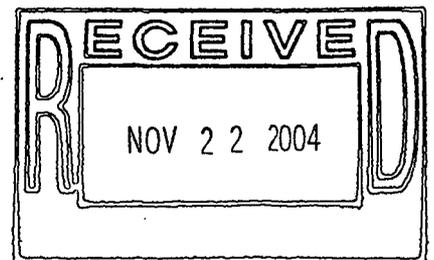


**Draft Environmental Restoration
RFCA Standard Operating Protocol
For Routine Soil Remediation
FY05 Notification #05-02
IHSS Group 500-3**

Approval received from the Colorado Department of Public Health and Environment
(, 2004).

Approval letter contained in the Administrative Record.



November 2004

ADMIN RECORD

IA-A-002452

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 IHSS GROUP 500-3	1
2.1 Project Conditions.....	3
2.2 RFCA SSRS Evaluation	3
2.3 Remediation Plan.....	6
2.4 Stewardship Evaluation	6
2.4.1 Proximity to Other Contaminant Sources	7
2.4.2 Surface Water Protection	7
2.4.3 Monitoring	8
2.4.4 Stewardship Actions and Recommendations.....	8
2.5 Accelerated Action Remediation Goals.....	9
2.6 Treatment	9
2.7 RCRA Units and Intended Waste Disposition.....	9
2.8 Administrative Record Documents.....	9
2.9 Projected Schedule.....	10
3.0 PUBLIC PARTICIPATION	10
4.0 REFERENCES	10

LIST OF FIGURES

Figure 1 IHSS Group 500-3 Location.....	2
Figure 2 IHSS Group 500-3 Potential Remediation Areas.....	4

LIST OF TABLES

Table 1 Potential Remediation Areas for IHSS Group 500-3.....	1
Table 2 WRW AL Exceedances in IHSS Group 500-3.....	3

ACRONYMS

AL	action level
bgs	below ground surface
BMP	best management practice
CDPHE	Colorado Department of Public Health
COC	contaminant of concern
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
EDDIE	Environmental Data Dynamic Information Exchange
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ER RSOP	Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation
ft	feet
FY	Fiscal Year
IA	Industrial Area
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Site
MDL	method detection limit
nCi/g	nanocuries per gram
NPWL	New Process Waste Lines
OPWL	Original Process Waste Lines
PA	protected area
PAC	Potential Area of Concern
pCi/g	picocuries per gram
pCi/L	picocuries per liter
PCOC	potential contaminant of concern
pdf	portable document format
POC	Point of Compliance
POE	Point of Evaluation
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS or Site	Rocky Flats Environmental Technology Site
RL	Reporting Limit
RSOP	RFCA Standard Operating Protocol
SAP	Sampling and Analysis Plan
SSRS	Subsurface Soil Risk Screen
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 2003a) Fiscal Year (FY) 05 Notification includes the notification to remediate Individual Hazardous Substance Sites (IHSSs), Under Building Contamination (UBC) sites, and Potential Areas of Concern (PACs) at the Rocky Flats Environmental Technology Site (RFETS or Site) Industrial Area (IA) during FY05. The purpose of this Notification is to invoke the ER RSOP for IHSS Group 500-3. Activities specified in the ER RSOP are not reiterated here; however, deviations from the ER RSOP are included where appropriate.

Soil with contaminant concentrations greater than the RFCA wildlife refuge worker (WRW) action levels (ALs), or as indicated by the Subsurface Soil Risk Screen (SSRS), and associated debris will be removed in accordance with RFCA (DOE et al. 2003) and the ER RSOP (DOE 2003a).

IHSS Group 500-3 is shown on Figure 1, and the areas requiring remediation under ER RSOP Notification #05-02 are listed in Table 1 along with potential contaminants of concern (PCOCs) and estimated remediation volume in cubic yards. The PCOCs were determined based on process knowledge and data collected during previous studies (DOE 1992-2002; DOE 2001; DOE2000a). In accordance with IA Sampling and Analysis Plan (SAP) (IASAP) Addendum #IA-03-12, accelerated action soil samples were collected throughout IHSS Group 500-3 and analyzed for the appropriate PCOCs.

Table 1
Potential Remediation Areas for IHSS Group 500-3

IHSS Group	IHSS/PAC/UBC Site	PCOCs	Media	Estimated Remediation Volume (cubic yards)
500-3	UBC 559 – Building 559	Radionuclides Metals VOCs	Surface and Subsurface Soil	20

2.0 IHSS GROUP 500-3

IHSS Group 500-3 includes the following IHSS, PAC, and UBC sites. These locations are shown in Figure 2.

- UBC 559, Building 559 Service Analytical Laboratory;
- UBC 528, Temporary Waste Holding Building;
- IHSS 500-159, Radioactive Site Building 559;

Figure 1
IHSS Group 500-3
Location

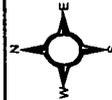
KEY

-  UBC 559
-  UBC 528
-  PAC 500-902
-  IHSS 159
-  Paved Road
-  Dirt Road
-  Lake
-  Ditch or Stream

Buildings

-  Demolished Building
-  Standing Building

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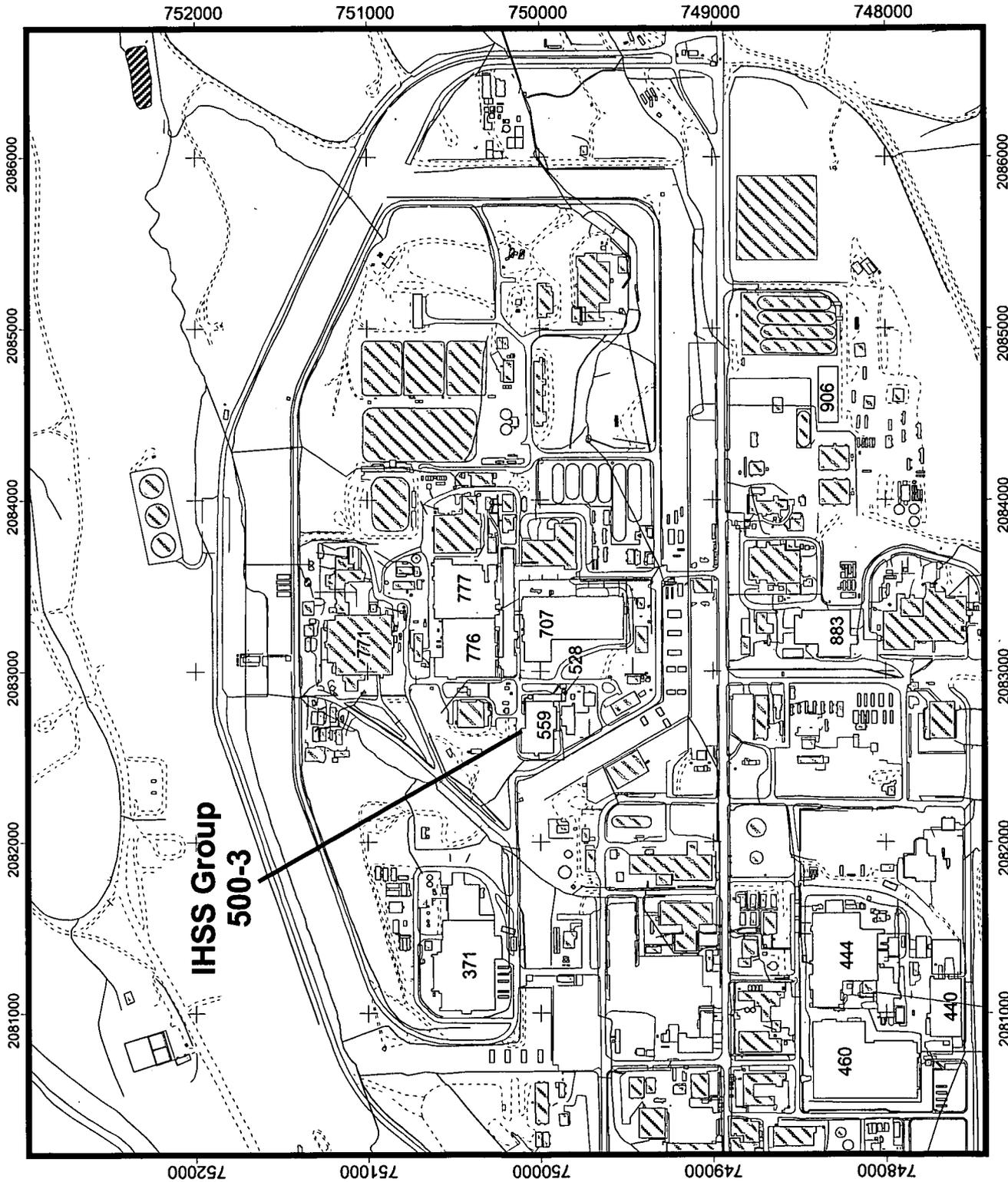
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State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Prepared by: **RADMS**



Prepared for: **KAISER-HILL**
COMPANY



- Portions of IHSS 000-121, including Tanks T-7, T-33, T-34, and T-35.

This notification concerns those portions of IHSS Group 500-3 requiring remediation as determined by accelerated action soil data, namely, UBC 559 sample location CD44-005. WRW AL exceedances for this location are shown in Table 2 and Figure 2.

Table 2
WRW AL Exceedances in IHSS Group 500-3

Sample Location	Sample Starting Depth (ft)	Sample Ending Depth (ft)	Analyte	Result	WRW AL	Units
CD44-005	0.0	0.5	Americium-241	1200.000	76.0	pCi/g
CD44-005	0.0	0.5	Plutonium-239/240	8130.000	50.0	pCi/g

2.1 Project Conditions

The following conditions are present within IHSS Group 500-3:

- UBC 559, Service Analytical Laboratory, is an approximately 35,000 square-foot building formerly used as a laboratory. An approximately 200-ft-long tunnel runs beneath the building in an east-west direction. Original Process Waste Lines (OPWL) are present in the tunnel as well as in other areas of the building. New Process Waste Lines (NPWL) are also present but are less extensive.
- Tank 7, Process Waste Pit, is located within Building 528. Tank 7 consists of two 2000-gallon in-sump steel tanks that once held process waste.
- IHSS 500-159, Radioactive Site Building 559, is a 5400 square-foot area to the east of Building 559 where radioactive soil associated with OPWL breaks was previously excavated and removed.
- Tanks 33, 34, and 35, upon investigation were determined to be a single process waste tank in the northeastern corner of Building 561.

2.2 RFCA SSRS Evaluation

A Subsurface Soil Risk Screen (SSRS) is performed when nonradionuclides and uranium are present in the soil between 6 inches and 3 feet (ft) below ground surface (bgs), and when americium or plutonium are present between 3 ft and 6 ft bgs. Current site conditions are evaluated to determine whether remediation is required by the SSRS. Any accelerated actions taken, confirmation results, and a revised SSRS will be documented in the IHSS Group 500-3 Closeout Report.

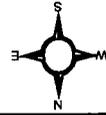
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Figure 2
IHSS Group 500-3
Potential Remediation Areas

KEY

- Sampling location with results exceeding the RW AL
- Sampling location with all results below the RW AL
- ▭ UBC 559
- ▭ UBC 528
- ▭ PAC 500-902
- ▭ IHSS 159
- ~ Original Process Waste Lines
- ~ New Process Waste Lines
- ~ Paved Road
- ~ Ditch or Stream
- ▨ Buildings
- ▨ Demolished Building
- ▭ Standing Building

DRAFT



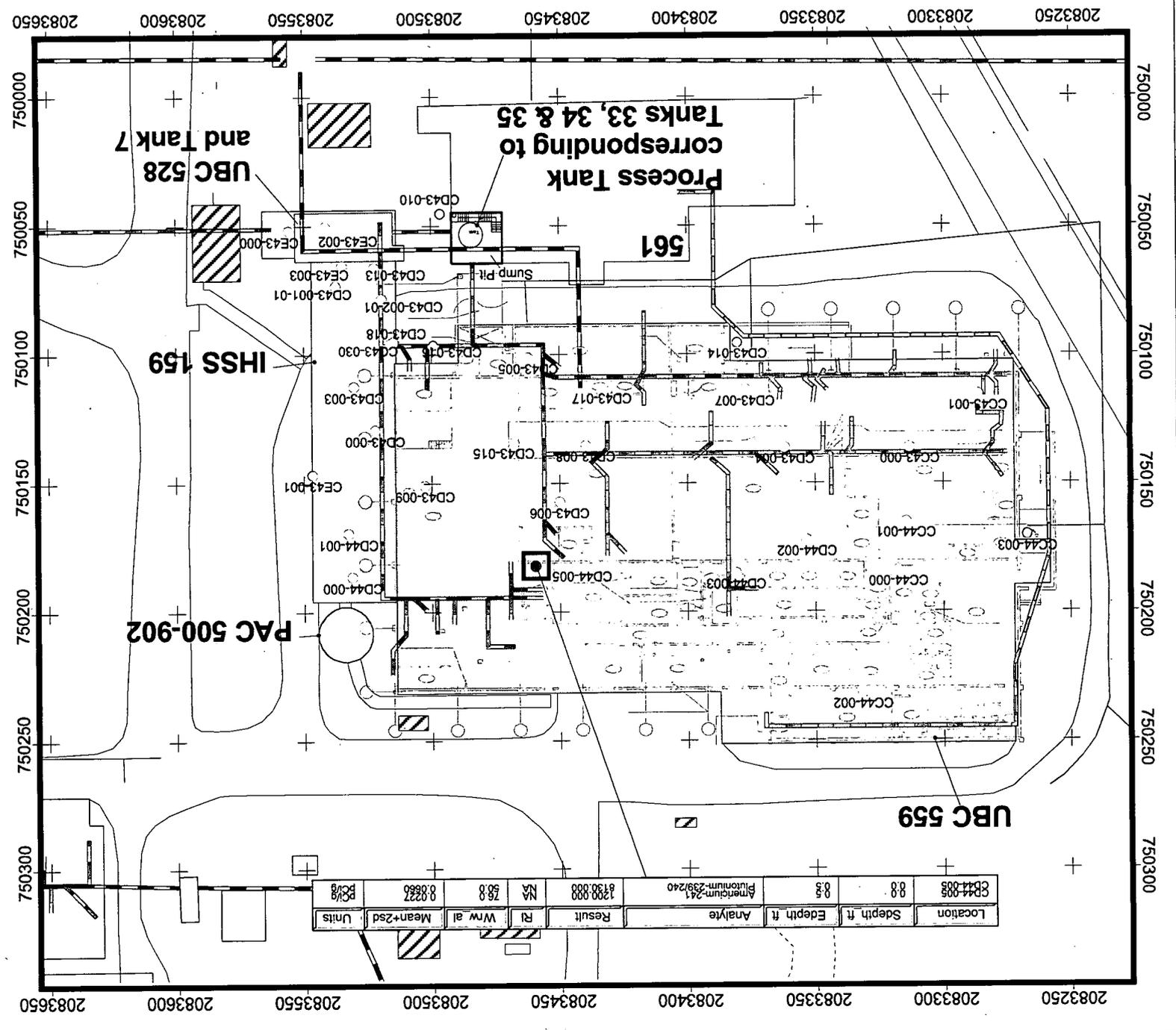
Scale 1:650
 State Plane Coordinate Projection
 Colorado Central Zone
 Datum: NAD 27

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

Prepared by: **RADMS**



Prepared for:



Screen 1 – Are contaminant of concern (COC) concentrations below WRW Soil Action Levels?

Yes. Accelerated action sampling was completed on September 13, 2004. There were no subsurface soil results that exceeded the WRW AL. Screens 2 and 3 are therefore omitted from the SSRS.

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

Radionuclide-contaminated surface soil is present beneath the Building 559 slab and VOC-contaminated groundwater is present beneath IHSS Group 500-3. Contaminant migration in surface water due to erosion and advective transport by groundwater are the two possible pathways whereby contamination originating in IHSS Group 500-3 could enter surface water. Both potential pathways are discussed below.

IHSS Group 500-3 occupies a relatively flat alluvial terrace that is not considered highly erodible (RFCA Attachment 5, Figure 1). Drainage from the northeastern corner of Building 559 flows into the South Walnut Creek drainage, while runoff from the remainder of the area flows into Walnut Creek. The nearest Point of Evaluation (POE) on Walnut Creek is SW093 and the nearest POE on South Walnut Creek is GS10. These specific locations are discussed below. The data show that surface water is impacted by multiple sources in the IA, but the impacts generally cannot be traced to specific IHSS Groups. Although erosion-prone areas contribute greater volumes of sediment to surface water than other areas, areas of relatively low erosion can still be contaminant sources. Very little of the IA is highly erodible (per RFCA Attachment 5, Figure 1), yet surface water impacts from broad areas of the IA are still present.

Water quality data for SW093 are consistently below the RFCA standards for metals and uranium. Plutonium activities are typically below RFCA standards, but there was one instance in 1999 in which the 30-day average plutonium activity at this location exceeded the standard for surface water. As a result of this exceedance, a source evaluation was conducted. While no source was identified, Building 559 was considered one of several potential sources, along with Buildings 771/774, 776/777, and 371/374 (DOE 2003c).

Water quality samples collected at GS10 have exceeded both the 0.15 picocurie per liter (pCi/L) RFCA standard for plutonium and the 0.15 pCi/L RFCA standard for americium. Source evaluations conducted from 1997 through 2001 did not identify a single source of the plutonium and americium detected at GS10, but concluded that a majority of the plutonium and americium loading to South Walnut Creek occurs between surface water stations GS40 and GS10, which is the area along Walnut Creek east of the 750 Pad to approximately 150 ft east of the former protected area (PA) fence (DOE 2003c). IHSS Group 500-3 is not located in this area and is therefore not likely to be one of the major sources.

A review of alluvial groundwater data from IHSS Group 500-3 indicates that plutonium and americium were below the detection limit or detected at very low activities in

groundwater. This is consistent with the RFETS Actinide Migration Pathway study (DOE 2002), which demonstrated that the solubility of actinides is very low and the subsurface mobility of actinides in the saturated and unsaturated zones is minimal. The lack of plutonium and americium exceedances in groundwater and the known immobility of these analytes in the subsurface both support the conclusion that the plutonium and americium contamination encountered beneath Building 559 is not likely to enter groundwater.

Groundwater exceedances in the IHSS Group 500-3 area also include trichloroethene and other chlorinated solvents. These contaminants were rarely detected in IHSS Group 500-3 accelerated action soil samples and it is unlikely that they migrated into groundwater from IHSS Group 500-3 soil.

In summary, surface water downgradient from IHSS Group 500-3 is contaminated with radionuclides and IHSS Group 500-3 is one of many possible sources. Groundwater is not an active pathway for radionuclide transport in this area. IHSS Group 500-3 does not appear to be a source for organic contaminants in groundwater.

2.3 Remediation Plan

This RSOP Notification remediation plan for IHSS Group 500-3 includes the following objectives:

1. To address contamination detected at CD44-005, remove soil with plutonium or americium activities greater than the RFCA WRW AL to a depth of 3 ft bgs or to the applicable AL, whichever comes first. If activities are greater than 3 nanocuries per gram (nCi/g) between 3 and 6 ft bgs, characterize and remediate in accordance with RFCA Attachment 5 (DOE et al. 2003). If plutonium or americium is present at activities greater than the RFCA WRW AL but less than 3 nCi/g below 6 ft bgs, conduct an SSRS.
2. Remove OPWL drains and piping within 3 ft bgs of the final grade in accordance with ER RSOP Notification #03-14 (DOE 2003d) and RFCA Attachment 14 (DOE et al. 2003).
3. Where contaminated soil is removed, collect confirmation soil samples in accordance with the IABZSAP (DOE 2004).
4. 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 method detection limits (MDLs) or reporting limits (RLs), but below RFCA WRW ALs.

2.4 Stewardship Evaluation

Because the full extent of excavation and remediation is not known at this time, an additional stewardship evaluation will be conducted during remediation using the consultative process and will be documented in the IHSS Group 500-3 Closeout Report.

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

2.4.1 Proximity to Other Contaminant Sources

IHSS Group 500-3 is located in an area with numerous other contaminant sources. IHSS Group 500-6, a contaminated wastewater spill site, is directly south of IHSS Group 500-3. IHSS Group 500-1, which includes metal and chemical storage sites as well as Valve Vaults 11, 12, and 13, is located to the west of IHSS Group 500-3. Directly east of IHSS Group 500-3 are portions of IHSS Group 000-2, which includes OPWL piping, tanks, and leaks. Northeast of IHSS Group 500-3 is IHSS Group 700-3, which includes UBCs 776, 777, 778, and 701, as well as a variety of associated IHSSs, PACs, and tanks.

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?

Although both natural drainage and the storm drain system convey runoff from IHSS Group 500-3 into the Walnut Creek drainage, erosion is not expected to be significant in the area based on the map shown in RFCA Attachment 5 Figure 1, which indicates areas with potential for high erosion.

Do characterization data indicate there are contaminants in surface soil?

Yes. Plutonium-239/240 and americium-241 have been detected at activities of 8,130 pCi/g and 1,200 pCi/g, respectively, in a sample collected at a depth interval of 0 to 0.5 ft beneath the slab of Building 559.

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

Monitoring results from POEs GS10 and SW093 indicate that contamination in surface water downgradient from IHSS Group 500-3 is consistent with surface soil contamination detected in IHSS Group 500-3.

Water quality samples collected at GS10 have exceeded both the 0.15 pCi/L RFCA standard for plutonium and the 0.15 pCi/L RFCA standard for americium. Source evaluations conducted from 1997 through 2001 did not identify a single source of the plutonium and americium detected at GS10, but concluded that a majority of the plutonium and americium loading to South Walnut Creek occurs between surface water stations GS40 and GS10, which is the area along Walnut Creek east of the 750 Pad to approximately 150 ft east of the former protected area (PA) fence. Although IHSS Group 500-3 is not located in this area, it is evident from the exceedances at CD44-005 that plutonium and americium were released beneath this portion of Building 559. It is not likely that contaminated soil at this location could have significantly impacted surface

10

water in the past because the Building 559 slab has isolated the affected soil from contact with precipitation and surface water.

Water quality data for SW093 are consistently below the RFCA standards for metals and uranium. As discussed earlier in this document, plutonium activities are typically below standards, except for one instance in 1999. Building 559 was named as a potential source for this exceedance, along with Buildings 771/774, 776/777, and 371/374.

Is the IHSS Group in an area with high erosion potential?

IHSS Group 500-3 is not located in an area subject to erosion in accordance with Attachment 5 Figure 1 of RFCA Attachment 5 (DOE et al. 2003).

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?

Analytical data for groundwater sampling locations in the area were reviewed. These wells had exceedances for total and dissolved metals and volatile organic compounds (VOCs), particularly carbon tetrachloride and trichloroethene.

Can the impact be traced to a specific IHSS Group?

The groundwater VOC exceedances in IHSS Group 500-3 are part of a larger mapped plume extending throughout a significant proportion of the IA (DOE 2003e). The plume is likely attributable to a variety of sources within the IA. Accelerated action soil data do not indicate the presence of a VOC source in IHSS Group 500-3.

Are additional monitoring stations needed?

Not applicable at this time. The need for and placement of monitoring stations will be re-evaluated in the Long-Term Stewardship Plan.

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

Not applicable at this time. Existing wells monitor contamination from areas within and outside IHSS Group 500-3.

2.4.4 Stewardship Actions and Recommendations

The current stewardship actions and recommendations for IHSS Group 500-3 are as follows:

- Use best management practices (BMPs) to reduce erosion into surface water drainage.

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Water quality data for SW093 are consistently below the RFCA standards for metals and uranium. As discussed earlier in this document, plutonium activities are typically below standards, except for one instance in 1999. Building 559 was named as a potential source for this exceedance, along with Buildings 771/774, 776/777, and 371/374.

Is the IHSS Group in an area with high erosion potential?

IHSS Group 500-3 is not located in an area subject to erosion in accordance with Attachment 5 Figure 1 of RFCA Attachment 5 (DOE et al. 2003).

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?

Analytical data for groundwater sampling locations in the area were reviewed. These wells had exceedances for total and dissolved metals and volatile organic compounds (VOCs), particularly carbon tetrachloride and trichloroethene.

Can the impact be traced to a specific IHSS Group?

The groundwater VOC exceedances in IHSS Group 500-3 are part of a larger mapped plume extending throughout a significant proportion of the IA (DOE 2003e). The plume is likely attributable to a variety of sources within the IA. Accelerated action soil data do not indicate the presence of a VOC source in IHSS Group 500-3.

Are additional monitoring stations needed?

Not applicable at this time. The need for and placement of monitoring stations will be re-evaluated in the Long-Term Stewardship Plan.

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

Not applicable at this time. Existing wells monitor contamination from areas within and outside IHSS Group 500-3.

2.4.4 Stewardship Actions and Recommendations

The current stewardship actions and recommendations for IHSS Group 500-3 are as follows:

- Use best management practices (BMPs) to reduce erosion into surface water drainage.

- Implement near-term institutional controls until final closure and stewardship decisions are implemented, including the following:
 - Restrict access; and
 - Control soil excavations through the Site Soil Disturbance Permit process.
- Implement long-term stewardship actions, including the following:
 - Prohibitions on construction of buildings in the area;
 - Restrictions on excavations or other soil disturbances; and
 - Prohibitions on groundwater pumping in the area of IHSS Group 500-3.

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

2.5 Accelerated Action Remediation Goals

ER RSOP remedial action objectives (RAOs) include 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.

2.6 Treatment

Not applicable.

2.7 RCRA Units and Intended Waste Disposition

Not applicable.

2.8 Administrative Record Documents

Department of Energy (DOE), 1992-2003, Historical Release Reports for the Rocky Flats Plant, Golden, Colorado.

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, 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.

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

DOE, 2003, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation, FY03 Notification #03-14, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

2.9 Projected Schedule

Remediation of IHSS Group 500-3 is expected to begin in the second quarter of FY05.

3.0 PUBLIC PARTICIPATION

ER RSOP Notification #05-02 activities will be discussed at the November 2004 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/eddie/

4.0 REFERENCES

Department of Energy (DOE), 1992-2003, Historical Release Reports for the Rocky Flats Plant, Golden, Colorado.

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

DOE, 2000b, RFCA Standard Operating Protocol for Facility Disposition, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

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DOE, 2003c, Final Automated Surface Water Monitoring Report Water Year 2001. Rocky Flats Environmental Technology Site, Golden, Colorado. May.

DOE, 2003d, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation, FY03 Notification #03-14, Rocky Flats Environmental Technology Site, Golden, Colorado, October.

DOE, 2003e, Integrated Monitoring Plan, FY 2003 Background Document, Rocky Flats Environmental Technology Site, Golden, Colorado, April.

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

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.

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