - left in place (clean closed)
- NPWL - left in place (not part of RCRA Unit 374.3)
- Tanks - removed
- Valve Vault - removed
- Valve Vault - partially removed and flow filled
- Valve Vault - partially removed and backfilled
- Building/structure
- Demolished structure
- Paved area
- Dirt road
- MST return line

Note: Valve vaults are greatly enlarged from actual scale for readability purposes

N W E S

200 0 200 Feet

Scale = 1:3,100

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

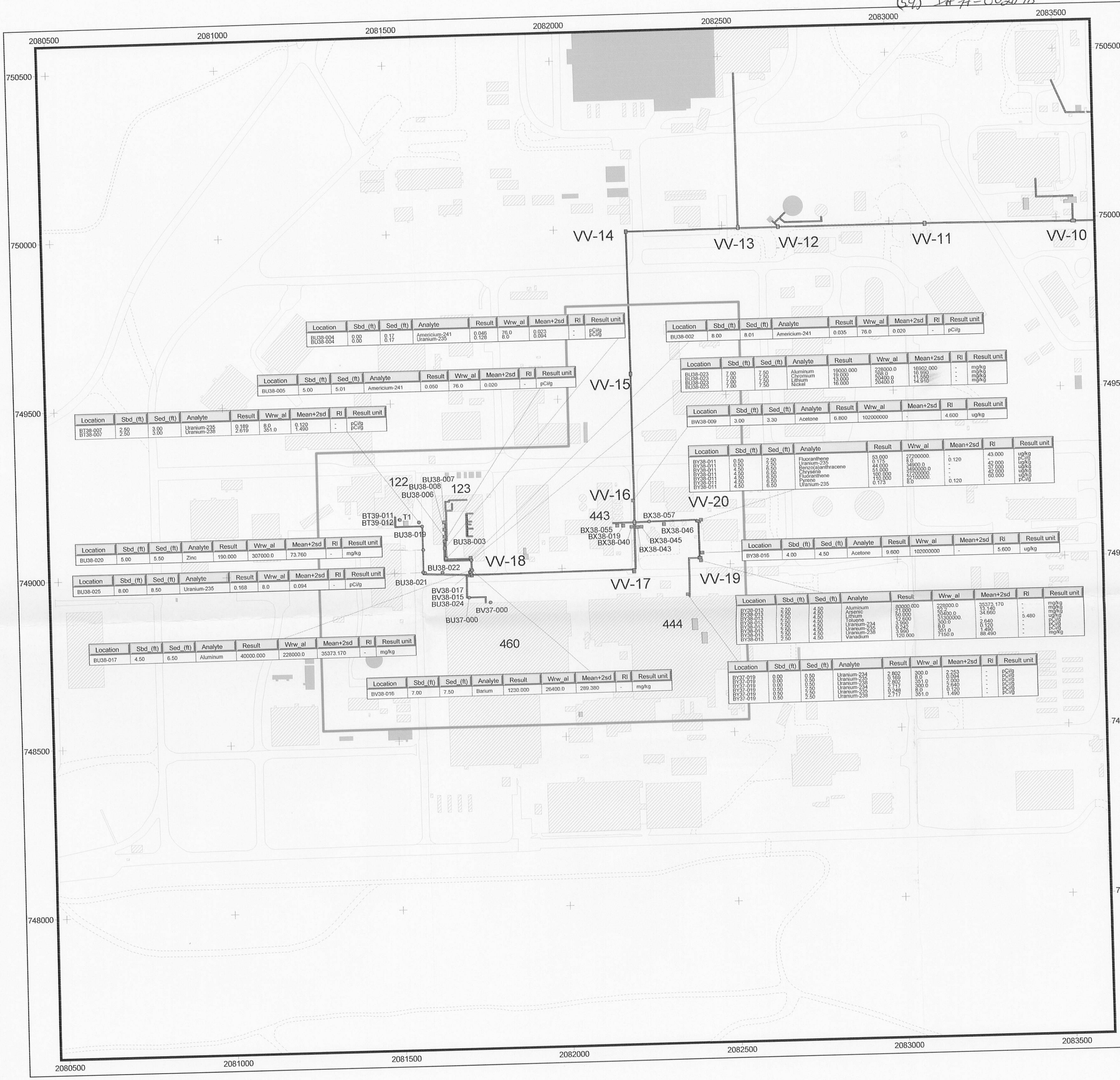
Prepared by: RADMS Date: 09/28/05

Prepared for: KAISER+HILL COMPANY

File:W:\Projects\Fy2005\000-4\NPWL cor gpp.apr

IA-A-002878 1 of 5

(54) IA A-002878



Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BU38-004	0.00	0.17	Americium-241	0.046	76.0	0.023	-	pCi/g
BU38-004	0.00	0.17	Uranium-235	0.128	8.0	0.094	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BU38-005	5.00	5.01	Americium-241	0.050	76.0	0.020	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BT38-007	2.50	3.00	Uranium-235	0.189	8.0	0.120	-	pCi/g
BT38-007	2.50	3.00	Uranium-238	2.619	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BU38-020	5.00	5.50	Zinc	190.000	307000.0	73.760	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BU38-025	8.00	8.50	Uranium-235	0.168	8.0	0.094	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BU38-017	4.50	6.50	Aluminum	40000.000	228000.0	35373.170	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BV38-016	7.00	7.50	Barium	1230.000	26400.0	289.380	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BU38-002	8.00	8.01	Americium-241	0.035	76.0	0.020	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BU38-023	7.00	7.50	Aluminum	19000.000	228000.0	16902.000	-	mg/kg
BU38-023	7.00	7.50	Chromium	19.000	269.0	16.990	-	mg/kg
BU38-023	7.00	7.50	Lithium	13.000	20400.0	11.550	-	mg/kg
BU38-023	7.00	7.50	Nickel	16.000	20400.0	14.910	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BW38-009	3.00	3.30	Acetone	6.800	102000000	-	4.600	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BY38-011	0.50	2.50	Fluoranthene	53.000	27200000.	-	43.000	ug/kg
BY38-011	0.50	2.50	Uranium-235	0.175	8.0	0.120	-	pCi/g
BY38-011	4.50	6.50	Benzo(a)anthracene	44.000	34900.0	-	42.000	ug/kg
BY38-011	4.50	6.50	Chrysene	51.000	3490000.0	-	37.000	ug/kg
BY38-011	4.50	6.50	Fluoranthene	100.000	27200000.	-	42.000	ug/kg
BY38-011	4.50	6.50	Pyrene	110.000	22100000.	-	60.000	ug/kg
BY38-011	4.50	6.50	Uranium-235	0.173	8.0	0.120	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BY38-016	4.00	4.50	Acetone	9.600	102000000	-	5.600	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BY38-013	2.50	4.50	Aluminum	80000.000	228000.0	35373.170	-	mg/kg
BY38-013	2.50	4.50	Arsenic	21.000	22.2	13.140	-	mg/kg
BY38-013	2.50	4.50	Lithium	50.000	20400.0	34.660	-	mg/kg
BY38-013	2.50	4.50	Toluene	12.600	51300000.	-	5.480	ug/kg
BY38-013	2.50	4.50	Uranium-234	3.990	300.0	2.640	-	pCi/g
BY38-013	2.50	4.50	Uranium-235	0.242	8.0	0.120	-	pCi/g
BY38-013	2.50	4.50	Uranium-238	3.990	351.0	1.490	-	pCi/g
BY38-013	2.50	4.50	Vanadium	120.000	7150.0	88.490	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	RI	Result unit
BY37-019	0.00	0.50	Uranium-234	2.802	300.0	2.253	-	pCi/g
BY37-019	0.00	0.50	Uranium-235	0.169	8.0	0.094	-	pCi/g
BY37-019	0.00	0.50	Uranium-238	2.802	351.0	2.000	-	pCi/g
BY37-019	0.50	2.50	Uranium-234	2.717	300.0	2.640	-	pCi/g
BY37-019	0.50	2.50	Uranium-235	0.248	8.0	0.120	-	pCi/g
BY37-019	0.50	2.50	Uranium-238	2.717	351.0	1.490	-	pCi/g

Figure 2

100/400 Area Characterization Soil Sampling Results Greater Than Background Means Plus Two Standard Deviations or RLs

KEY

IHSS Group 000-4

- Detection greater than WRW AL
- Detection less than WRW AL
- Below background or MDL/RL

Other IHSS Group

- Detection greater than WRW AL
- Detection less than WRW AL
- Below background or MDL/RL

- NPWL - removed (below ground)
- NPWL - removed (above ground)
- NPWL - left in place (clean closed)
- NPWL - left in place (not part of RCRA Unit 374.3)
- Tank - removed
- Valve Vault - removed
- Valve Vault - partially removed and flow filled
- Valve Vault - partially removed and backfilled
- Building/structure
- Demolished structure
- Paved area
- Dirt road

N W E S

250 0 250 Feet

Scale = 1:2,250

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: RADMS Date: 09/28/05

Prepared for: KAISER+HILL COMPANY

File:W:\Projects\Fy2005\000-4\NPWL cor gpp.apr

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Figure 3

300/500 Area Characterization Soil Sampling Results Greater Than Background Means Plus Two Standard Deviations or RLs

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ45-005	6.50	8.50	Barium	822.000	26400.0	289.380	-	mg/kg
BZ45-005	6.50	8.50	Uranium-234	5.315	300.0	2.640	-	pCi/g
BZ45-005	6.50	8.50	Uranium-235	0.312	8.0	0.120	-	pCi/g
BZ45-005	6.50	8.50	Uranium-238	5.315	351.0	1.490	-	pCi/g
BZ45-005	6.50	8.50	Vanadium	137.000	7150.0	88.480	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BY44-001	0.00	0.50	Copper	24.000	40900.0	18.060	-	mg/kg
BY44-001	0.00	0.50	Manganese	460.000	3480.0	365.080	-	mg/kg
BY44-001	0.00	0.50	Uranium-234	2.587	300.0	2.253	-	pCi/g
BY44-001	0.00	0.50	Uranium-235	0.587	8.0	0.094	-	pCi/g
BY44-001	0.00	0.50	Uranium-238	2.587	351.0	2.000	-	pCi/g
BY44-001	2.50	4.50	Uranium-235	0.197	8.0	0.120	-	pCi/g
BY44-001	2.50	4.50	Uranium-238	0.154	8.0	0.120	-	pCi/g
BY44-001	4.50	6.50	Uranium-238	1.929	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-011	2.50	4.50	Acetone	6.500	102000000	-	5.200	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-010	3.00	4.50	Uranium-235	0.217	8.0	0.120	-	pCi/g
BZ43-010	3.00	4.50	Uranium-238	1.638	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-029	0.00	0.30	Americium-241	1.140	76.0	0.023	-	pCi/g
BZ43-029	0.00	0.30	Plutonium-239/240	0.489	50.0	0.060	-	pCi/g
BZ43-029	0.00	0.30	Uranium-235	0.445	8.0	0.094	-	pCi/g
BZ43-029	0.00	0.30	Uranium-238	2.720	351.0	2.000	-	pCi/g
BZ43-029	7.00	7.30	Americium-241	0.758	76.0	0.020	-	pCi/g
BZ43-029	7.00	7.30	Plutonium-239/240	4.318	50.0	0.020	-	pCi/g
BZ43-029	7.00	7.30	Uranium, Total	8.600	2750.0	3.040	-	mg/kg
BZ43-029	7.00	7.30	Uranium-234	5.115	300.0	2.640	-	pCi/g
BZ43-029	7.00	7.30	Uranium-235	0.201	8.0	0.120	-	pCi/g
BZ43-029	7.00	7.30	Uranium-238	5.115	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-009	2.50	4.50	Uranium-234	4.872	300.0	2.640	-	pCi/g
BZ43-009	2.50	4.50	Uranium-235	0.190	8.0	0.120	-	pCi/g
BZ43-009	2.50	4.50	Uranium-238	4.872	351.0	1.490	-	pCi/g
BZ43-009	4.50	6.50	Uranium-234	3.456	300.0	2.640	-	pCi/g
BZ43-009	4.50	6.50	Uranium-235	0.248	8.0	0.120	-	pCi/g
BZ43-009	4.50	6.50	Uranium-238	3.456	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-008	2.50	4.50	Uranium-235	0.145	8.0	0.120	-	pCi/g
BZ43-008	4.50	6.50	Uranium-238	1.990	351.0	1.490		pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ42-016	3.00	3.30	Uranium-234	3.504	300.0	2.640	-	pCi/g
BZ42-016	3.00	3.30	Uranium-235	0.191	8.0	0.120	-	pCi/g
BZ42-016	3.00	3.30	Uranium-238	3.504	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-007	2.50	4.50	Arsenic	13.300	22.2	13.140	-	mg/kg
BZ43-007	2.50	4.50	Barium	1300.000	26400.0	289.380	-	mg/kg
BZ43-007	2.50	4.50	Uranium-235	0.127	8.0	0.120	-	pCi/g
BZ43-007	4.50	6.50	Barium	1110.000	26400.0	289.380	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ42-015	3.00	3.30	Uranium-234	2.902	300.0	2.640	-	pCi/g
BZ42-015	3.00	3.30	Uranium-238	2.902	351.0	1.490		pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ42-014	3.00	3.30	Uranium-234	3.214	300.0	2.640	-	pCi/g
BZ42-014	3.00	3.30	Uranium-235	0.163	8.0	0.120	-	pCi/g
BZ42-014	3.00	3.30	Uranium-238	3.214	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-000	14.50	16.50	Uranium-234	5.553	300.0	2.640	-	pCi/g
BZ43-000	14.50	16.50	Uranium-235	0.361	8.0	0.120	-	pCi/g
BZ43-000	14.50	16.50	Uranium-238	5.553	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-028	10.00	12.00	Americium-241	0.206	76.0	0.020	-	pCi/g
BZ43-028	10.00	12.00	Plutonium-239/240	0.446	50.0	0.020	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-002	14.50	16.50	Uranium-234	5.616	300.0	2.640	-	pCi/g
BZ43-002	14.50	16.50	Uranium-235	0.307	8.0	0.120	-	pCi/g
BZ43-002	14.50	16.50	Uranium-238	5.616	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-001	14.50	16.50	Uranium-234	5.132	300.0	2.640	-	pCi/g
BZ43-001	14.50	16.50	Uranium-235	0.244	8.0	0.120	-	pCi/g
BZ43-001	14.50	16.50	Uranium-238	5.132	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-006	6.50	8.50	Uranium-234	4.604	300.0	2.640	-	pCi/g
BZ43-006	6.50	8.50	Uranium-235	0.212	8.0	0.120	-	pCi/g
BZ43-006	6.50	8.50	Uranium-238	4.604	351.0	1.490	-	pCi/g
BZ43-006	8.50	10.50	Uranium-234	5.189	300.0	2.640	-	pCi/g
BZ43-006	8.50	10.50	Uranium-238	5.189	351.0	1.490	-	pCi/g
BZ43-006	10.50	12.50	Uranium-234	4.462	300.0	2.640	-	pCi/g
BZ43-006	10.50	12.50	Uranium-235	0.201	8.0	0.120	-	pCi/g
BZ43-006	10.50	12.50	Uranium-238	4.462	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-037	17.00	18.00	Uranium-234	3.468	300.0	2.640	-	pCi/g
BZ43-037	17.00	18.00	Uranium-238	3.468	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-039	0.00	0.50	Americium-241	0.218	76.0	0.020	-	pCi/g
BZ43-039	0.00	0.50	Plutonium-239/240	1.240	50.0	0.020		pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-038	0.00	0.50	Uranium-234	3.545	300.0	2.640	-	pCi/g
BZ43-038	0.00	0.50	Uranium-235	0.167	8.0	0.120	-	pCi/g
BZ43-038	0.00	0.50	Uranium-238	3.545	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-040	0.00	0.50	Uranium-235	0.213	8.0	0.120	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-036	9.00	10.00	Uranium-234	3.925	300.0	2.640	-	pCi/g
BZ43-036	9.00	10.00	Uranium-235	0.214	8.0	0.120	-	pCi/g
BZ43-036	9.00	10.00	Uranium-238	3.925	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-004	12.50	14.50	Uranium-234	4.093	300.0	2.640	-	pCi/g
BZ43-004	12.50	14.50	Uranium-235	0.229	8.0	0.120	-	pCi/g
BZ43-004	12.50	14.50	Uranium-238	4.093	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-005	6.50	8.50	Uranium-234	3.076	300.0	2.640	-	pCi/g
BZ43-005	6.50	8.50	Uranium-235	0.170	8.0	0.120	-	pCi/g
BZ43-005	6.50	8.50	Uranium-238	3.076	351.0	1.490	-	pCi/g
BZ43-005	8.50	10.50	Uranium-234	3.914	300.0	2.640	-	pCi/g
BZ43-005	8.50	10.50	Uranium-235	0.190	8.0	0.120	-	pCi/g
BZ43-005	8.50	10.50	Uranium-238	3.914	351.0	1.490	-	pCi/g
BZ43-005	10.50	11.00	Uranium-234	4.672	300.0	2.640	-	pCi/g
BZ43-005	10.50	11.00	Uranium-235	0.265	8.0	0.120	-	pCi/g
BZ43-005	10.50	11.00	Uranium-238	4.672	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BX44-001	7.00	7.50	2-Methylnaphthalene	1100.000	20400000.	-	22.000	ug/kg
BX44-001	7.00	7.50	Americium-241	566.500	76.0	0.020	-	pCi/g
BX44-001	7.00	7.50	Barium	954.000	26400.0	289.380	-	mg/kg
BX44-001	7.00	7.50	bis(2-Ethylhexyl)phthalate	140.000	19700000.0	-	35.000	ug/kg
BX44-001	7.00	7.50	Fluorene	57.000	4060000.	-	21.000	ug/kg
BX44-001	7.00	7.50	Mercury	13.800	2520000.0	1.520	-	mg/kg
BX44-001	7.00	7.50	Naphthalene	1400.000	3060000.0	-	535.000	ug/kg
BX44-001	7.00	7.50	Plutonium-239/240	3229.950	50.0	0.020	-	pCi/g
BX44-001	7.00	7.50	Uranium-234	2056.000	300.0	2.640	-	pCi/g
BX44-001	7.00	7.50	Uranium-235	27.410	8.0	0.120	-	pCi/g
BX44-001	7.00	7.50	Uranium-238	2056.000	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-003	12.50	14.50	Uranium, Total	9.900	2750.0	3.040	-	mg/kg
BZ43-003	12.50	14.50	Uranium-238	2.950	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CB43-048	9.00	11.00	Antimony	0.720	409.0	0.470	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CK44-024	9.00	10.50	Uranium-235	0.134	8.0	0.120	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CA43-022	11.00	11.50	1,2,4-Trichlorobenzene	0.880	9230000.0	-	0.790	ug/kg
CA43-022	11.00	11.50	Methylene chloride	3.300	2530000.0	-	0.890	ug/kg
CA43-022	11.00	11.50	Naphthalene	1.400	3090000.0	-	0.960	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CB42-024	1.00	1.30	Uranium-234	39.070	300.0	2.253	-	pCi/g
CB42-024	1.00	1.30	Uranium-235	0.370	8.0	0.094	-	pCi/g
CB42-024	1.00	1.30	Uranium-238	39.070	351.0	2.000	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CC43-017	4.50	6.50	Naphthalene	0.970	3090000.0	-	0.890	ug/kg
CC43-017	4.50	6.50	Plutonium-239/240	0.446	50.0	0.020	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CC43-007	4.50	6.50	Uranium-234	5.981	300.0	2.640	-	pCi/g
CC43-007	4.50	6.50	Uranium-238	5.981	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CC43-004	0.50	2.50	Acetone	15.000	102000000	-	5.000	ug/kg
CC43-004	2.50	4.50	1,2,4-Trichlorobenzene	0.760	9230000.0	-	0.740	ug/kg
CC43-004	2.50	4.50	Naphthalene	2.400	3090000.0	-	0.890	ug/kg
CC43-004	2.50	4.50	Tetrachloroethene	1.700	6150000.0	-	1.000	ug/kg
CC43-004	2.50	4.50	Toluene	1.200	31300000.	-	0.810	ug/kg
CC43-004	4.50	6.50	Naphthalene	1.000	3090000.0	-	0.890	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CD43-029	20.00	22.00	Uranium-238	1.624	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CD43-024	20.00	21.00	Americium-241	1.002	76.0	0.020	-	pCi/g
CD43-024	20.00	21.00	Plutonium-239/240	5.211	50.0	0.020	-	pCi/g
CD43-024	20.00	21.00	Uranium-238	1.675	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CE43-000	6.50	7.10	Uranium-235	0.141	8.0	0.120	-	pCi/g
CE43-000	6.50	7.10	Uranium-238	1.817	351.0	1.490	-	pCi/g
CE43-000	8.50	10.10	Ethylbenzene	6.460	4250000.0	-	5.830	ug/kg
CE43-000	8.50	10.10	Toluene	6.910	31300000.	-	5.830	ug/kg
CE43-000	8.50	10.10	Uranium-235	0.185	8.0	0.120	-	pCi/g
CE43-000	8.50	10.10	Xylene	41.700	2040000.0	-	11.700	ug/kg
CE43-000	10.50	11.50	Uranium-235	0.169	8.0	0.120	-	pCi/g
CE43-000	14.70	15.80	Uranium-235	0.175	8.0	0.120	-	pCi/g
CE43-000	16.50	18.50	Uranium-235	0.115	8.0	0.120	-	pCi/g
CE43-000	18.50	20.50	Uranium-234	4.585	300.0	2.640	-	pCi/g
CE43-000	18.50	20.50	Uranium-235	0.240	8.0	0.120	-	pCi/g
CE43-000	18.50	20.50	Uranium-238	4.585	351.0	1.490	-	pCi/g
CE43-000	20.50	22.40	Uranium-234	4.066	300.0	2.640	-	pCi/g
CE43-000	20.50	22.40	Uranium-235	0.175	8.0	0.120	-	pCi/g
CE43-000	20.50	22.40	Uranium-238	4.066	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CD43-022	17.00	18.00	Americium-241	1.363	76.0	0.020	-	pCi/g
CD43-022	17.00	18.00	Plutonium-239/240	7.769	50.0	0.020	-	pCi/g
CD43-022	17.00	18.00	Uranium-235	0.173	8.0	0.120	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CC43-008	4.50	6.50	Uranium-235	0.140	8.0	0.120	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CC43-037	0.00	0.50	Acetone	5.000	102000000	-	1.600	ug/kg
CC43-037	0.00	0.50	Carbon Tetrachloride	0.340	91500.0	-	0.190	ug/kg
CC43-037	0.00	0.50	Methylene chloride	1.600	2530000.0	-	0.360	ug/kg
CC43-037	0.00	0.50	Tetrachloroethene	0.790	6150000.0	-	0.200	ug/kg
CC43-037	0.00	0.50	Toluene	0.099	31300000.	-	0.094	ug/kg
CC43-037	0.00	0.50	Trichloroethene	0.170	19600.0	-	0.150	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CC43-012	4.50	6.50	Uranium-235	0.134	8.0	0.120	-	pCi/g

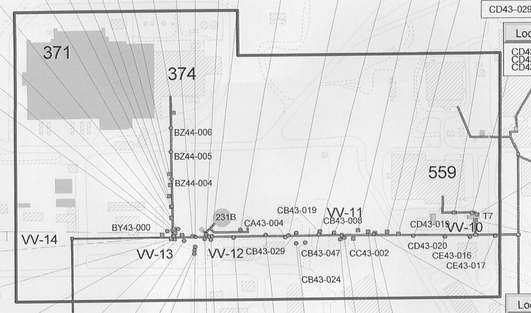
Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CB43-001	12.50	14.50	Barium	1200.000	26400.0	289.380	-	mg/kg
CB43-001	12.50	14.50	Vanadium	96.200	7150.0	88.490	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CB43-000	12.50	14.50	Barium	847.000	26400.0	289.380	-	mg/kg
CB43-000	12.50	14.50	Strontium	217.000	6130000.0	211.380	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
BZ43-030	0.00	0.50	Uranium-234	3.939	300.0	2.253	-	pCi/g
BZ43-030	0.00	0.50	Uranium-235	0.188	8.0	0.094	-	pCi/g
BZ43-030	0.00	0.50	Uranium-238	3.939	351.0	2.000	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CA43-017	7.00	8.50	Barium	945.000	26400.0	289.380	-	mg/kg
CA43-017	7.00	8.50	Uranium-234	2.926	300.0	2.640	-	pCi/g
CA43-017	7.00	8.50	Uranium-235	0.102	8.0	0.120	-	pCi/g
CA43-017	7.00	8.50	Uranium-238	2.926	351.0	1.490	-	pCi/g
CA43-017	8.50	10.50	Barium	1210.000	26400.0	289.380	-	mg/kg
CA43-017	8.50	10.50	Uranium-234	3.097	300.0	2.640	-	pCi/g
CA43-017	8.50	10.50	Uranium-238	3.097	351.0	1.490	-	pCi/g
CA43-017	10.50	12.50	Barium	863.000	26400.0	289.380	-	mg/kg
CA43-017	10.50	12.50	Iron	41100.000	307000.0	41046.520	-	mg/kg
CA43-017	10.50	12.50	Uranium-235	0.145	8.0	0.120	-	pCi/g
CA43-017	10.50	12.50	Vanadium	89.300	7150.0	88.490	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CA43-016	6.50	8.50	Barium	769.000	26400.0	289.380	-	mg/kg
CA43-016	8.50	10.50	Barium	1000.000	26400.0	289.380	-	mg/kg
CA43-016	8.50	10.50	Uranium-235	0.135	8.0	0.120	-	pCi/g
CA43-016	8.50	10.50	Vanadium	89.600	7150.0	88.490	-	mg/kg
CA43-016	10.50	12.50	Barium	1110.000	26400.0	289.380	-	mg/kg
CA43-016	10.50	12.50	Iron	41200.000	307000.0	41046.520	-	mg/kg
CA43-016	10.50	12.50	Strontium	216.000	6130000.0	211.380	-	mg/kg
CA43-016	10.50	12.50	Uranium-238	1.723	351.0	1.490	-	pCi/g
CA43-016	10.50	12.50	Vanadium	98.500	7150.0	88.490	-	mg/kg



KEY

IHSS Group 000-4

- Detection greater than WRW AL
- Detection less than WRW AL
- Below background or MDL/RL

Other IHSS Group

- Detection greater than WRW AL
- Detection less than WRW AL
- Below background or MDL/RL

Tank - removed

Building/structure

Demolished structure

Paved area

Dirt road

Stream, ditch, or other drainage feature

NPWL - removed (below ground)

NPWL - removed (above ground)

NPWL - left in place (clean closed)

NPWL - left in place (not part of RCRA Unit 374.3)

Valve Vault - removed

Valve Vault - partially removed and flow filled

Valve Vault - partially removed and backfilled

N W E S

300 0 300 Feet

Scale = 1 : 3,000

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: RADMS

Date: 09/28/05

Prepared for: KAISER-HILL COMPANY

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Figure 4

700 Area Characterization Soil Sampling Results Greater Than Background Means Plus Two Standard Deviations or RLs

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CJ46-021	0.00	0.50	Americium-241	0.6010	76	0.023	-	pCi/g
CJ46-021	0.00	0.50	Chromium	17.0000	268	16.990	-	mg/kg
CJ46-021	0.00	0.50	Plutonium-239/240	3.4270	50	0.066	-	pCi/g
CJ46-021	0.00	0.50	Uranium-234	4.7060	300	2.253	-	pCi/g
CJ46-021	0.00	0.50	Uranium-235	0.1680	8	0.094	-	pCi/g
CJ46-021	0.00	0.50	Uranium-238	4.7060	351	2.000	-	pCi/g
CJ46-021	0.50	2.50	Americium-241	1.0680	76	0.02	NA	pCi/g
CJ46-021	0.50	2.50	Plutonium-239/240	6.0876	50	0.02	NA	pCi/g
CJ46-021	0.50	2.50	Uranium-235	0.1312	8	0.12	NA	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CJ46-014	0.00	0.50	Aluminum	25000.000	228000	16902.000	-	mg/kg
CJ46-014	0.00	0.50	Americium-241	3.7050	76	0.023	-	pCi/g
CJ46-014	0.00	0.50	Barium	210.0000	26400	141.260	-	mg/kg
CJ46-014	0.00	0.50	Chromium	30.0000	268	16.990	-	mg/kg
CJ46-014	0.00	0.50	Lithium	16.0000	20400	11.550	-	mg/kg
CJ46-014	0.00	0.50	Mercury	0.5900	25200	0.134	-	mg/kg
CJ46-014	0.00	0.50	Nickel	16.0000	20400	14.910	-	mg/kg
CJ46-014	0.00	0.50	Plutonium-239/240	21.1190	50	0.066	-	pCi/g
CJ46-014	0.00	0.50	Strontium	77.0000	613000	48.940	-	mg/kg
CJ46-014	0.00	0.50	Uranium-234	4.3030	300	2.253	-	pCi/g
CJ46-014	0.00	0.50	Uranium-235	0.2540	8	0.094	-	pCi/g
CJ46-014	0.00	0.50	Uranium-238	4.3030	351	2.000	-	pCi/g
CJ46-014	0.00	0.50	Vanadium	54.0000	7150	45.590	-	mg/kg
CJ46-014	0.50	2.50	Americium-241	49.9500	76	0.02	NA	pCi/g
CJ46-014	0.50	2.50	Plutonium-239/240	284.7150	50	0.02	NA	pCi/g
CJ46-014	0.50	2.50	Uranium-234	4.7350	300	2.64	NA	pCi/g
CJ46-014	0.50	2.50	Uranium-235	0.3235	8	0.12	NA	pCi/g
CJ46-014	0.50	2.50	Uranium-238	4.7350	351	1.49	NA	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CJ46-010	0.00	0.50	Americium-241	0.4240	76	0.023	-	pCi/g
CJ46-010	0.00	0.50	Plutonium-239/240	2.4150	50	0.066	-	pCi/g
CJ46-010	0.00	0.50	Uranium-235	0.1630	8	0.094	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE46-013	0.00	0.50	Benzo(a)pyrene	52.0000	3490	-	41.000	ug/kg
CE46-013	0.00	0.50	Benzo(b)fluoranthene	49.0000	34900	-	30.000	ug/kg
CE46-013	0.00	0.50	Chrysene	44.0000	3490000	-	29.000	ug/kg
CE46-013	0.00	0.50	Fluoranthene	69.0000	27200000	-	23.000	ug/kg
CE46-013	0.00	0.50	Uranium-234	3.9520	300	2.253	-	pCi/g
CE46-013	0.00	0.50	Uranium-235	0.1970	8	0.094	-	pCi/g
CE46-013	0.00	0.50	Uranium-238	3.9520	351	2.000	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE44-027	12.50	14.50	Trichloroethene	3.3000	19600	-	1.100	ug/kg
CE44-027	14.50	16.50	1,2,4-Trichlorobenzene	0.8500	9230000	-	0.810	ug/kg
CE44-027	14.50	16.50	Naphthalene	1.6000	3090000	-	0.980	ug/kg
CE44-027	14.50	16.50	Trichloroethene	1.3000	19600	-	0.990	ug/kg
CE44-027	16.50	18.50	Trichloroethene	1.7000	19600	-	1.100	ug/kg
CE44-027	18.50	20.50	Trichloroethene	1.2000	19600	-	1.100	ug/kg
CE44-027	18.50	20.50	Uranium-238	1.7900	351	1.490	-	pCi/g
CE44-027	20.50	22.00	Acetone	6.0000	102000000	-	5.700	ug/kg
CE44-027	20.50	22.00	Naphthalene	1.3000	3090000	-	1.100	ug/kg
CE44-027	20.50	22.00	Trichloroethene	3.9000	19600	-	1.100	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE44-028	12.50	14.50	Acetone	16.0000	102000000	-	5.700	ug/kg
CE44-028	12.50	14.50	Ethylbenzene	4.5000	4250000	-	1.500	ug/kg
CE44-028	12.50	14.50	Toluene	36.0000	31300000	-	0.960	ug/kg
CE44-028	12.50	14.50	Trichloroethene	1.9000	19600	-	1.100	ug/kg
CE44-028	12.50	14.50	Xylene	16.0000	2040000	-	3.400	ug/kg
CE44-028	14.50	16.50	Acetone	6.8000	102000000	-	5.500	ug/kg
CE44-028	20.50	22.50	Uranium-238	1.8000	351	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE44-033	8.00	8.50	Americium-241	0.6930	76	0.020	-	pCi/g
CE44-033	8.00	8.50	Uranium-235	0.2580	8	0.120	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE43-019	8.50	8.80	Lithium	47.0000	20400	34.660	-	mg/kg
CE43-019	8.50	8.80	Uranium, Total	9.7000	2750	3.040	-	mg/kg
CE43-019	8.50	8.80	Uranium-238	3.1500	351	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE42-001	2.50	4.50	Barium	1210.0000	26400	289.380	-	mg/kg
CE42-001	2.50	4.50	bis(2-Ethylhexyl)phthalate	96.0000	1970000	-	74.000	ug/kg
CE42-001	2.50	4.50	Uranium-238	1.6310	351	1.490	-	pCi/g
CE42-001	4.50	6.50	Barium	989.0000	26400	289.380	-	mg/kg
CE42-001	4.50	6.50	bis(2-Ethylhexyl)phthalate	96.0000	1970000	-	81.000	ug/kg
CE42-001	4.50	6.50	Di-n-butylphthalate	130.0000	73700000	-	23.000	ug/kg
CE42-001	4.50	6.50	Strontium	217.0000	613000	211.380	-	mg/kg
CE42-001	4.50	6.50	Uranium-234	3.2840	300	2.640	-	pCi/g
CE42-001	4.50	6.50	Uranium-235	0.2400	8	0.120	-	pCi/g
CE42-001	4.50	6.50	Uranium-238	3.2840	351	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE42-007	8.00	8.50	Acetone	15.0000	102000000	-	1.600	ug/kg
CE42-007	8.00	8.50	Naphthalene	0.5700	3090000	-	0.410	ug/kg
CE42-007	8.00	8.50	Trichloroethene	1.6000	19600	-	0.150	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE42-008	0.00	0.30	Acetone	4.6000	102000000	-	1.800	ug/kg

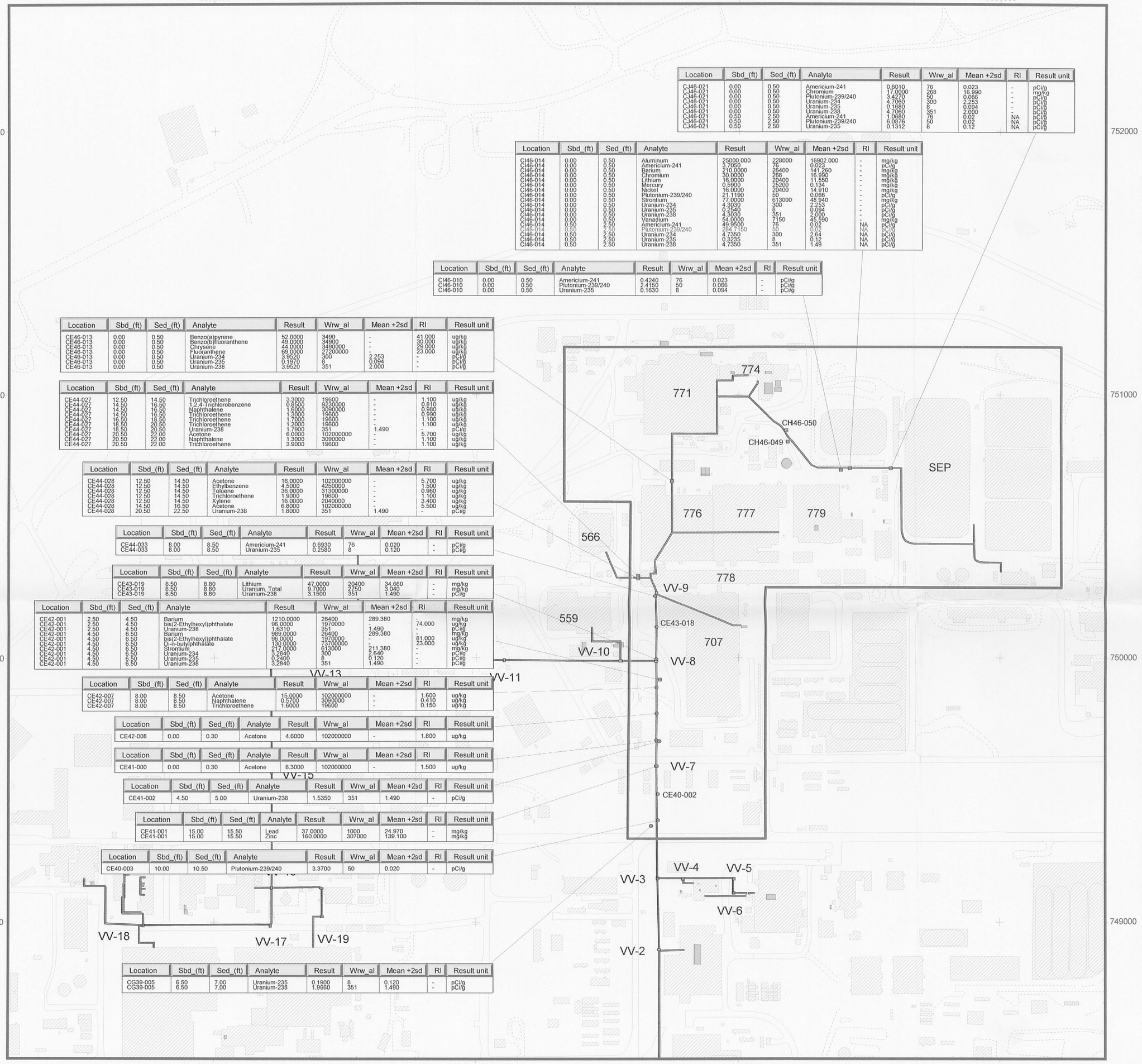
Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE41-000	0.00	0.30	Acetone	8.3000	102000000	-	1.500	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE41-002	4.50	5.00	Uranium-238	1.5350	351	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE41-001	15.00	15.50	Lead	37.0000	1000	24.970	-	mg/kg
CE41-001	15.00	15.50	Zinc	160.0000	307000	139.100	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CE40-003	10.00	10.50	Plutonium-239/240	3.3700	50	0.020	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean +2sd	Rl	Result unit
CG39-005	6.50	7.00	Uranium-235	0.1900	8	0.120	-	pCi/g
CG39-005	6.50	7.00	Uranium-238	1.9660	351	1.490	-	pCi/g



KEY

IHSS Group 000-4

- Detection greater than WRW AL
- Detection less than WRW AL
- Below background or MDL/RL

Other IHSS Group

- Detection greater than WRW AL
- Detection less than WRW AL
- Below background or MDL/RL
- NPWL - removed (below ground)
- NPWL - removed (above ground)
- NPWL - left in place (clean closed)
- NPWL - left in place (not part of RCRA Unit 374.3)
- Tank - removed
- Valve Vault - removed
- Valve Vault - partially removed and flow filled
- Valve Vault - partially removed and backfilled
- Building/structure
- Demolished structure
- Paved area
- Dirt road

N W E S

300 0 300 Feet

Scale = 1:3,000

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: RADMS Date: 10/7/05

Prepared for: KAISER•HILL COMPANY

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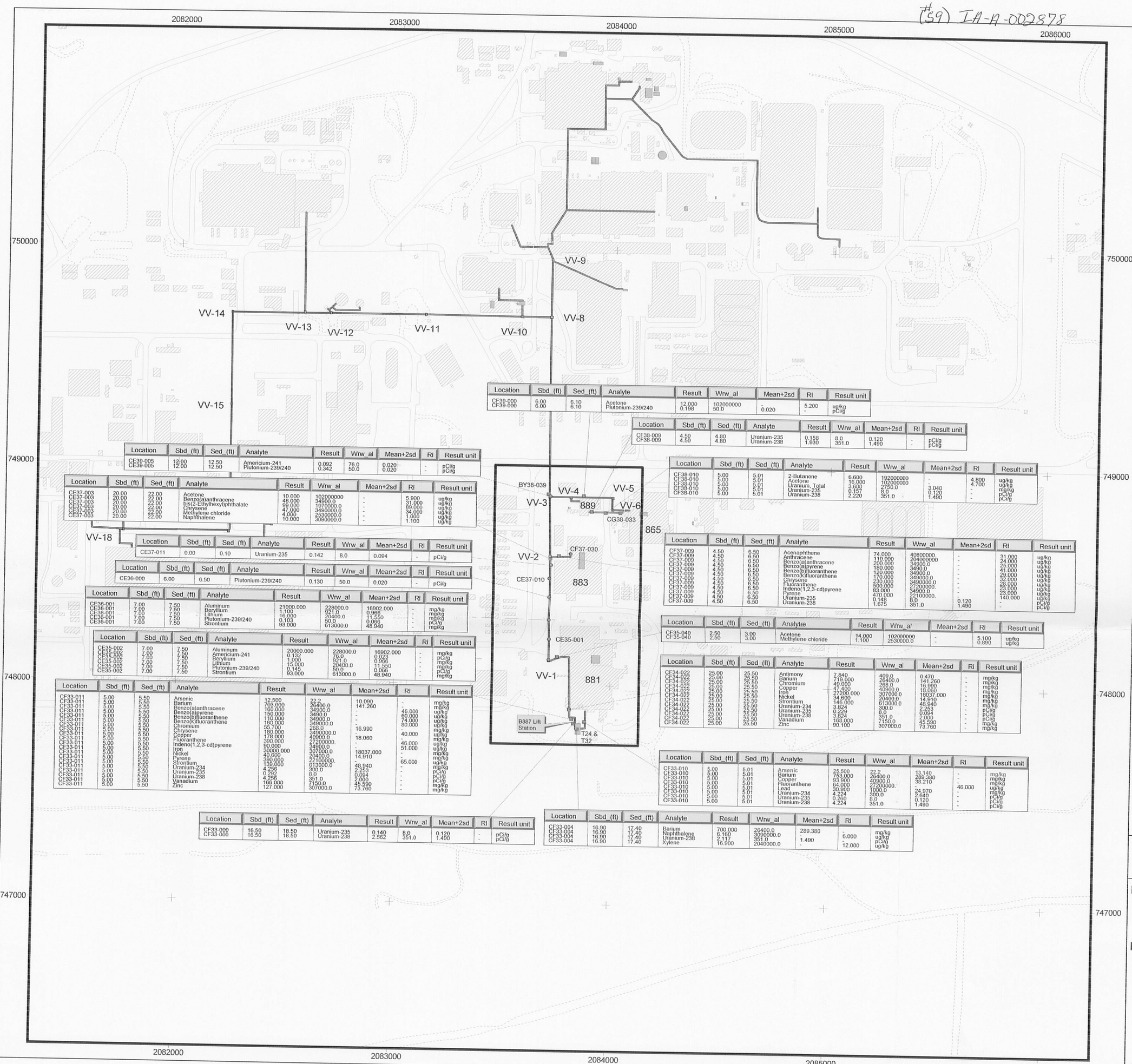

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CF39-000	6.00	6.10	Acetone	12.000	102000000	-	5.200	ug/kg
CF39-000	6.00	6.10	Plutonium-239/240	0.198	50.0	0.020	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CE39-005	12.00	12.50	Americium-241	0.092	76.0	0.020	-	pCi/g
CE39-005	12.00	12.50	Plutonium-239/240	0.342	50.0	0.020	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CF38-009	4.50	4.80	Uranium-235	0.158	8.0	0.120	-	pCi/g
CF38-009	4.50	4.80	Uranium-238	1.930	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CF38-010	5.00	5.01	2-Butanone	6.600	192000000	-	4.800	ug/kg
CF38-010	5.00	5.01	Acetone	16.000	102000000	-	4.700	ug/kg
CF38-010	5.00	5.01	Uranium, Total	3.600	2750.0	3.040	-	mg/kg
CF38-010	5.00	5.01	Uranium-235	0.157	8.0	0.120	-	pCi/g
CF38-010	5.00	5.01	Uranium-238	2.220	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CE37-003	20.00	22.00	Acetone	10.000	102000000	-	5.900	ug/kg
CE37-003	20.00	22.00	Benzo(a)anthracene	48.000	34900.0	-	31.000	ug/kg
CE37-003	20.00	22.00	bis(2-Ethylhexyl)phthalate	99.000	1970000.0	-	69.000	ug/kg
CE37-003	20.00	22.00	Chrysene	47.000	3490000.0	-	34.000	ug/kg
CE37-003	20.00	22.00	Methylene chloride	4.000	2530000.0	-	1.000	ug/kg
CE37-003	20.00	22.00	Naphthalene	10.000	3090000.0	-	1.100	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CE37-011	0.00	0.10	Uranium-235	0.142	8.0	0.094	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CE36-000	6.00	6.50	Plutonium-239/240	0.130	50.0	0.020	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CE36-001	7.00	7.50	Aluminum	21000.000	228000.0	16902.000	-	mg/kg
CE36-001	7.00	7.50	Beryllium	1.100	921.0	0.966	-	mg/kg
CE36-001	7.00	7.50	Lithium	16.000	20400.0	11.550	-	mg/kg
CE36-001	7.00	7.50	Plutonium-239/240	0.103	50.0	0.066	-	pCi/g
CE36-001	7.00	7.50	Strontium	93.000	613000.0	48.940	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CE35-002	7.00	7.50	Aluminum	20000.000	228000.0	16902.000	-	mg/kg
CE35-002	7.00	7.50	Americium-241	0.132	76.0	0.023	-	pCi/g
CE35-002	7.00	7.50	Beryllium	1.000	921.0	0.966	-	mg/kg
CE35-002	7.00	7.50	Lithium	15.000	20400.0	11.550	-	mg/kg
CE35-002	7.00	7.50	Plutonium-239/240	0.145	50.0	0.066	-	pCi/g
CE35-002	7.00	7.50	Strontium	93.000	613000.0	48.940	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CF33-011	5.00	5.50	Arsenic	12.500	22.2	10.090	-	mg/kg
CF33-011	5.00	5.50	Barium	703.000	26400.0	141.260	-	mg/kg
CF33-011	5.00	5.50	Benzo(a)anthracene	160.000	34900.0	-	46.000	ug/kg
CF33-011	5.00	5.50	Benzo(a)pyrene	150.000	3490.0	-	60.000	ug/kg
CF33-011	5.00	5.50	Benzo(b)fluoranthene	110.000	34900.0	-	74.000	ug/kg
CF33-011	5.00	5.50	Benzo(k)fluoranthene	160.000	349000.0	-	80.000	ug/kg
CF33-011	5.00	5.50	Chromium	55.700	208.0	16.990	-	mg/kg
CF33-011	5.00	5.50	Chrysene	180.000	3490000.0	-	40.000	ug/kg
CF33-011	5.00	5.50	Copper	178.000	40900.0	18.060	-	mg/kg
CF33-011	5.00	5.50	Fluoranthene	390.000	27200000.	-	46.000	ug/kg
CF33-011	5.00	5.50	Indeno(1,2,3-cd)pyrene	90.000	34900.0	-	51.000	ug/kg
CF33-011	5.00	5.50	Iron	30000.000	307000.0	18037.000	-	mg/kg
CF33-011	5.00	5.50	Nickel	40.600	20400.0	14.910	-	mg/kg
CF33-011	5.00	5.50	Pyrene	390.000	22100000.	-	65.000	ug/kg
CF33-011	5.00	5.50	Strontium	139.000	613000.0	48.940	-	mg/kg
CF33-011	5.00	5.50	Uranium-234	4.256	300.0	2.253	-	pCi/g
CF33-011	5.00	5.50	Uranium-235	0.292	8.0	0.094	-	pCi/g
CF33-011	5.00	5.50	Uranium-238	4.256	351.0	2.000	-	pCi/g
CF33-011	5.00	5.50	Vanadium	166.000	7150.0	45.590	-	mg/kg
CF33-011	5.00	5.50	Zinc	127.000	307000.0	73.760	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CF33-000	16.50	18.50	Uranium-235	0.140	8.0	0.120	-	pCi/g
CF33-000	16.50	18.50	Uranium-238	2.562	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CF33-004	16.90	17.40	Barium	700.000	26400.0	289.380	-	mg/kg
CF33-004	16.90	17.40	Naphthalene	6.160	3090000.0	-	6.000	ug/kg
CF33-004	16.90	17.40	Uranium-238	2.117	351.0	1.490	-	pCi/g
CF33-004	16.90	17.40	Xylene	16.900	2040000.0	-	12.000	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CF37-009	4.50	6.50	Acenaphthene	74.000	40800000.	-	31.000	ug/kg
CF37-009	4.50	6.50	Anthracene	110.000	204000000	-	24.000	ug/kg
CF37-009	4.50	6.50	Benzo(a)anthracene	200.000	34900.0	-	25.000	ug/kg
CF37-009	4.50	6.50	Benzo(a)pyrene	180.000	3490.0	-	41.000	ug/kg
CF37-009	4.50	6.50	Benzo(b)fluoranthene	120.000	34900.0	-	29.000	ug/kg
CF37-009	4.50	6.50	Benzo(k)fluoranthene	170.000	349000.0	-	32.000	ug/kg
CF37-009	4.50	6.50	Chrysene	230.000	3490000.0	-	28.000	ug/kg
CF37-009	4.50	6.50	Fluoranthene	500.000	27200000.	-	23.000	ug/kg
CF37-009	4.50	6.50	Indeno(1,2,3-cd)pyrene	83.000	34900.0	-	23.000	ug/kg
CF37-009	4.50	6.50	Pyrene	470.000	22100000.	-	140.000	ug/kg
CF37-009	4.50	6.50	Uranium-235	0.148	8.0	0.120	-	pCi/g
CF37-009	4.50	6.50	Uranium-238	1.675	351.0	1.490	-	pCi/g

Location	Sbd_(ft)	Sed_(ft)	Analytee	Result	Wrw_al	Mean+2sd	Rl	Result unit
CF35-040	2.50	3.00	Acetone	14.000	102000000	-	5.100	ug/kg
CF35-040	2.50	3.00	Methylene chloride	1.100	2530000.0	-	0.890	ug/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CF34-022	25.00	25.50	Antimony	7.840	409.0	0.470	-	mg/kg
CF34-022	25.00	25.50	Barium	719.000	26400.0	141.260	-	mg/kg
CF34-022	25.00	25.50	Chromium	49.000	268.0	16.990	-	mg/kg
CF34-022	25.00	25.50	Copper	47.400	40900.0	18.060	-	mg/kg
CF34-022	25.00	25.50	Iron	27200.000	307000.0	18037.000	-	mg/kg
CF34-022	25.00	25.50	Nickel	34.600	20400.0	14.910	-	mg/kg
CF34-022	25.00	25.50	Strontium	146.000	613000.0	48.940	-	mg/kg
CF34-022	25.00	25.50	Uranium-234	3.824	300.0	2.253	-	pCi/g
CF34-022	25.00	25.50	Uranium-235	0.229	8.0	0.094	-	pCi/g
CF34-022	25.00	25.50	Uranium-238	3.824	351.0	2.000	-	pCi/g
CF34-022	25.00	25.50	Vanadium	168.000	7150.0	45.590	-	mg/kg
CF34-022	25.00	25.50	Zinc	90.100	307000.0	73.760	-	mg/kg

Location	Sbd_(ft)	Sed_(ft)	Analyte	Result	Wrw_al	Mean+2sd	Rl	Result unit
CF33-010	5.00	5.01	Arsenic	25.500	22.2	13.140	-	mg/kg
CF33-010	5.00	5.01	Barium	753.000	26400.0	289.380	-	mg/kg
CF33-010	5.00	5.01	Copper	85.900	40900.0	38.210	-	mg/kg
CF33-010	5.00	5.01	Fluoranthene	64.000	27200000.	-	46.000	ug/kg
CF33-010	5.00	5.01	Lead	30.900	1000.0	24.970	-	mg/kg
CF33-010	5.00	5.01	Uranium-234	4.224	300.0	2.640	-	pCi/g
CF33-010	5.00	5.01	Uranium-235	0.260	8.0	0.120	-	pCi/g
CF33-010	5.00	5.01	Uranium-238	4.224	351.0	1.490	-	pCi/g

Figure 5

800 Area Characterization Soil Sampling Results Greater Than Background Means Plus Two Standard Deviations or RLs

KEY

IHSS Group 000-4

- Detection greater than WRW AL
- Detection less than WRW AL
- Below background or MDL/RL

Other IHSS Group

- Detection greater than WRW AL
- Detection less than WRW AL
- Below background or MDL/RL

- NPWL - removed (below ground)
- NPWL - removed (above ground)
- NPWL - left in place (clean closed)
- NPWL - left in place (not part of RCRA Unit 374.3)
- Tank - removed
- Valve Vault - removed
- Valve Vault - partially removed and flow filled
- Valve Vault - partially removed and backfilled
- Building/structure
- Demolished structure
- Paved area
- Dirt road

N W E S

400 0 400 Feet

Scale = 1:3,500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: RADMS Date: 09/28/05

Prepared for: KAISER•HILL COMPANY

File:W:\Projects\Fy2005\000-4\NPWL cor gpp.apr

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