

**Draft Annotated Outline  
RFCA Standard Operating Protocol  
For Environmental Remediation**

**December 2000**

## **Notice to Readers**

The purpose of this draft, annotated outline is to provide an overview of the RFCA Standard Operating Protocol for Environmental Remediation being developed to guide routine remediation of soil, as well as groundwater decisions at the Rocky Flats Environmental Technology Site. This is a working draft intended to facilitate discussion and does not represent the final opinions or positions of the RFCA Parties or Kaiser-Hill.

Annotation of the outline is not evenly weighted from section to section. Sections representing key activities and approaches contain the most discussion. Routine items contain minimal description. A final draft outline will be developed as discussions proceed between the RFCA Parties, Stakeholders and Kaiser-Hill.

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## **Acronyms**

AL	Action Level
ALF	Action Levels and Standards Framework for Surface Water, Ground Water, and Soils
AME	Actinide Migration Evaluation
AOC	Area of Concern
AR	Administrative Record
ARAR	Applicable or Relevant and Appropriate Requirement
BZ	Buffer Zone
CAB	Citizen Advisory Board
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRA	Comprehensive Risk Assessment
D&D	Decontamination and Decommissioning
DOE	United States Department of Energy
DQO	Data Quality Objective
EPA	United States Environmental Protection Agency
ER	Environmental Restoration
ESS	Environmental Systems and Stewardship
HASP	Health and Safety Plan
HRR	Historical Release Report
IA	Industrial Area
IGD	Implementation Guidance Document
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
IMP	Integrated Monitoring Program
LLW	Low-Level
LLMW	Low-Level Mixed Waste
LRA	Lead Regulatory Agency
NEPA	National Environmental Policy Act
OPWL	Original Process Waste Line
OU	Operable Unit
PAC	Potential Area of Concern
PAM	Proposed Action Memorandum
PCOC	Potential Contaminant of Concern
PPE	Personal Protective Equipment
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
SVOC	Semi-Volatile Organic Compound
TSCA	Toxic Substance Control Act
UBC	Under Building Contamination
VOC	Volatile Organic Compound

## **Executive Summary**

Overview of the RSOP.

### **1.0 INTRODUCTION**

The Rocky Flats Cleanup Agreement (RFCA) requires the development of decision documents including RFCA Standard Operating Protocols (RSOPs), Proposed Action Memoranda (PAMs), or Interim Measures/Interim Remedial Actions (IM/IRAs) for accelerated remedial actions at the Rocky Flats Environmental Technology Site (RFETS or Site). Because RSOPs apply to “accelerated actions that are routine and substantially similar in nature, for which standardized procedures can be developed”, (DOE, et al. 1996) and because most remediation at RFETS will be routine, this RSOP for Environmental Restoration (ER RSOP) is the decision document for routine soil and groundwater remediation at RFETS.

The ER RSOP addresses routine remediation of soil and associated debris at Individual Hazardous Substance Sites (IHSSs), Potential Areas of Concern (PACs), and Under Building Contamination (UBC) Sites, as well as the remedial decision for groundwater contaminant plumes. Non-routine actions such as closure of the Present Landfill, Original Landfill, Solar Evaporation Ponds, final Site configuration or the design for groundwater remediation systems will be addressed through other documents. This RSOP covers IHSSs, PACs, and UBC sites in the Industrial Area (IA) and Buffer Zone (BZ) Operable Units (OUs), and new PACs discovered as part of the Historical Release Report (HRR) process.

The ER RSOP will

- Streamline the decisionmaking process by relying on one decision document instead of many;
- Accelerate remediation schedules by eliminating numerous review cycles; and
- Provide a consistent approach to remedial decisions and remediation activities, which will enhance safety, quality, and compliance.

Existing data and process knowledge indicate that potential contaminants of concern (PCOCs) are similar throughout most of the Site and are related to plutonium and uranium processing activities and associated support facilities and functions.

Potential contamination of surface and subsurface soil from past operations at RFETS may exist as

- Surface contamination (within top 6 inches);
- Subsurface contamination (below top 6 inches, but without structural complications);
- Contamination under building floor slabs; and

- Subsurface contamination associated with process waste lines, storm drains and sanitary sewer lines.

Remediation alternatives for contaminated soil at RFETS are limited because of technical feasibility constraints. Constraints are generally related to the effectiveness, availability, and cost of some potential treatment options.

It is expected that most soil exceeding RFCA Tier I Action Levels (ALs) will be excavated and shipped directly to an appropriate offsite disposal facility. Other alternatives are also considered, but their use will be limited. It is anticipated that contaminated soil will be low-level waste (LLW), low-level mixed waste (LLMW), or hazardous waste.

Potential contamination of groundwater from past operations at RFETS may include volatile organic compounds (VOCs), uranium, plutonium, and nitrate. This RSOP will address the remedial decision for the groundwater plume, but not the design of the remediation system. The remedial technology design will be submitted separately to the regulatory agencies for approval.

## **1.1 Purpose and Goals**

The purpose of the ER RSOP is to serve as the decision document for routine remediation of soil and groundwater at RFETS.

This ER RSOP addresses the following:

- In-process confirmation approach;
- The decision process for making soil and ground water remediation decisions;
- Routine remediation alternatives for surface and subsurface soil at IHSSs, PACs, and UBC sites; and
- Routine remediation alternatives for groundwater at RFETS.

Goals of the ER RSOP process include the following:

- Choosing cost-effective remedial alternatives that meet RFCA cleanup standards while minimizing waste;
- Choosing remedial alternatives that reduce final high cost/high maintenance stewardship;
- Choosing remedial alternatives that favor offsite disposal of wastes;
- Coordinating soil remediation with the Decontamination and Decommissioning (D&D) schedule; and

- Ensuring that remediation does not pose unacceptable risks to workers, public, or the environment.

## **1.2 Regulatory Framework**

RFCA, signed by the U.S. Department of Energy (DOE), Colorado Department of Public Health and Environment (CDPHE), and U.S. Environmental Protection Agency (EPA) (the RFCA Parties) on July 19, 1996, provides the regulatory framework for the cleanup of RFETS (DOE, et al. 1996). RFCA streamlines remediation of the Site through accelerated actions that include characterization, remediation, and closure of IHSSs, PACs, and UBC sites in the IA and BZ OUs.

RFCA provides the regulatory framework for DOE response obligations under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and corrective action obligations under the Resource Conservation and Recovery Act (RCRA). The RFCA accelerated action process incorporates the requirements of both CERCLA and RCRA characterization, remediation, and closure. The accelerated action process includes development of RSOPs and serves to provide the documentation for the closure of IHSSs and PACs that are also RCRA units in the IA.

After accelerated actions are complete, DOE will develop a RCRA Facility Investigation/Remedial Investigation (RFI/RI) to describe the accelerated actions and a comprehensive risk assessment (CRA) to verify that potential contamination remaining at RFETS is within acceptable risk levels as defined by CERCLA and implemented through RFCA. DOE will also develop a Corrective Action Decision /Record of Decision (CAD/ROD) that will include the final remedy and post-closure monitoring and operation requirements, including 5-year requirements for reviews of the Site to evaluate whether the remedies, including any institutional controls, are effective.

## **1.3 ER RSOP Approach**

The ER RSOP approach follows the RSOP approach outlined in RFCA and the Implementation Guidance Document (IGD). The ER RSOP is the decision document for routine remediation of soil and groundwater at RFETS. While all remedial alternatives will be evaluated in the ER RSOP, the choice of the approved remedial alternative for each action will be detailed in the notification letter.

### **1.3.1 Notification Letter**

Once the regulatory agencies approve the ER RSOP, no further formal approvals of this RSOP are required. DOE will notify the Lead Regulatory Agency (LRA), with a notification letter, prior to implementing the ER RSOP for each specific project. The notification letter may be prepared annually to address remediation for the upcoming fiscal year or on an as-needed basis. DOE intends to achieve consensus between all parties on the work to be performed by optimizing individual sampling designs using a GIS/database system to concurrently review existing data and proposed sampling locations. The LRA will have fourteen days to review the notification letter and provide

feedback. If no feedback is received within fourteen days that documents the LRA exceptions to the notification letter, the project will proceed.

A list of documents comprising the Administrative Record (AR) file for the individual project will be included in the notification letter. The notification letter will become part of the AR.

The notification letter will contain the following information:

- Detailed schedule;
- IHSS, PAC, or UBC site specific location;
- IHSS, PAC, or UBC site characterization information (existing qualified data);
- Applicable or relevant and appropriate requirement (ARARs), if in addition to those in the RSOP;
- Remedial alternative;
- Specific material handling and waste management practices, if in addition to the RSOP;
- Specific exceptions or special safety and quality assurance practices; and
- Project organization.

An annotated notification letter outline is included as Appendix \_\_\_.

## **2.0 SITE DESCRIPTION**

### **2.1 Nature and History of Contamination Sources**

Historical operations and processes at RFETS resulting in known and potential releases to the environment include surface spills, UBC sites, process lines, trenches, and ponds. IHSSs, PACs, and UBC sites are shown in Figure \_\_\_ and listed in Table \_\_\_.

### **2.2 Existing Data**

Existing data that may be used when making remedial decisions includes data contained in the Industrial Area Data Summary Report (DOE 2000a) and the Buffer Zone Data Summary Report (DOE 2000b). These data were developed by screening existing environmental data through a data quality filter (DOE 2000c). The resulting data sets are the “starting point” for decision making and will be updated with characterization data and as sites are remediated.

### **2.3 Incorporation of Characterization Data**

Data developed during characterization of the IA and the BZ will be incorporated into the ER data set. All data developed during characterization activities will be screened through the data quality filter before incorporation into the set of data used for decisions.

### **2.4 General Conditions**

This section describes geological and hydrological conditions. This discussion is thorough, but references existing documents for detail not relevant to the scope of the RSOP. Includes geological and hydrological maps.

### **2.5 Future Site Conceptual Model**

Future Site land use assumptions for open space and industrial land use scenarios are consistent with RFCA Attachment 5, Action Levels and Standards Framework for Surface Water, Ground Water, and Soils (ALF), Figure 1. RFCA ALs for these land use scenarios will be applied to remedial decisions.

## **3.0 INTERFACES**

Because the ER RSOP is sitewide and comprehensive, it relies on information from a number of organizations and projects from across RFETS.

### **3.1 Organizational Interfaces**

ER will interact with almost all Site organizations during the implementation of the ER RSOP. Several key interfaces are described in the following sections.

#### **3.1.1 Decontamination and Decommissioning**

Approximately 90% of the potentially contaminated sites that may require remediation are associated with buildings or supporting infrastructure. Consequently, close interaction with D&D staff will be required.

#### **3.1.2 Environmental Systems and Stewardship**

The Environmental Systems and Stewardship (ESS) organization is responsible for guiding and supporting Site regulatory compliance. ER will interact closely with ESS to ensure that remediation is compliant with RFCA as well as all applicable federal, state, and local regulations. Additionally, remediation of RCRA units will be coordinated with ESS to ensure that data generated during ER remediation is available for the closure of RCRA units.

### *Integrated Monitoring Plan*

The Integrated Monitoring Plan (IMP) provides a template for data collection requirements for routine groundwater, soil, surface water, air and ecology in the IA and BZ OUs and around decommissioning and remediation projects. Interaction and data transfer between the IMP and ER will be ongoing.

### **3.1.3 Material Stewardship**

The Material Stewardship group is responsible for Site waste management activities. ER will work closely with Material Stewardship on waste characterization and transportation issues.

### **3.1.4 Site Services**

The Site Services group is responsible for all Site systems. The ER staff works with Site Services to locate waste lines, utilities, and coordinate remediation activities.

## **3.2 Informational Interfaces**

The ER staff will use a variety of information sources when making remedial decisions and will provide information and data developed during remediation to other Site programs. Key information sources and interfaces are described below.

### **3.2.1 Environmental Restoration Data Management**

The ER group will manage all ER-specific data through an integrated data management system. Data generated during ER activities will be shared with several Site programs. Additionally, ER may use data from these other programs in remedial decisions.

### **3.2.2 Actinide Migration Evaluation**

The Actinide Migration Evaluation (AME) group evaluates the behavior and mobility of actinides in surface water, groundwater, and soil environments. ER will provide data to the AME group on an as-needed basis. ER will use AME results when planning remedial actions.

### **3.2.3 Land Configuration Design Basis**

The goal of the Land Configuration Design Basis study is to develop the information needed to design the final land surface configuration for RFETS. ER data will be used in the design models and subsequent Land Configuration Design Basis results will be used in the remedial decision process.

### **3.2.4 Site-Wide Water Balance**

The Site-Wide Water Balance is being implemented to model existing and future surface water and groundwater hydrology. The results of the water balance modeling will provide information for future remedial decisions.

## **4.0 DECISION FRAMEWORK**

### **4.1 RCRA Units**

The ER RSOP will serve as the permit modification vehicle for ER RCRA units to document what action was taken to support the RCRA permit modification. Remedial

actions related to original process waste lines (OPWL) and associated tanks (in IHSSs or under buildings) will be tracked. The strategy is to remediate tanks and sections of the OPWL associated with UBC sites and other IHSSs when those sites are remediated, archive the data, and close the RCRA unit when tank and OPWL remediation are complete. As tanks and sections of the OPWL are remediated, the specifics will be documented in the annual update to the HRR.

Table \_\_\_ lists the RCRA units that will be addressed under the ER RSOP.

## **4.2 Action Levels**

RFCA ALs as described in RFCA Attachment 5, March 2000, will be used for remedial decisions.

## **4.3 Methodology**

The remedial alternative decision process includes the following components:

- Comparison to data quality objective (DQO) decision rules;
- Remedial action for each IHSS, PAC, or UBC site will be based on characterization results and other circumstances specific to the site. Remedial decisions will follow the decision framework; and
- In-process confirmation sampling.

### **4.3.1 Data Quality Objectives**

The ER RSOP decisions are based on the Preliminary Industrial Area Characterization and Remediation Data Quality Objectives (DOE 2000).

#### *The Problem*

1. IHSSs, PACs, and UBC sites that have analytical results exceeding Tier I or Tier II ALs must be evaluated to determine the appropriate action. Remedial objectives for each IHSS, PAC, and UBC site that requires remediation need to be met.
2. An action must be taken when groundwater with analytical results exceeding Tier I ALs exits. Remedial alternatives for preventing groundwater impact on surface water need to be determined.

#### *Identification of Decisions*

The remediation questions that will be resolved include the following:

1. Is remediation necessary within an IHSS, PAC, or UBC site based on comparison of the characterization data to the RFCA Tier I ALs as specified in the IGD?

2. Is evaluation, management, or remediation of an IHSS, PAC, or UBC site required because of exceedances of RFCA Tier II ALs as specified in the IGD?
3. What remedial action is appropriate for each IHSS, PAC, or UBC site?
4. Has contamination within an area of concern (AOC) been successfully remediated based on RFCA ALs and other mutually agreed-upon cleanup criteria?
5. Did any releases of contamination occur outside the remediation activity boundaries during the remediation activity (based on IMP and project-specific monitoring)?
6. What groundwater action is appropriate to prevent or minimize impacts to surface water?

#### **4.3.2 Decision Framework**

The RSOP decision process includes both DQOs and determining which remedial alternative is appropriate. The ER RSOP Decision Framework is shown in Figure \_\_\_\_.

#### **4.3.3 In-Process Confirmation Sampling**

The K-H Team will implement an in-process confirmation sampling approach that combines remediation with field instrument confirmation analysis to determine when remedial objectives have been achieved. The in-process approach is illustrated in Figure \_\_\_\_.

### **5.0 LONG-TERM REMEDIAL ACTION OBJECTIVES**

Remedial action objectives (RAOs) are contaminant- and medium-specific goals for protecting human health and the environment. The RAOs are designed to protect human health and the environment, and are used to evaluate the remedial alternatives. The overall long-term remedial action objective (RAO) for soil and groundwater remediation at RFETS is the protection of human health and the environment. RAOs for specific media include requirements for compliance with RFCA Tier I and Tier II ALs consistent with future land use as specified in RFCA Attachment 5, Figure 1.

#### **5.1 Previous Studies**

Previous remedial actions and feasibility studies conducted at RFETS provide information on and validation of proposed alternatives. Previous studies in relationship to current remedial alternatives are briefly discussed.

#### **5.2 Surface Soil Remedial Action Objectives**

The surface soil RAOs are to prevent human exposure to contaminated surface soils above RFCA Tier I ALs, protect surface water quality via runoff, and protect ecological resources.

Potential contaminants of concern in surface soil include metals, radionuclides, semi-volatile organic compounds (SVOCs), and in some places pesticides and herbicides.

### **5.3 Subsurface Soil Remedial Action Objectives**

The subsurface soil RAOs are to prevent human exposure to contaminated subsurface soils above RFCA Tier I ALs, remediate subsurface soils to the extent necessary to protect surface water standards via ground water transport.

Potential contaminants of concern in surface soil include metals, radionuclides, VOCs, SVOCs, and, in some places, pesticides and herbicides.

### **5.4 Groundwater Remedial Action Objectives**

The groundwater RAOs are to prevent exposure to contaminated groundwater above RFCA Tier I ALs, prevent or minimize further migration of contaminants from source materials to groundwater (source control) to protect surface water.

Potential contaminants of concern in groundwater include metals, radionuclides, SVOCs, VOCs, and nitrates.

## **6.0 REMEDIAL ALTERNATIVES – SOIL**

This section provides a description of the proposed actions including the scope of the actions, the proposed methodologies, cleanup levels, and Site restoration requirements.

Based on characterization data and site-specific factors such as surface/subsurface soil, UBC, footing drains or buried piping, five remediation alternatives will be evaluated.

- Alternative 1 - Excavation, onsite thermal desorption, and onsite disposal of residuals
- Alternative 2 - Excavation, onsite thermal desorption, and offsite disposal of residuals
- Alternative 3 - Excavation, offsite thermal desorption and offsite disposal of residuals
- Alternative 4 - Excavation, offsite disposal of residuals
- Alternative 5 - Cover or stabilize in place, employ institutional controls and monitoring

To facilitate understanding of requirements, ARARs will be described in this section for each alternative rather than discussing ARARs in a separate section. This will be an analysis of Federal and State chemical-specific, location-specific and action-specific ARARs.

Protectiveness and compliance with ARARs are threshold criteria that all alternatives must achieve. Long-term effectiveness, reduction of toxicity, mobility, or volume, short-term effectiveness, implementability, and cost are balancing criteria used to compare

alternatives to each other. State acceptance and community acceptance are modifying criteria, and are addressed after the formal comment period.

## 6.1 Alternative 1 - Excavation, Onsite Thermal Desorption, and Onsite Disposal of Residuals

### 6.1.1 Description of Alternative

The alternative will be described in sufficient detail to allow understanding of the processes.

### 6.1.2 Alternative Evaluation

The alternative evaluation will include assessment of the threshold and balancing criteria in the following table format.

Threshold Criteria		Balancing Criteria				
Protectiveness	ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost
Protective because contaminated soils are removed and treated before returning soil to site.	Meets ARARS during action as well as post action (See below).	Provides long-term benefits because VOCs are removed from soil.	Reduces toxicity by removing VOCs from soil.	Protects workers, public, and environment because (1) dust generated during soil removal activities will be controlled, and (2) the onsite treatment system is a closed system and VOCs will not be released to the atmosphere.	Technically feasible because both the remediation and treatment technologies are readily available commercially. Remediation technology is being procured. Treatment technology is not currently onsite.	\$

### 6.1.3 ARARs

ARARs will be listed in the following table format, which includes the requirement, citation, and compliance strategy.

ARARs		
Requirement	Citation	Compliance Strategy
Rules and Regulations Pertaining to Radiation Control <ul style="list-style-type: none"> <li>Permissible Levels of Radioactive Material in Uncontrolled Areas</li> </ul>	6 CCR 1007-1, Part 4 4.60.1	Samples will be screened for gross alpha/gross beta, and subsequently managed appropriately. Radioactivity assays will be performed during in-process remediation sampling based on pre-remediation characterization of each IHSS, PAC, and UBC.

**6.2 Alternative 2 – Excavation, Onsite Thermal Desorption, and Offsite Disposal of Residuals**

**6.2.1 Description of Alternative**

The alternative will be described in sufficient detail to allow understanding of the processes.

**6.2.2 Alternative Evaluation**

The alternative evaluation will include assessment of the threshold and balancing criteria in the following table format.

Threshold Criteria		Balancing Criteria				
Protectiveness	ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost
						\$

**6.2.3 ARARs**

ARARs will be listed in the following table format, which includes the requirement, citation, and compliance strategy.

ARARs		
Requirement	Citation	Compliance Strategy

**6.3 Alternative 3 – Excavation, Offsite Thermal Desorption, and Offsite Disposal of Residuals**

**6.3.1 Description of Alternative**

The alternative will be described in sufficient detail to allow understanding of the processes.

**6.3.2 Alternative Evaluation**

The alternative evaluation will include assessment of the threshold and balancing criteria in the following table format.

<b>Threshold Criteria</b>		<b>Balancing Criteria</b>				
<b>Protectiveness</b>	<b>ARARs</b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Cost</b>
						\$

**6.3.3 ARARs**

ARARs will be listed in the following table format, which includes the requirement, citation, and compliance strategy.

<b>ARARs</b>		
<b>Requirement</b>	<b>Citation</b>	<b>Compliance Strategy</b>

**6.4 Alternative 4 – Excavation and Offsite Disposal of Residuals**

**6.4.1 Description of Alternative**

The alternative will be described in sufficient detail to allow understanding of the processes.

**6.4.2 Alternative Evaluation**

The alternative evaluation will include assessment of the threshold and balancing criteria in the following table format.

Threshold Criteria		Balancing Criteria				
Protectiveness	ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost
						\$

**6.4.3 ARARs**

ARARs will be listed in the following table format, which includes the requirement, citation, and compliance strategy.

ARARs		
Requirement	Citation	Compliance Strategy

**6.5 Alternative 5 - Cover or Stabilize In Place, Employ Institutional Controls and Monitoring**

**6.5.1 Description of Alternative**

The alternative will be described in sufficient detail to allow understanding of the processes.

**6.5.2 Alternative Evaluation**

The alternative evaluation will include assessment of the threshold and balancing criteria in the following table format.

<b>Threshold Criteria</b>		<b>Balancing Criteria</b>				
<b>Protectiveness</b>	<b>ARARs</b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Cost</b>
						\$

**6.5.3 ARARs**

ARARs will be listed in the following table format, which includes the requirement, citation, and compliance strategy.

<b>ARARs</b>		
<b>Requirement</b>	<b>Citation</b>	<b>Compliance Strategy</b>

## **6.6 Original Process Waste Line, New Process Waste Lines, Sanitary Sewers and Storm Drains**

The key strategy for OPWL, NPWL, the sanitary sewer system, and storm drains is to remediate contaminated soil and associated pipelines, and stabilize in place those segments with contaminant concentrations below RFCA ALs.

### **6.6.1 Original Process Waste Lines**

The OPWL, shown on Figure \_\_, is a network of tanks, underground pipelines, and aboveground pipelines used to transport and temporarily store aqueous chemical and radioactive process wastes. The OPWL potentially transported a variety of wastes including acids, bases, solvents, radionuclides, metals, oils, PCBs, biohazards, paints, and other chemicals (DOE 1992).

The OPWL network originally consisted of approximately 35,000 feet of pipeline. Parts of the OPWL were converted to NPWL or other systems (e.g., fire plenum deluge system), and will be remediated as part of those systems. The current OPWL system contains approximately 28,638 feet of pipeline. Approximately 13,317 feet of pipeline is included in IA Group 000-2. The remaining 15,321 feet of pipeline is included in other IA Groups.

### **6.6.2 New Process Waste Lines**

The NPWL consists of pipelines, tanks, and valve vaults that overlap extensively with the OPWL. The NPWL transports low-level aqueous waste to the liquid waste treatment facility in Building 374. Based on Site utility maps, it is estimated that approximately 6,300 feet of pipeline does not overlap and is not included with OPWL.

### **6.6.3 Sanitary Sewer System**

The sanitary sewer system consists of approximately 36,480 feet of pipeline, and 25 valve vaults, pump vaults, and similar structures. This estimate includes only main pipelines. Remaining pipelines will be remediated with UBC Sites or other IHSSs or PACs.

### **6.6.4 Storm Drains**

There are 239 storm drains at RFETS. Of these, 139 are part of IA Group 000-3. The remaining 100 storm drains are part of other IA Groups. Storm drains may have been exposed to contaminated liquids because of spills, fires, contaminated surface-water runoff, and contaminated sediments. Potential wastes that have been documented in storm drains are silver paints (DOE 1992).

### **6.6.5 Remediation Strategy**

The remediation strategy for the OPWL, NPWL, sanitary sewer and storm drains consists of two approaches:

1. The sections of OPWL, NPWL, sanitary sewers, and storm drain systems associated with IHSSs, PACs, and UBC Sites will be remediated along with the IA Groups. Additionally, sections of pipeline adjacent to or close to an IHSS, PAC, or UBC Site will also be included with the IA Group remediations wherever possible. This approach will reduce planning, mobilization, and field costs and schedules. Pipeline segments that will be included with other IHSS Groups will be documented in the appropriate notification letter.
2. Remaining sections of the OPWL, NPWL, sanitary sewers, and storm drain system will be remediated as infrastructure constraints are eliminated or reduced. Remediation of soil and pipelines will be based on the in-process approach to characterization and confirmation sampling. Where soil is contaminated above Tier I ALs, the soil and associated pipeline will be excavated. In areas where the soil is not contaminated above Tier I, the pipeline will be stabilized by foaming or grouting.

### **6.7 Foundation Drains**

Foundation drains are associated with many RFETS buildings and are used to intercept and transport groundwater from the buildings. The intercepted water is discharged to either a storm sewer, sanitary sewer, building sump, or surface outfall. If contamination above RFCA Tier I ALs is found in foundation drains, they will be remediated.

Associated building sumps and surface outfalls will also be remediated, if necessary. Associated storm and sanitary sewers will be addressed according to section 6.2.5.

### **6.8 Backfilling**

Excavations will be backfilled, as necessary. Three potential backfill materials considered are:

- Recycled concrete;
- Onsite soil; and
- Offsite soil.

Backfill material will be characterized to ensure that backfill meets appropriate standards.

- Concrete – meet free release criteria
- Onsite Soil – below Tier I.
- Offsite Soil – consistent with regional background
- Backfilling materials will be staged onsite as necessary.

#### **6.8.1 Stabilization**

Remediated areas will be stabilized, as necessary, to prevent erosion.

## **6.8.2 Revegetation**

Remediated areas will be revegetated as necessary to prevent erosion.

## **6.9 Contingency Planning**

During excavation at IHSSs, PACs, and UBC sites, the potential exists for uncovering unanticipated materials. Potential unanticipated materials could include drums with unknown constituents, pipes and utilities, debris (construction debris – concrete, asphalt, wood, steel components), and classified material.

Materials will be evaluated and tested as necessary to determine appropriate disposal.

## **6.10 Environmental Protection and Monitoring**

Uncontrolled releases of contaminants to the environment, including fugitive dust and erosion, will be controlled. Air, surface water, groundwater, and ecological monitoring will be conducted during implementation of RSOP activities. ER RSOP activities will be integrated with IMP activities and requirements, and actions will be taken when air and surface water quality standards are exceeded at points of evaluation. Descriptions of protective measures and monitoring are listed in Table \_\_\_\_.

## **6.11 Material Handling**

Waste will be handled from the point of excavation to the point of storage prior to shipment off site. Potential waste forms include low-level, low-level mixed, hazardous, and Toxic Substance Control Act (TSCA) waste. Handling of soil, concrete, asphalt, and miscellaneous materials (drums, debris, piping, wood, personal protective equipment [PPE], etc.).

### **6.11.1 Soil**

Excavated soil will be shipped to an appropriate waste disposal facility. ER will coordinate waste sampling with Material Stewardship to facilitate shipment directly from the point of generation. Soil not destined for offsite disposal will be managed according to the Soil Management RSOP.

### **6.11.2 Concrete**

Concrete, including building slabs and sidewalks, will be dispositioned according to the Concrete RSOP.

### **6.11.3 Asphalt**

Asphalt from roads and parking areas will be removed. Clean asphalt will be recycled onsite or sent offsite to a sanitary landfill. Asphalt with contamination above remedial goals will be shipped to an appropriate offsite waste disposal facility. Asphalt not destined for offsite disposal will be managed according to the Soil Management RSOP.

#### **6.11.4 Miscellaneous Materials**

Miscellaneous materials including debris will be tested to determine appropriate disposal options.

#### **6.12 Waste Management**

This section describes waste management requirements and final anticipated disposition of all waste streams, including secondary waste, generated under this RSOP. Discussion will include ARARs.

#### **6.13 Closure Report**

A closure report will be written for each IHSS Group remediation. Additionally, each IHSS, PAC, and UBC site will be individually dispositioned through the HRR process. A closure report outline is shown on Figure \_\_\_\_.

## **7.0 REMEDIAL ALTERNATIVES – GROUNDWATER**

This section provides a description of the proposed actions including the scope of the actions, the proposed methodologies, cleanup levels, and Site restoration requirements.

The RSOP will address the remedial decision for groundwater but not the design of the remediation system. The remedial technology design will be submitted separately, as required.

Based on the nature and extent of the contaminant plume, four remediation alternatives will be evaluated:

- Alternative 1 - Monitored natural attenuation
- Alternative 2 - Passive barriers
- Alternative 3 - In-situ treatment
- Alternative 4 - Groundwater extraction and treatment

**7.1 Alternative 1 – Monitored Natural Attenuation**

**7.1.1 Description of Alternative**

The alternative will be described in sufficient detail to allow understanding of the processes.

**7.1.2 Alternative Evaluation**

The alternative evaluation will include assessment of the threshold and balancing criteria in the following table format.

<b>Threshold Criteria</b>		<b>Balancing Criteria</b>				
<b>Protectiveness</b>	<b>ARARs</b>	<b>Long-Term Effectiveness</b>	<b>Reduction of Toxicity, Mobility, or Volume</b>	<b>Short-Term Effectiveness</b>	<b>Implementability</b>	<b>Cost</b>
						\$

**7.1.3 ARARs**

ARARs will be listed in the following table format, which includes the requirement, citation, and compliance strategy.

<b>ARARs</b>		
<b>Requirement</b>	<b>Citation</b>	<b>Compliance Strategy</b>

**7.2 Alternative 2 – Passive Barriers**

**7.2.1 Description of Alternative**

The alternative will be described in sufficient detail to allow understanding of the processes.

**7.2.2 Alternative Evaluation**

The alternative evaluation will include assessment of the threshold and balancing criteria in the following table format.

Threshold Criteria		Balancing Criteria				
Protectiveness	ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost
						\$

**7.2.3 ARARs**

ARARs will be listed in the following table format, which includes the requirement, citation, and compliance strategy.

ARARs		
Requirement	Citation	Compliance Strategy

### 7.3 Alternative 3 – In-situ Treatment

#### 7.3.1 Description of Alternative

The alternative will be described in sufficient detail to allow understanding of the processes.

#### 7.3.2 Alternative Evaluation

The alternative evaluation will include assessment of the threshold and balancing criteria in the following table format.

Threshold Criteria		Balancing Criteria				
Protectiveness	ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost
						\$

#### 7.3.3 ARARs

ARARs will be listed in the following table format, which includes the requirement, citation, and compliance strategy.

ARARs		
Requirement	Citation	Compliance Strategy

**7.4 Alternative 4 – Groundwater Extraction and Treatment**

**7.4.1 Description of Alternative**

The alternative will be described in sufficient detail to allow understanding of the processes.

**7.4.2 Alternative Evaluation**

The alternative evaluation will include assessment of the threshold and balancing criteria in the following table format.

Threshold Criteria		Balancing Criteria				
Protectiveness	ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost
						\$

**7.4.3 ARARs**

ARARs will be listed in the following table format, which includes the requirement, citation, and compliance strategy.

ARARs		
Requirement	Citation	Compliance Strategy

## **7.5 Environmental Protection and Monitoring**

ER RSOP activities will be integrated with IMP activities and requirements, and actions will be taken when air and surface water quality standards are exceeded at points of evaluation. Descriptions of protective measures and monitoring are listed in Table \_\_\_\_.

## **7.6 Material Handling**

Wastewater from groundwater treatment will be managed.

## **7.7 Waste Management**

This section describes waste management requirements and final anticipated disposition of all waste streams, including secondary waste, generated under this RSOP. Discussion will include ARARs.

## **7.8 Closure Report**

A closure report will be written.

## **8.0 WORKER HEALTH AND SAFETY**

This section includes a brief description of the basis for the health and safety plan (HASP) requirements, the hazards, monitoring requirements, PPE, and actions to protect human health. An action-specific HASP and Job Hazard Analysis (JHA) will be prepared separately.

## **9.0 ENVIRONMENTAL CONSEQUENCES**

National Environmental Policy Act (NEPA) values and the potential environmental consequences associated with RSOP activities include the following:

- Soils and geology;
- Air quality;
- Water quality;
- Human health and safety;
- Ecological resources;
- Historical resources;
- Visual resources;
- Noise;
- Transportation;

- Unavoidable adverse impacts;
- Short-term uses versus long-term effects; and
- Irreversible and irretrievable commitments.

## **10.0 PUBLIC PARTICIPATION**

Stakeholder input to the ER RSOP is solicited and received through the formal RFCA RSOP review process, which incorporates the requirements of CERCLA and RCRA; and public meetings.

Public meetings including:

- The Citizens Advisory Board (CAB);
- The Rocky Flats Water Working Group;
- The Rocky Flats Coalition of Local Governments; and
- The Rocky Flats Cleanup Agreement Stakeholders Focus Group.

## **11.0 IMPLEMENTATION SCHEDULE**

The ER RSOP implementation schedule is based on the Project Closure Baseline and is shown in Figure \_\_\_\_\_. The timing of remedial actions is provided for informational purposes and may change based on the D&D schedules and if acceleration opportunities arise. Project-specific schedules will be included in the notification letter.

## **12.0 ADMINISTRATIVE RECORD**

The AR will contain an ER RSOP file for this decision document and a file for each IHSS Group that requires remediation.

After completion of the public comment period, the comments received from the public and the subsequent responsiveness summary as well as the document approval letter will be added to the AR file. Approval of the RSOP by the regulators constitutes approval of the RSOP's AR file. Each individual project (IHSS, PAC, and UBC site) will have its own AR file. A list of documents making up the AR file for the individual project will be included in the notification letter.