Environmental Restoration
RFCA Standard Operating Protocol
For Routine Soil Remediation
FY03 Notification #03-14
IHSS Group 000-2

October 2003

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RFCA Standard Operating Protocol
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Approval received from the Colorado Department of Public Health and Environment
October 17, 2003
Approval letter is contained in the Administrative Record.

October 2003

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ACRONYMS

AL	action level
cy	cubic yard
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
EDDIE	Environmental Data Dynamic Information
ER	Environmental Restoration
ER RSOP	Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation
FY	Fiscal Year
IA	Industrial Area
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Site
nCi/g	nanocuries per gram
OPWL	Original Process Waste Lines
PCB	polychlorinated biphenyl
PVC	polyvinyl chloride
PDF	Portable Document Format
PAC	Potential Area of Concern
PCOC	potential contaminant of concern
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RSOP	RFCA Standard Operating Protocol
SEP	Solar Evaporation Ponds
SSRS	Subsurface Soil Risk Screen
SVOC	semi-volatile organic compound
UBC	Under Building Contamination
VOC	volatile organic compound
WRW	wildlife refuge worker

1.0 INTRODUCTION

This Environmental Restoration (ER) Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) for Routine Soil Remediation (ER RSOP) (DOE 2002) Fiscal Year (FY) 03 Notification includes the notification to remediate Individual Hazardous Substance Sites (IHSSs), Potential Areas of Concern (PACs), and Under Building Contamination (UBC) Sites at the Rocky Flats Environmental Technology Site (RFETS) Industrial Area (IA) during FY04. The purpose of this Notification is to invoke the ER RSOP for IHSS Group 000-2. Activities specified in the ER RSOP are not reiterated here; however, deviations from the ER RSOP are included where appropriate.

Original Process Waste Lines (OPWL), related valve vaults and manholes, and associated soil will be remediated in accordance with RFCA Attachment 14 (DOE et al 2003). The OPWL system is shown on Figure 1, and the proposed remediation area covered under ER RSOP Notification #03-14 is listed in Table 1. It is estimated that 1,170 cubic yards (cy) of pipe and 19 cy of soil will be removed and disposed.

Table 1
Potential Remediation Area for IHSS Group 000-2

IHSS Group	IHSS/PAC/UBC Site	PCOCs	Media
000-2	IHSS 000-121, OPWL	Radionuclides, Metals, VOCs, SVOCs, Nitrite	Piping, concrete, and subsurface soil
	IHSS 700-123.2, Valve Vault West of Building 707	Radionuclides, Metals, VOCs	Subsurface soil
	IHSS 100-602, Building 123 Process Line Break	Radionuclides	Subsurface soil
	IHSS 000-121, Tank 29 – OPWL	Radionuclides, Metals, VOCs	Surface and subsurface soil
	IHSS 000-121, Tank 31 – OPWL	Radionuclides, Metals, VOCs	Surface and subsurface soil
	IHSS Group 700-127, Low-Level Radioactive Waste Leak	Radionuclides	Surface and subsurface soil
	IHSS Group 700-147.1, Process Waste Line Leaks	Radionuclides, Metals, VOCs	Surface and subsurface soil
	IHSS Group 000-162, Radioactive Site 700 Area	Radionuclides, PCBs	Surface soil

2.0 IHSS GROUP 000-2

IHSS Group 000-2 includes IHSS 000-121, OPWL. The IHSS location is shown on Figure 1. Not included is the portion of IHSS 000-121 associated with other IHSS Groups.

2.1 Potential Contaminants of Concern

Potential contaminants of concern (PCOCs) at IHSS Group 000-2 are listed in Table 1. However, PCOCs vary with location. The PCOCs at IHSS Group 000-2 were determined based on process knowledge and data collected during previous studies (DOE 1992, 1996, 1998, 2000, 2001).

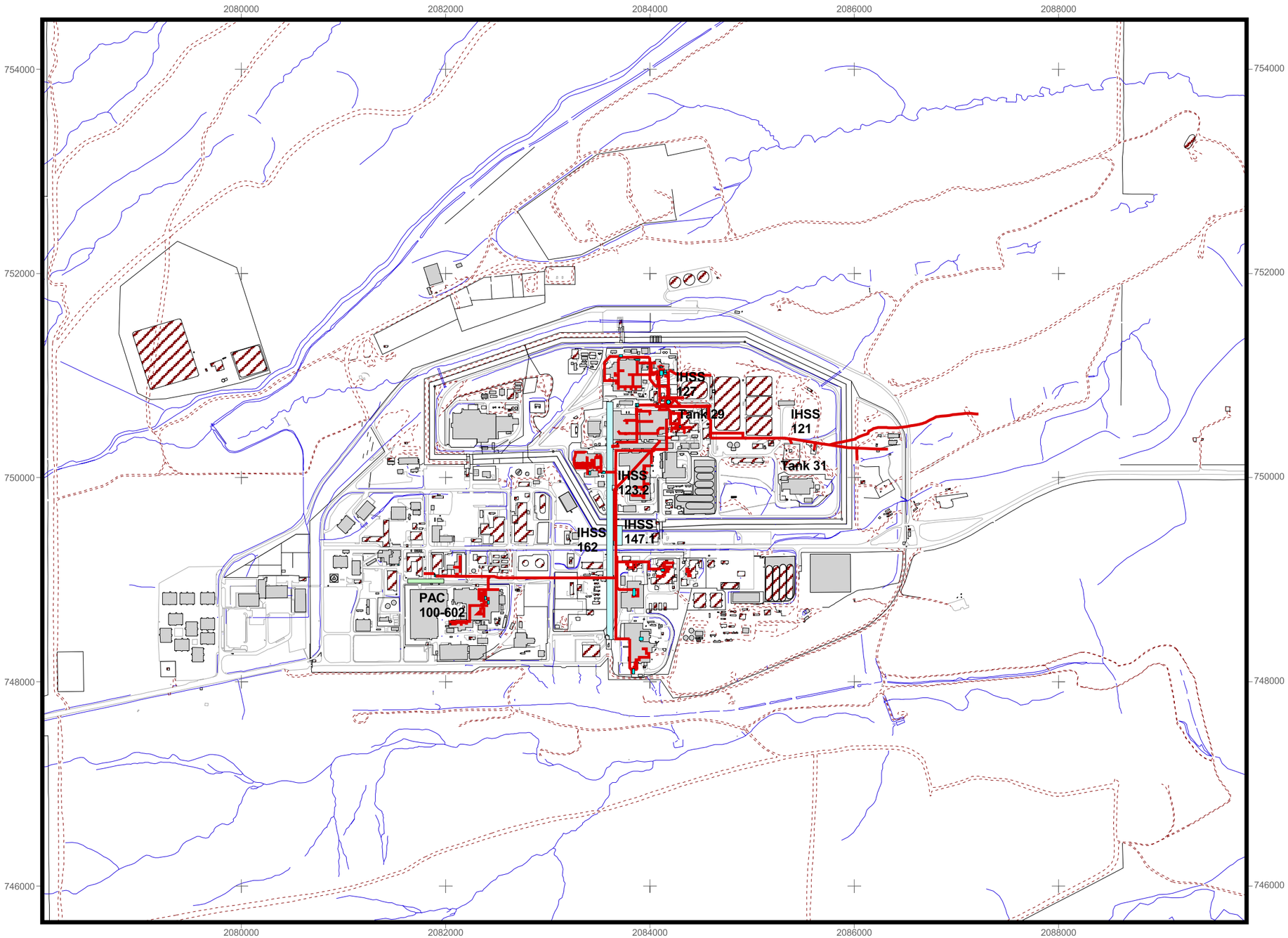

Figure 1
IHSS Group 000-2 Location

KEY

- IHSS
- PAC
- OPWL
- Paved area
- Dirt road
- Stream, ditch, or drainage

Building

- Demolished
- Standing

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N

300 0 300 600 900 Feet

Scale = 1: 11500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Prepared by: RADMS

Prepared for: KAISER•HILL COMPANY

000-2characterization4-2-03sps.apr/000-2Figure1

September, 2003

2.2 Project Conditions

The following conditions are present within the IHSS Group 000-2 area:

- The OPWL system consisted of approximately 35,000 feet of pipeline and 39 separate tank locations that house a total of 73 tanks (DOE 1992). OPWL tanks and pipelines existed in RFETS Areas 100, 400, 500, 600, 700, 800, and 900; the Solar Evaporation Ponds (SEP); and the northeast Buffer Zone (BZ) between the 900 Area and holding Pond B-2 (Figure 1).

- Some of the tanks and pipelines from the OPWL system were removed, other lines were incorporated into the New Process Waste Lines (NPWL) system, and some tanks were converted into the plenum deluge system. The OPWL that was not replaced or removed remains in place and consists of 66 pipeline segments and 5 pipeline spurs (Figure 2). Most of the OPWL is located in highly congested areas with other active and inactive utility lines. Approximately 13,000 feet of pipeline is beneath buildings, with another 7,000 feet beneath asphalt or concrete (DOE 1992).

- The pipelines range from 1 to 10 inches in diameter and are constructed of a variety of materials, including black iron, cast iron, plastic, polyethylene, vitrified clay, cement/asbestos, Saran-lined steel, stainless steel, fiberglass, polyvinyl chloride (PVC), Pyrex, and Teflon.

- Valve vaults and manholes provided access for operation and maintenance. Valve vaults were included in the initial installation or added later at locations with persistent leaks, such as at elbows, valves, and transitions from one pipe material to another (DOE 1992). RFCA Attachment 14 (DOE et al 2003) indicates that approximately 30 valve vaults are present within the system.

- Numerous accidental releases of process waste occurred during the operating history of the OPWL and may have resulted in environmental contamination. Releases occurred throughout the system at tank/pipeline connections, pipeline joints, elbows and reducers, junction boxes, and valves. Releases also occurred as a result of pipeline breakage due to construction activities, soil settling, and building foundation settling; overflow of tanks, pipeline junction boxes, and valve vaults; and tank and pipeline corrosion and deterioration. Known and suspected release sites are shown on Figure 3.

- The material transported included various aqueous process wastes containing low-level radioactive materials, nitrates, caustics, and acids. Small quantities of other liquids were also handled, including medical decontamination fluids, miscellaneous laboratory wastes, and laundry effluent. These process waste streams also contained metals, volatile organic compounds (VOCs), oil and grease, and cleaning compounds (DOE 1992).

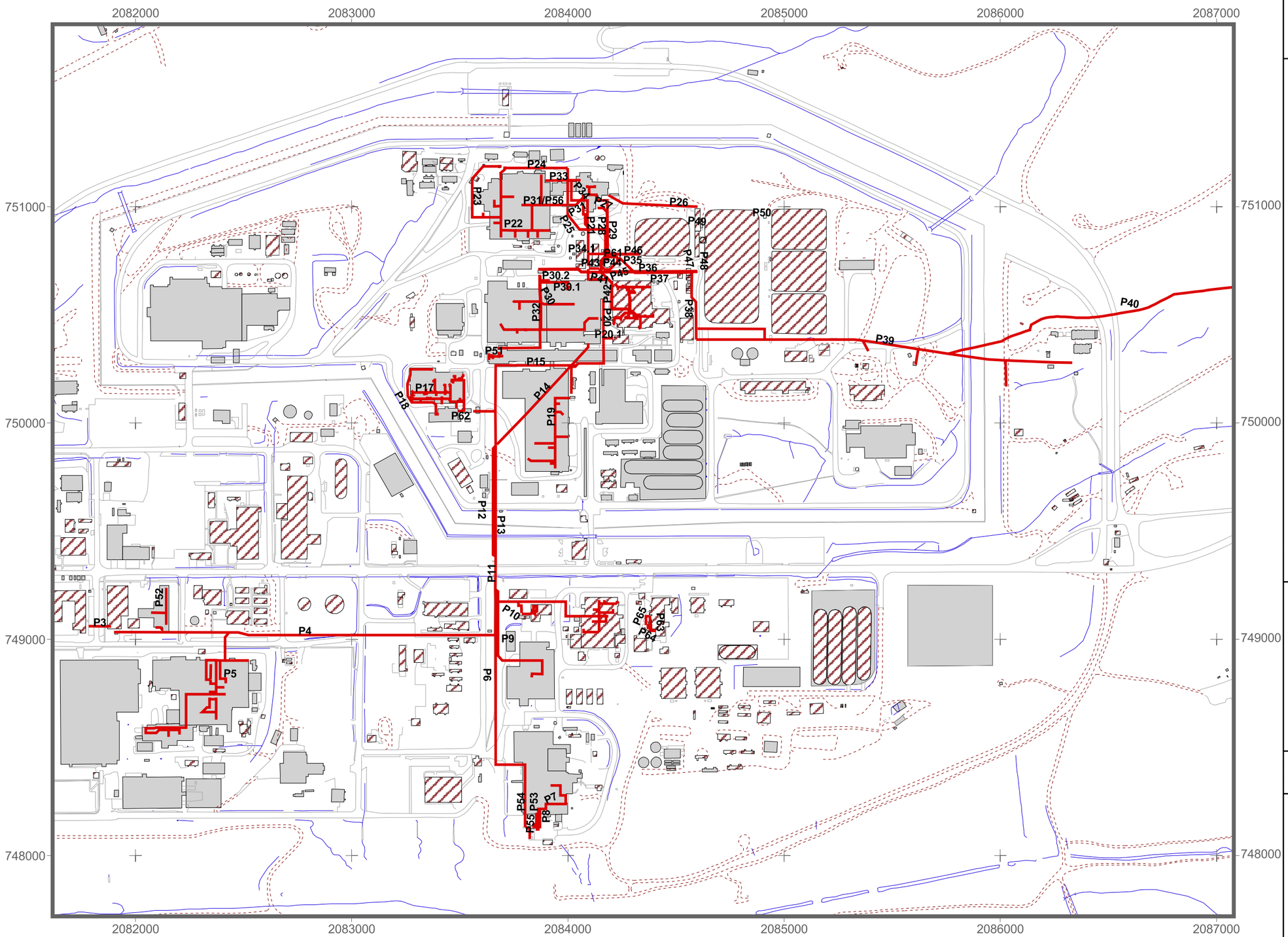

Figure 2
IHSS Group 000-2
OPWL Designations

KEY

- OPWL
- Paved area
- Dirt road
- Stream, ditch, or drainage

Building

- Demolished
- Standing

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N W E S

200 0 200 400 600 Feet

Scale = 1: 5500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Prepared by:

Prepared for:

File: 000-2characterization4-2-03sps.apr/000-2Figure2

Date: 8.21.03

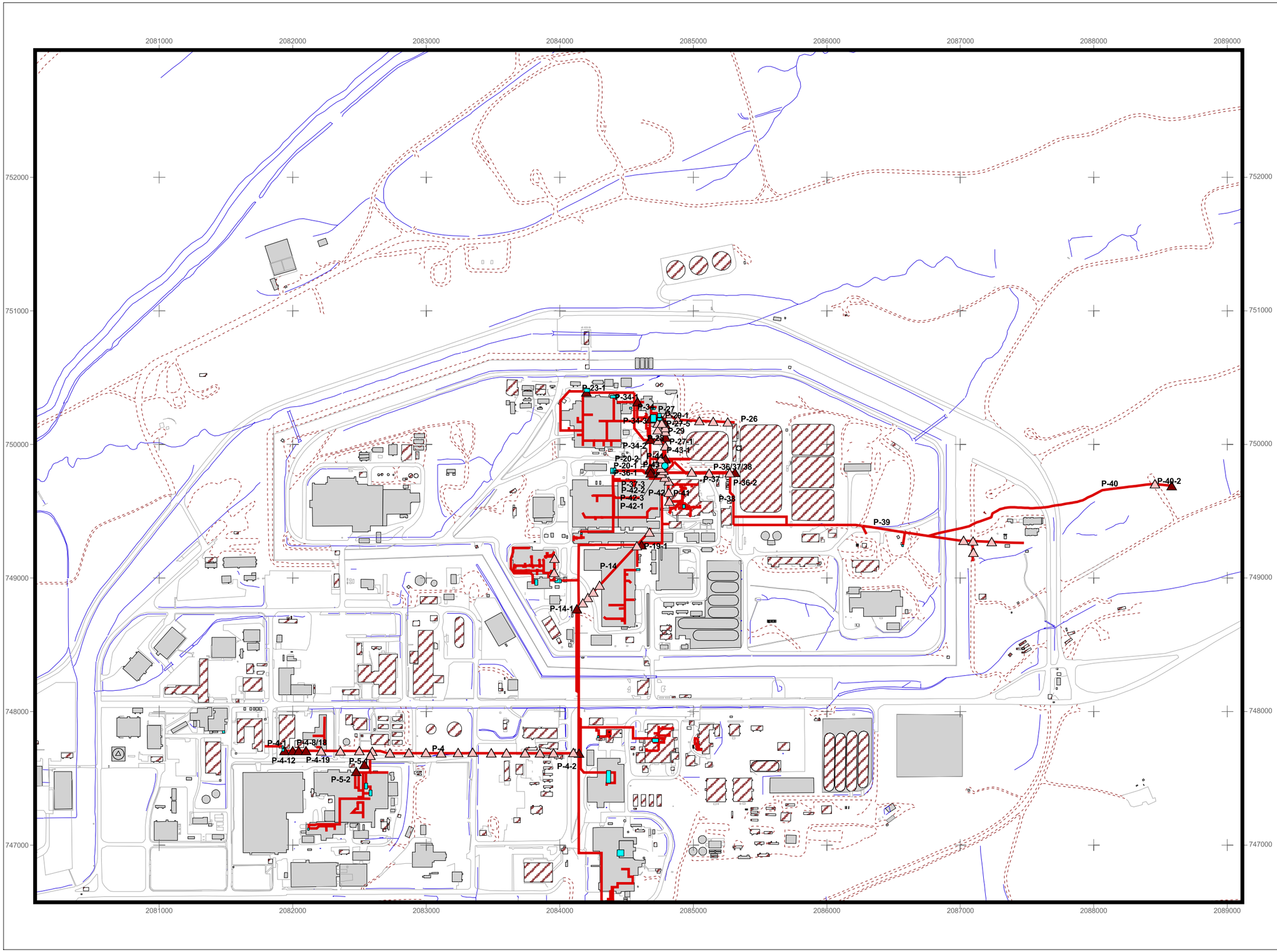

Figure 3
IHSS Group 000-2
RFCA Leak Designations

KEY

- OPWL
- Paved area
- Dirt road
- Stream, ditch, or drainage
- Known leaks
- Suspected leak (line designation)

Building

- Demolished
- Standing
- Tanks

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N

200 0 200 400 Feet

Scale = 1:6,000

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Prepared by:

RADMS

Prepared for:

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000-2characterization4-2-03sps.apr/000-2Figure3

September 2003

The potential contamination from these released constituents has not yet been fully characterized. Some OPWL characterization has been conducted during the characterization of other IHSS Groups, including 100-4 (UBC 123) (DOE 2003a), 700-4 (UBC 771 and UBC 774) (results not yet published), 800-4 (UBC 886) (DOE 2003b), 800-6 (UBC 889) (DOE 2003c), and 800-2 (UBC 881) (DOE 2003d). Figure 4 shows analytical results greater than the RFCA soil action levels (ALs). IHSS Group 000-2 will be characterized in accordance with RFCA Attachment 14 (DOE et al 2003); IA Sampling and Analysis Plan (IASAP) Addenda #IA-03-11 (IHSS Group 000-2) (DOE 2003e), #IA-03-12 (IHSS Group 500-3) (DOE 2003f), and #IA-03-15 (IHSS Group 700-7) (DOE 2003g); and IASAP Addenda for IHSS Group 700-2 (not yet published) and IHSS Group 800-3 (not yet published).

2.3 RFCA Subsurface Soil Risk Screen Evaluation

Because the OPWL are spread out across the Site, a Subsurface Soil Risk Screen (SSRS) will be conducted (1) when the OPWL are characterized as part of another IHSS Group (DOE 2003e, 2003f, 2003g), or 2) when IHSS Group 000-2 characterization data become available. SSRSs will evaluate the potential risk of exposure and the need for further accelerated action. SSRS results will be documented in individual closeout and data summary reports.

2.4 Remediation Plan

This RSOP Notification remediation plan for IHSS Group 000-2 includes the following objectives:

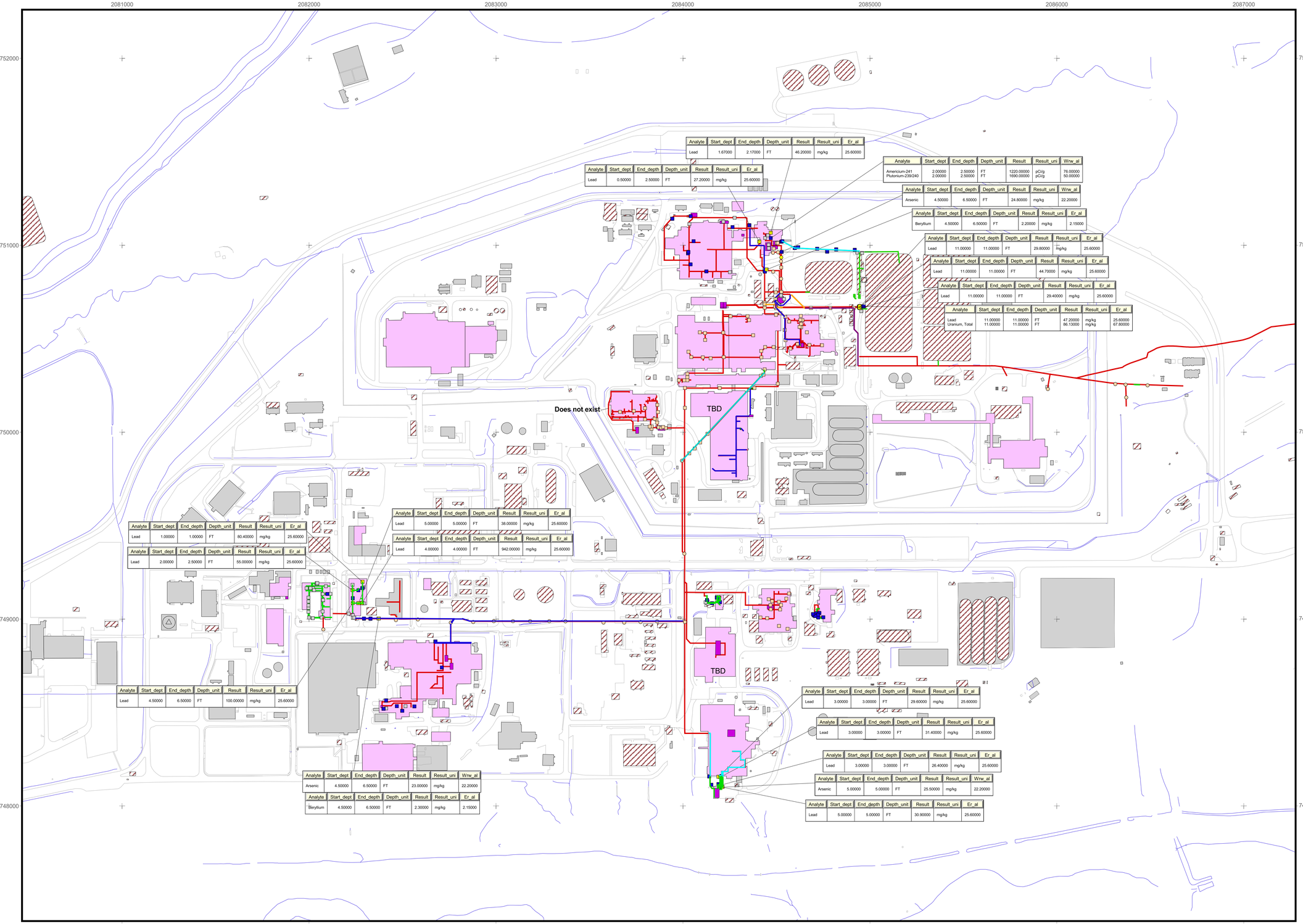
- Remove all OPWL within 3 feet of the existing grade in accordance with RFCA Attachment 14 (DOE et al 2003). Record the actual depth, elevation, composition, condition, and dimensions of OPWL components encountered, and the length of pipe removed. Collect confirmation samples in accordance with the IASAP (DOE 2001).

- Remove OPWL valve vaults and manholes down to a minimum of 6 feet below the surface. Remove OPWL valve vaults deeper than 6 feet below the surface to the extent practicable in accordance with RFCA Attachment 14 (DOE et al 2003), giving due consideration to the safety of workers. Collect confirmation samples in accordance with the IASAP (DOE 2001).

- After an OPWL or associated valve vault is opened, and where safe and practical, the pipe will be grouted or foamed to minimize the possibility of mobilizing contamination inside the OPWL. Conduct radiation surveys at all pipe ends. Record the coordinates of pipe ends and the grouting material used.

- Sample and analyze liquids that are found in OPWL components and require disposition. To minimize the risk of mobilizing and transporting contaminants into subsurface soil, flushing the OPWL is not anticipated or required.

Figure 4
OPWL Sampling Results Greater Than RFCA Action Levels



Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	1.67000	2.17000	FT	46.20000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	0.50000	2.50000	FT	27.20000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Wrw_al
Americium-241 Plutonium-239/240	2.00000 2.00000	2.50000 2.50000	FT FT	1220.00000 1690.00000	pCi/g pCi/g	76.00000 50.00000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Wrw_al
Arsenic	4.50000	6.50000	FT	24.80000	mg/kg	22.20000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Beryllium	4.50000	6.50000	FT	2.20000	mg/kg	2.15000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	11.00000	11.00000	FT	29.80000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	11.00000	11.00000	FT	44.70000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	11.00000	11.00000	FT	29.40000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead Uranium, Total	11.00000 11.00000	11.00000 11.00000	FT FT	47.20000 86.13000	mg/kg mg/kg	25.60000 67.80000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	1.00000	1.00000	FT	80.40000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	2.00000	2.50000	FT	55.00000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	5.00000	5.00000	FT	38.00000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	4.00000	4.00000	FT	942.00000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	4.50000	6.50000	FT	100.00000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Wrw_al
Arsenic	4.50000	6.50000	FT	23.00000	mg/kg	22.20000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Beryllium	4.50000	6.50000	FT	2.30000	mg/kg	2.15000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	3.00000	3.00000	FT	29.60000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	3.00000	3.00000	FT	31.40000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	3.00000	3.00000	FT	26.40000	mg/kg	25.60000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Wrw_al
Arsenic	5.00000	5.00000	FT	25.50000	mg/kg	22.20000

Analyte	Start_dept	End_depth	Depth_unit	Result	Result_uni	Er_al
Lead	5.00000	5.00000	FT	30.90000	mg/kg	25.60000

KEY

IHSS 000-2 IASAP

- Planned in IHSS 000-2
- WRW AL Exceedance
- Eco AL Exceedance
- Background or DL Exceedance (Does not trigger an accelerated action)
- Less than Background or Detection Limit
- Sampled, data not received
- Action required

Other IHSS Group IASAPs

- Planned in Other IHSS
- WRW AL Exceedance
- Eco AL Exceedance
- Background or DL Exceedance (Does not trigger an accelerated action)
- Less than Background or Detection Limit
- Sampled, data not received
- Action required

- OPWL
- OPWL Removed
- OPWL at 3 feet or overhead line
- OPWL at approximately 3.5 feet
- OPWL between 3 to 5 feet
- Tanks
- UBC
- Paved area
- Dirt road
- Stream, ditch, or drainage

Depth under buildings is measured at native soil beneath concrete and fill

N

200 0 200 400 Feet

Scale = 1:3,000

Datum: NAD27

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

Prepared by:

RADMS

Prepared for:

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File: 000-2characterization4-2-03sps/apr

Date: August 31, 2003

- Remove soil contaminated with concentrations of plutonium and americium above the ALs resulting from any leaks from OPWL within 3 feet of the ground surface to a depth of 3 feet in accordance with RFCA Attachment 14 (DOE et al 2003).

- If the plutonium concentration is greater than 3 nanocuries per gram (nCi/g) between 3 and 6 feet below the surface and the areal or volumetric extent of contamination exceeds the trigger values provided in Attachment 14, Table A14-1 (DOE et al 2003), remove radionuclide contamination to less than 1 nCi/g. If plutonium or americium is present below 6 feet, conduct a SSRS.

- If non-radionuclide or uranium contaminant concentrations greater than the RFCA wildlife refuge worker (WRW) ALs extends below 6 inches in depth, perform the SSRS to evaluate the potential risk of exposure and need for further accelerated action.

- Consult with the regulatory agencies if contaminant concentrations are greater than the proposed ecological ALs but lower than the WRW ALs.

- If contaminated soil is removed, collect confirmation soil samples in accordance with the IASAP (DOE 2001).

It is anticipated that after remediation there may be areas with concentrations of radionuclides, metals, and organics greater than the background means plus two standard deviations or the method detection/reporting limits, but below RFCA ALs.

2.5 Stewardship Evaluation

Based on the PCOCs (Table 1 and Section 2.1) and the ER RSOP (DOE 2002), it is anticipated that all contamination above RFCA ALs will be remediated to RFCA cleanup levels. Figure 3 shows the potential remediation areas.

Because the OPWL are spread out across the Site and the full extent of excavation and remediation is not known at this time, stewardship evaluations will be conducted during remediation of individual IHSS Groups, including IHSS Groups 000-2, 500-3, 700-2, 700-7, and 800-3. Stewardship evaluations will be conducted using the consultative process and documented in individual closeout reports. A new map of residual contamination will be generated after remediation of individual IHSS Groups. Removed and remaining OPWL components will also be documented in individual closeout reports.

2.6 Accelerated Action Remediation Goals

ER RSOP remedial action objectives (RAOs) include the following:

1. Provide a remedy consistent with the RFETS goal of protection of human health and the environment;

2. Provide a remedy that minimizes the need for long-term maintenance and institutional or engineering controls; and

3. Minimize the spread of contaminants during implementation of accelerated actions.

2.7 Treatment

Not applicable.

2.8 Project-Specific Monitoring

High-volume air samplers may be used at various remediation areas within IHSS Group 000-2 consistent with work controls to determine airborne radioactivity concentrations. Such areas may include locations with known or suspected leaks (Figure 3) and will be identified based on characterization results.

2.9 RCRA Units and Intended Waste Disposition

Not applicable.

2.10 Administrative Record Documents

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Golden, Colorado, June.

DOE, 1996, Annual Update, Historical Release Report, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1998, Annual Update, Historical Release Report, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2000, Industrial Area Data Summary Report, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2001, Industrial Area Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2002, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2003, Final Closeout Report for IHSS Group 100-4, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

DOE, 2003, Final Closeout Report for IHSS Group 800-4, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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

DOE, 2003, Final Data Summary Report for IHSS Group 800-2, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2003, 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, September.

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

DOE, 2003, Industrial Area Sampling and Analysis Plan FY03 Addendum #IA-03-15, IHSS Group 700-4, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, CDPHE, and EPA, 2003, Modifications to the Rocky Flats Cleanup Agreement Attachment, U.S. Department of Energy, Colorado Department of Public Health and Environment, and U.S. Environmental Protection Agency, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

2.11 Projected Schedule

Remediation of IHSS Group 000-2 is expected to begin in first quarter of FY04.

3.0 PUBLIC PARTICIPATION

ER RSOP Notification #03-14 activities were discussed at the October 2003 ER/Decontamination and Decommissioning (D&D) Status meeting. A Portable Document Format (PDF) version of this Notification was provided to the local governments. This Notification is available at the Rocky Flats Reading Rooms and on the Environmental Data Dynamic Information Exchange (EDDIE) Website at www.rfets.gov.

4.0 REFERENCES

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Golden, Colorado, June.

DOE, 1996, Annual Update, Historical Release Report, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1998, Annual Update, Historical Release Report, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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DOE, 2001, Industrial Area Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2002, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2003a, Final Closeout Report for IHSS Group 100-4, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

DOE, 2003b, Final Closeout Report for IHSS Group 800-4, Rocky Flats Environmental Technology Site, Golden, Colorado, May.

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

DOE, 2003d, Final Data Summary Report for IHSS Group 800-2, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2003e, 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, September.

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

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

DOE, CDPHE, EPA, and 2003, Modifications to the Rocky Flats Cleanup Agreement Attachment, U.S. Department of Energy, Colorado Department of Public Health and Environment, and U.S. Environmental Protection Agency, Rocky Flats Environmental Technology Site, Golden, Colorado, June.