

NOTICE

All drawings located at the end of the document.

**Draft Environmental Restoration
RFCA Standard Operating Protocol
for Routine Soil Remediation
FY2002
Notification #02-03**



1/15

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ACRONYMS

AL	action level
D&D	Decontamination and Decommissioning
COC	contaminant of concern
cy	cubic yard
EDDIE	Environmental Data Dynamic Information Exchange
ER	Environmental Restoration
ER RSOP	Environmental Restoration RSOP for Routine Soil Remediation
FY	Fiscal Year
IA	Industrial Area
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Site
OPWL	Original Process Waste Lines
PAC	Potential Area of Concern
pCi/g	picocuries per gram
PCOC	potential contaminant of concern
POC	Point of Compliance
POE	Point of Evaluation
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RSOP	RFCA Standard Operating Protocol
SVOC	semivolatile organic compound
UBC	Under Building Contamination
ug/L	micrograms per liter
VOC	volatile organic compound

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)02 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 FY02. The purpose of this Notification is to invoke the ER RSOP for IHSS Group 800-4. Activities specified in the ER RSOP are not reiterated here. However, deviations from the ER RSOP are noted where appropriate.

Proposed remediation sites covered under ER RSOP Notification #02-03 are listed in Table 1 and the locations are shown on Figure 1. There are no PACs in IHSS Group 800-4.

Table 1
FY02 Potential Remediation Areas

IHSS Group	IHSS/PAC/UBC Site	PCOCs	Media	Estimated Remediation Volume
800-4	UBC 886 – Critical Mass Laboratory	Radionuclides Metals SVOCs VOCs	Subsurface Soil	<1cy
	800-164 2 – Radioactive Site #2 800 Area Building 886 Spill	Radionuclides Metals SVOCs VOCs	Subsurface Soil	<1 cy
	000-121 – OPWL 250-Gallon Sump	Radionuclides	Subsurface Soil	<1 cy
	000-121 – OPWL Two 250-Gallon Steel Tanks (Tanks 21 and 22)	Radionuclides	Subsurface Soil	<1 cy
	000-121 – OPWL 500-Gallon Steel Tank (Tank 27)	Radionuclides	Subsurface Soil	<1 cy

2.0 IHSS GROUP 800-4

IHSS Group 800-4 includes UBC 886 – Critical Mass Laboratory, IHSS 164 2 – Radioactive Site #2 800 Area Building 886 Spill, and 000-121 – Original Process Waste Lines (OPWL) 250-Gallon Sump, two 250-Gallon Steel Tanks, and one 500-Gallon Steel Tank. IHSS Group 800-4 is shown on Figure 2 with potential air monitoring locations.

2.1 Potential Contaminants of Concern

Potential contaminants of concern (PCOCs) at IHSS Group 800-4 were determined based on data collected during characterization of UBC 886, summarized in the Final Data Summary Report for the Characterization of UBC's 123 and 886 (DOE 2001a) and data collected during previous studies (DOE 2001b, 2000a).

**Figure 1
ER RSOP Notification #02-03 IHSS Group Location Map**

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**Figure 2
IHSS Group 800-4 Potential Remediation Area Map**

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Results of previous sampling and analysis of surface soil at IHSS Group 800-4 (DOE 2000a) indicate that radionuclides and metals were detected at concentrations greater than background plus two standard deviations, and semivolatile organic compounds (SVOCs) were detected in surface soil at concentrations greater than method detection limits. SVOCs and volatile organic compounds (VOCs) were detected in subsurface soil at concentrations greater than RFCA Tier II Action Levels (ALs) (DOE 2001a).

2.2 Project Conditions

The following conditions are present at this site

- A tank storage pit in the Building 886 floor slab,
- A foundation drain on the western side of Building 886,
- Portions of OPWL P-63 and P-64 in IHSS 164 2,
- Tanks 21, 22, and 27 were previously removed,
- One sump (for Tanks 21, 22, and 27) in Building 828, and
- The UBC 886 floor slab, which will be recycled in accordance with the RSOP for Recycling Concrete (DOE 1999), or disposed of

2.3 Remediation Plan

The remediation plan for IHSS Group 800-4 includes several objectives: Remove contaminated soil to below Tier I ALs (Figure 2); Remove sump and associated soil to below RFCA Tier I ALs (Figure 2); Disrupt the foundation drain potential pathway (Figure 2); Collect confirmation samples in accordance with the Industrial Area Sampling and Analysis Plan (IASAP) (DOE 2001b).

Additional remediation, if required, for OPWL (Figure 2) will be conducted when IHSS Group 000-2 (OPWL) is addressed.

It is anticipated that after remediation there will be areas with concentrations of metals, radionuclides, and organics greater than background plus two standard deviations or method detection limits, but below RFCA Tier II ALs at this site. Additionally, it is anticipated that there will be very few areas with concentrations above RFCA Tier II ALs.

2.4 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 Tier I ALs will be remediated. Figure 2 shows the potential remediation area. Additional remediation to below Tier I ALs is not required by RFCA.

Because the full extent of excavation and remediation is not known at this time, an additional stewardship evaluation, using the consultative process, will be conducted.

during remediation. A new map of residual contamination will be generated after remediation. The following sections contain the stewardship evaluation.

2.4.1 Proximity to Other Contaminant Sources

IHSS Group 800-4 is in the RFETS IA. Nearby potential contaminant sources are IHSS Groups 800-1 (UBC 865) and 000-3 (Central Avenue Ditch Caustic Leak). These sites and their PCOCs, media of interest, and relationship to IHSS Group 800-4 are listed in Table 2 and shown on Figure 2.

**Table 2
 Other Potential Contaminant Sources for IHSS Group 800-4**

IHSS Group	PCOCs/COCs	Media	Distance from IHSS Group 800-4
800-1 – UBC 865	Radionuclides Beryllium Metals SVOCs VOCs	Surface and Subsurface Soil	Approximately 115 feet to the west
000-3 – Central Avenue Ditch Caustic Leak IHSS 000-190	Sodium Hydroxide	Surface Soil	Approximately 47 feet to the north

IHSS Group 800-1 has PCOCs similar to, and in the same media as, IHSS Group 800-4. It is anticipated that after remediation of this IHSS Groups, it will have residual contamination in subsurface soil similar to the residual contamination anticipated at IHSS Group 800-4. The only PCOC at IHSS Group 000-3 (IHSS 000-190) is sodium hydroxide which does not affect stewardship considerations at IHSS Group 800-4.

2.4.2 Surface Water Protection

Surface water protection includes the following considerations:

Is there a pathway to surface water from potential erosion to streams or drainages?

This site is in a flat-lying area not prone to erosion. However, one drainage ditch along the eastern perimeter of IHSS 164-2 drains into the Central Avenue Ditch, which flows west to east approximately 80 feet north of the site.

Do characterization data indicate there are contaminants in surface soil?

Table 3 lists radionuclide data from IHSS Group 800-4, along with background values and RFCA ALs for comparison.

Table 3
Surface Soil Characterization Summary

Analyte	Maximum Result (pCi/g)	Background Plus Two Standard Deviations (pCi/g)	Tier II AL (pCi/g)	Tier I AL (pCi/g)
Americium-241	0.18	0.0227	38	215
Plutonium-239/240	0.92	0.066	252	1,429
Uranium-235	0.15	0.0939	24	135

Do monitoring results from Points of Evaluation (POEs) or Points of Compliance (POCs) indicate there are surface water impacts from the area under consideration?

Surface water sampling location GS43 is located at the northeastern edge of IHSS 164.2. Data from this location indicate compliance standards were not exceeded, however, several metal concentrations exceeded RFCA Tier II ALs. These results are shown in Table 4.

Table 4
Surface Water Exceedances Associated With IHSS Group 800-4

Analyte	Maximum Result (ug/L)	RFCA Tier II AL (ug/L)
Antimony	1.5	0.006
Arsenic	1.2	0.05
Barium	93.2	1
Beryllium	0.1	0.004
Cadmium	0.26	0.00153
Copper	1.7	0.016
Iron	48.1	1
Lead	0.9	0.0065
Manganese	6.1	1
Nickel	1.6	0.123
Selenium	2.6	0.005

Is the IHSS Group in an area with high erosion potential, based on the 100-Year Average Erosion Map?

Not applicable. The 100-Year Average Erosion Map does not include areas in the IA.

2.4.3 Monitoring

Monitoring includes the following considerations:

Do monitoring results from POEs or POCs indicate there are groundwater impacts from the area under consideration?

Groundwater monitoring results from wells 40999 west of Building 886, 41099 north of Building 886, 41199 east of the southern part of Building 886, and 22996 east of

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Building 886 were evaluated (DOE 2000b, 2000c, 2000d, 2001c, 2001d, 2001e) Results from well 40999, which is upgradient, of IHSS Group 800-4, indicate lead, methylene chloride, and uranium-238 concentrations in groundwater are greater than RFCA Tier II ALs Data from well 41099, north of Building 886, indicate americium, uranium, and metals are present at concentrations greater than RFCA Tier II ALs Data from well 22996, the furthest downgradient, indicate only uranium is present at concentrations greater than RFCA Tier II ALs Table 5 presents the maximum results from IHSS Group 800-4 wells and boreholes that exceed RFCA Tier II ALs

**Table 5
Groundwater Exceedances Associated With IHSS Group 800-4**

Analyte	Well 40999 (pCi/l)	Well 41199 (pCi/l)	Well 41099 (pCi/l)	Well 22996 (pCi/l)	Borehole 03995 (pCi/l)	Borehole 04295 (pCi/l)	Tier II AL (pCi/l)	Tier I AL (pCi/l)
Americium-241			0.38			59.91	0.145	14.5
Uranium-233/234				4.62			1.06	106
Uranium-235			2.32			2.73	1.01	101
Uranium-238	8.3	4.33	33.77	3.02	10.66	27.08	0.768	76.8
Analyte	Well 40999 (ug/L)	Well 41199 (ug/L)	Well 41099 (ug/L)	Well 22996 (ug/L)	Borehole 03995 (ug/L)	Borehole 04295 (ug/L)	Tier II AL (ug/L)	Tier I AL (ug/L)
Aluminum						194,000	36,500	3,650,000
Antimony						8.3	6	600
Arsenic						80.1	50	5,000
Barium						3,280	2,000	200,000
Benzo(a)anthracene					63		0.117	11.7
Benzo(a)pyrene					66		0.2	20
Benzo(b)fluoranthene					87		0.117	11.7
Benzo(k)fluoranthene					24		1.17	117
Beryllium						11.6	4	400
Cadmium			5.43				5	500
Carbon Tetrachloride					17		5	500
Chloromethane						150	6.55	655
Chromium (total)						220	100	10,000
Chrysene					70	41	11.7	1,170
Lead	18		40.3		17.9	198	15	1,500
Methylene Chloride	6.3					9	5	500
Nickel						178	140	14,000
Thallium			4.89				2	200
Vanadium						415	256	25,600

Data from borehole 03395, located at Tanks 21, 22, and 27, indicate uranium, SVOCs, VOCs, and lead are present at concentrations greater than the Tier II AL The data indicate that SVOCs are also above RFCA Tier I ALs Data from borehole 04295, also located near Tanks 21, 22, and 27, indicate uranium, metals, and VOCs are present at

concentrations greater than RFCA Tier II Als, and americium is present at concentrations greater than RFCA Tier I ALs. Groundwater at both boreholes was sampled once during drilling and was not sampled at these locations again.

Groundwater quality at the upgradient well (40999) cannot be attributed to IHSS Group 800-4. Groundwater quality at wells within IHSS Group 800-4 may have been impacted by potential contamination from the IHSS Group. Both the number of contaminants and the contaminant level in groundwater at the downgradient well, 22996, decreases significantly compared to wells within the IHSS Group. The RFCA Tier I americium exceedance at borehole 04295 and the SVOC exceedances at borehole 03995 are not reflected in the borehole subsurface soil analytical results, which do not indicate radionuclides or SVOCs are present in concentrations greater than background plus two standard deviations or method detection limits.

Can the impact be traced to a specific IHSS Group?

Radionuclides, metals, and organic constituents in groundwater monitoring wells at IHSS Group 800-4 are similar to constituents detected above background plus two standard deviations or method detection limits in subsurface soil at this site. However, no Tier II or Tier I exceedances were detected in subsurface soil.

Are additional monitoring stations needed?

Current groundwater wells are appropriately placed to detect potential contamination at IHSS Group 800-4.

Can existing monitoring locations be deleted if additional remediation is conducted?

Not applicable.

2.4.4 Stewardship Actions and Recommendations

The stewardship actions and recommendations for IHSS Group 800-4 are as follows:

- Implement near-term institutional controls until final closure and stewardship decisions are implemented, including the following
 - Signs and barriers,
 - Restrictions on soil excavation, and
 - Soil excavations controlled through the Site Soil Disturbance Permit process
- Implement long-term stewardship actions, including the following
 - Federal ownership, and
 - Land use restrictions to prevent soil excavation. Specific land use restrictions will be discussed in the Site Long-Term Stewardship Plan.

These recommendations may change based on in-process remediation activities and other future RFETS remediation activities.

2.5 Accelerated Action Remediation Goals

ER RSOP remedial action objectives 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

The accelerated action goals for IHSS Group 800-4 include the following

- 1 Remove the UBC 886 concrete slab and dispose of or disposition the concrete according to the RSOP for Recycling Concrete (DOE 1999),
- 2 Remove contaminated soil (if any) associated with the sump from Tanks 21, 22, and 27 to below Tier I ALs (Figure 2),
- 3 Disrupt the foundation drain potential pathway (Figure 2),
- 4 Remove contaminated subsurface soil (if any) to below RFCA Tier I ALs, and
- 5 Remove contaminated soil (if any) associated with OPWL to below RFCA Tier I ALs (Figure 2)

2.6 Treatment

Not applicable

2.7 Project-Specific Monitoring

High-volume air samplers may be used at the remediation area consistent with work controls to determine airborne radioactivity concentrations. Approximate locations of air samplers are shown on Figure 2

2.8 RCRA Units and Intended Waste Disposition

Not applicable

2.9 Administrative Record Documents

DOE, 1999, RFCA Standard Operating Protocol for Recycling Concrete, Rocky Flats Environmental Technology Site, Golden, Colorado, September

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

DOE, 2000, 1999 Annual Rocky Flats Cleanup Agreement Groundwater Monitoring Report, Rocky Flats Environmental Technology Site, Golden, Colorado, November

DOE, 2000, 2000 First Quarter RFCA Groundwater Monitoring Report, Rocky Flats Environmental Technology Site, Golden, Colorado, August

DOE, 2000, Second Quarter RFCA Groundwater Monitoring Report for Calendar Year 2000, Rocky Flats Environmental Technology Site, Golden, Colorado, November

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

DOE, 2001, Final Data Summary Report for the Characterization of UBCs 123 and 886, Rocky Flats Environmental Technology Site, Golden, Colorado, September

DOE, 2001, Third Quarter RFCA Groundwater Monitoring Report for Calendar Year 2000, Rocky Flats Environmental Technology Site, Golden, Colorado, February

DOE, 2001, Fourth Quarter RFCA Groundwater Monitoring Report for Calendar Year 2000, Rocky Flats Environmental Technology Site, Golden, Colorado, May

DOE, 2001, First Quarter RFCA Groundwater Monitoring Report for Calendar Year 2001, Rocky Flats Environmental Technology Site, Golden, Colorado, August

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

2.10 Projected Schedule

Remediation of IHSS Group 800-4 will begin in March 2002

3.0 PUBLIC PARTICIPATION

ER RSOP Notification #02-03 activities were discussed at the March, 2002 ER/D&D Status meeting. 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, 1999, RFCA Standard Operating Protocol for Recycling Concrete, Rocky Flats Environmental Technology Site, Golden, Colorado, September

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

DOE, 2000b, 1999 Annual Rocky Flats Cleanup Agreement Groundwater Monitoring Report, Rocky Flats Environmental Technology Site, Golden, Colorado, November

DOE, 2000c, 2000 First Quarter RFCA Groundwater Monitoring Report, Rocky Flats Environmental Technology Site, Golden, Colorado, August

DOE, 2000d, Second Quarter RFCA Groundwater Monitoring Report for Calendar Year 2000, Rocky Flats Environmental Technology Site, Golden, Colorado, November

DOE, 2001a, Final Data Summary Report for the Characterization of UBCs 123 and 886, Rocky Flats Environmental Technology Site, Golden, Colorado, September

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

DOE, 2001c, Third Quarter RFCA Groundwater Monitoring Report for Calendar Year 2000, Rocky Flats Environmental Technology Site, Golden, Colorado, February

DOE, 2001d, Fourth Quarter RFCA Groundwater Monitoring Report for Calendar Year 2000, Rocky Flats Environmental Technology Site, Golden, Colorado, May

DOE, 2001e, First Quarter RFCA Groundwater Monitoring Report for Calendar Year 2001, Rocky Flats Environmental Technology Site, Golden, Colorado, August

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

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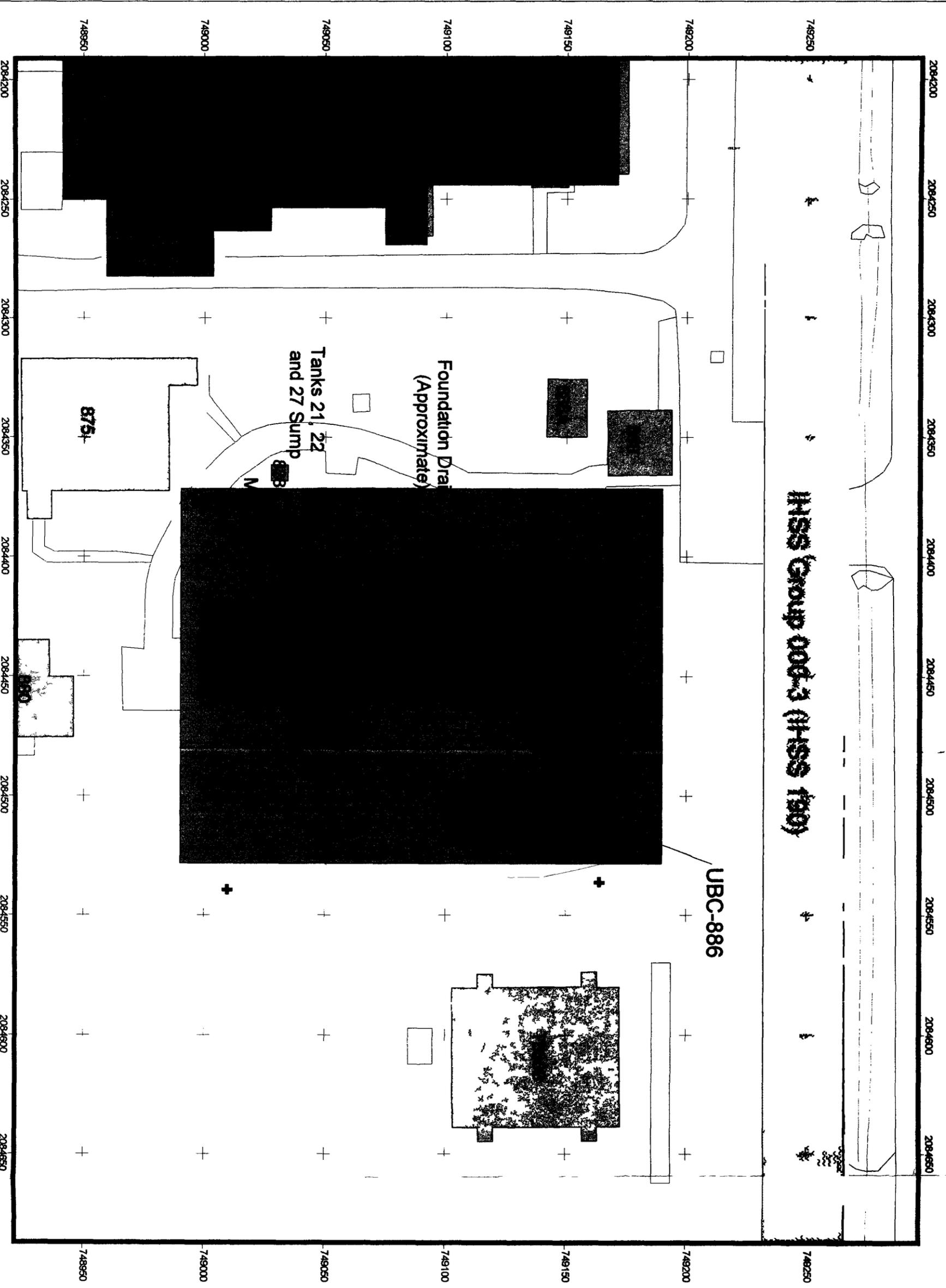


Figure 2
Potential Remediation Map
and Nearby IHSSs
IHSS Group 800-4
(800-164.2 and UBC 886)

KEY

- Foundation Drain (Approximate)
- + Potential air sampling locations
- ▨ Adjacent and Nearby IHSSs
- FY 2002 IHSS location
- FY 2002 PAC location
- FY 2002 UBC location
- Building/structure
- Paved area
- ~ Dirt road
- ~ Stream ditch or other drainage feature
- ▭ OPWL location (estimated)
- ▭ OPWL tank location (estimated)
- ⊙ Existing soil sampling locations (50-ft buffer)
- ⊙ Both subsurface and surface soil
- ▲ Subsurface soil
- Surface soil



Scale - 1:750



State Plane Coordinate Projection
 Colorado Central Zone
 Datum NAD 27

U S Department of Energy
 Rocky Flats Environmental Technology Site

Prepared by

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