

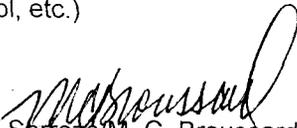
# ER/WM&I DDT

RFCA Milestone

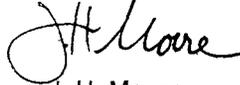
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## Document Subject:

TRANSMITTAL OF THE "INDUSTRIAL AREA CHARACTERIZATION AND REMEDIATION STRATEGY, RF/RMRS-99-419" - JWP-040-99

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September 27, 1999

## Discussion and/or Comments:

At the instruction of Kaiser-Hill, the "*Industrial Area Characterization and Remediation Strategy RF/RMRS-99-419*" has been transmitted to RMRS Document Control for controlled distribution. As per direction from DOE to Kaiser-Hill, twenty-four (24) uncontrolled copies of the document were delivered to DOE this date (as well as electronic files), for distribution to EPA, CDPHE, CAB and the Reading Rooms.

Comments have been received from EPA, CDPHE and the stakeholders and have been incorporated into this document.

If you have any questions concerning this transmittal, please contact Susan Serreze at extension 2677.

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RMRS Records



ADMIN RECORD

IA-A-000555



# Industrial Area Characterization and Remediation Strategy



September 1999

ADMIN RECORD

2

# Industrial Area Characterization and Remediation Strategy

Rocky Mountain Remediation Services, L.L.C.  
and  
Kaiser-Hill Company, L.L.C.

Rocky Flats Environmental Technology Site

September 1999

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By B. W. Hoffman

Date 9-29-99

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Appendix B	Comment Response (to be provided at a later date)
Appendix C	Annual Updates (to be provided at a later date)

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## Acronyms

AL	action level
ALF	Action Levels and Standards Framework for Surface Water, Ground Water, and Soils
Am	americium
AME	Actinide Migration Evaluation
AR	Administrative Record
ARAR	applicable or relevant and appropriate requirement
ASD	Analytical Services Division
BZ	Buffer Zone
CAA	Clean Air Act
CAB	Citizens Advisory Board
CAD/ROD	Corrective Action Decision/Record of Decision
CAMU	corrective action management unit
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHWA	Colorado Hazardous Waste Act
CPB	Closure Project Baseline
CRA	comprehensive risk assessment
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FY	fiscal year
GIS	Geographic Information System
H&S	health and safety
HASP	Health and Safety Plan
HRR	Historical Release Report
IA	Industrial Area
IA Strategy	IA Characterization and Remediation Strategy
IASAP	IA Sampling and Analysis Plan
IHSS	individual hazardous substance site
IM/IRA	interim measure/interim remedial action
IMP	Integrated Monitoring Plan
ISMS	Integrated Safety Management System
MARSSIM	Multi-Agency Radiation Survey and Site Assessment Investigation Manual
MNA	monitored natural attenuation
NEPA	National Environmental Policy Act
NFA	no further action
NPL	National Priorities List
NPWL	new process waste lines
OPWL	original process waste lines
OU	operable unit
PA	Protected Area

**Acronyms (continued)**

PAC	potential area of concern
PAM	proposed action memorandum
PCB	polychlorinated biphenyl
PCOC	potential contaminant of concern
PPE	personal protective equipment
Pu	plutonium
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
R&D	research and development
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFCLOG	Rocky Flats Coalition of Local Governments
RFETS	Rocky Flats Environmental Technology Site
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RSOP	RFCA Standard Operating Protocol
SAP	Sampling and Analysis Plan
SEP	Solar Evaporation Ponds
SOW	Statement of Work
SWD	Soil Water Database
TRU	transuranic
U	uranium
UBC	under-building contamination
VOC	volatile organic compound
WAC	waste acceptance criteria

*Environmental remediation of the IA is a major step toward closing RFETS in 2006.*

## **1.0 Introduction**

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Most of the remaining cleanup effort at the Rocky Flats Environmental Technology Site (RFETS or Site) will take place in the Industrial Area (IA), and will be the final major activity leading to Site closure. This IA Characterization and Remediation Strategy (IA Strategy) describes the path forward for closure of the IA Operable Unit (OU) at RFETS, and the integration of this effort with overall Site closure.

The current focus of remediation in the IA is the decommissioning of buildings and associated support structures. The IA Strategy addresses the integration of decommissioning and environmental remediation, but is focused on post-decommissioning remediation. This includes characterization and remediation of surface soil, subsurface soil, and groundwater (including that beneath buildings).

The IA includes approximately 350 acres at the geographic center of RFETS, as illustrated on Figure 1. The IA is occupied by 400 buildings, other structures, roads, and utilities, and is where the bulk of RFETS mission activities took place between 1951 and 1989 (DOE, 1996). Most of the buildings and associated structures were used for historic processing activities associated with weapons production.

Materials defined as hazardous substances by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and materials defined as hazardous waste and hazardous constituents by the Resource Conservation and Recovery Act (RCRA) and/or Colorado Hazardous Waste Act (CHWA) have been released to the environment at various locations at RFETS. In the IA, these releases were identified at 194 individual hazardous substance sites (IHSSs), potential areas of concern (PACs), and under-building contamination (UBC) sites, as illustrated on Plate 1.

The bibliography in Appendix A presents sources for additional information on RFETS history, geology, hydrology, and hydrogeology, and lists previous characterization and remediation reports.

### **1.1 Purpose and Objectives**

The purpose of the IA Strategy is to provide a roadmap for final closure of the IA, and ensure full integration of remediation efforts, including facility decommissioning, characterization, remediation, and regulatory agency and stakeholder participation. The IA Strategy has been developed to provide the U.S. Department of Energy (DOE), Colorado Department of Public Health

*The IA Strategy is the path forward for IA remediation.*

and Environment (CDPHE), and U.S. Environmental Protection Agency (EPA) (Rocky Flats Cleanup Agreement [RFCA] Parties), and stakeholders with a clear understanding of the decisions that need to be made to close the IA. Because future decisions related to technical, regulatory, policy, and stakeholder issues will be based on complex information, the IA Strategy also discusses how the information will be collected and used to facilitate those decisions.

The IA Strategy is not a decision document and does not provide detailed information about the Site, nor does it address all potential remediation issues. Specific objectives of the IA Strategy include the following:

- Define a closure approach consistent with the overall RFETS final 2006 closure strategy;
- Support a risk and dose assessment approach to describe the contribution of the IA to the overall RFETS final risk profile;
- Identify cost-effective remediation strategies that meet RFCA cleanup standards while minimizing generation of remediation waste;
- Ensure the performance of appropriate closure-driven characterization;
- Ensure that characterization and remediation do not pose unacceptable risks to the citizens of Colorado or Site workers;
- Enable accurate forecasting of budget needs and baseline updates for closure of the IA OU;
- Ensure full integration and use of data from other Site programs; and
- Identify internal and regulatory challenges to closure.

## **1.2 IA Strategy**

Remediation of the IA is an important part of overall Site closure. Site closure, as illustrated on Figure 2, includes remediation of the IA and Buffer Zone (BZ), and development of a RCRA Facility Investigation/Remedial Investigation (RFI/RI), comprehensive risk assessment (CRA), and Corrective Action Decisions/Records of Decision (CAD/ROD[s]). IA remediation will be conducted simultaneously with BZ remediation.

After remediation activities are complete, DOE will develop a CRA to verify that potential contamination remaining at RFETS is within acceptable risk levels as defined by CERCLA and implemented through RFCA. The CRA should support the final CAD/ROD(s) and DOE recommendation to EPA and

**Strategy**

Integrate regulatory and technical strategies to achieve 2006 closure through streamlining schedules and eliminating unnecessary or redundant efforts.

*RFCA is the RFETS regulatory framework that integrates CERCLA and RCRA corrective action obligations.*

CDPHE to have RFETS delisted from the National Priorities List (NPL). The final CAD/ROD(s) will include post-closure monitoring and operations requirements, including 5-year requirements for reviews of the Site to evaluate whether the remedies, including any institutional controls, are effective.

The major components of the IA Strategy are the (1) regulatory framework, (2) decision framework, (3) characterization and remediation approach, and (4) project interfaces. The regulatory framework describes key RFETS regulatory guidance as specified in RFCA. The decision framework guides when and how decisions will be made during IA characterization and remediation. The characterization and remediation approach includes strategies to streamline and accomplish the technical work in the IA. The project interfaces component describes approaches for coordination among all appropriate RFETS organizations and stakeholders. IA strategies are summarized in Figure 3 and discussed in the appropriate section.

## **2.0 Regulatory Framework**

Because many of the IA and overall Site closure activities are regulatory requirements, a brief description of the regulatory framework is important to understand how IA activities fit in with overall Site closure.

The Rocky Flats Vision, presented in RFCA (Appendix 9), guides all Site activities. The Vision for RFETS includes:

- Achieving accelerated cleanup and closure of RFETS in a safe, environmentally protective manner, in compliance with applicable state and federal environmental laws;
- Ensuring that RFETS does not pose an unacceptable risk to the citizens of Colorado or Site workers from either contamination or an accident; and
- Working toward the disposition of contamination, wastes, buildings, facilities, and infrastructure from RFETS, consistent with community preferences and national goals.

RFCA, signed by DOE, EPA, and CDPHE on July 19, 1996, is consistent with the Vision and provides the regulatory framework for the cleanup of RFETS (DOE, 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. At the completion of all accelerated actions, DOE will prepare a no-further-action (NFA) CAD/ROD to support delisting of RFETS from the NPL.

*Technical and regulatory decisions will be made throughout the closure process.*

*CERCLA and RCRA corrective action requirements must be met for Site closure.*

RFCA provides the regulatory framework for DOE response obligations under CERCLA and corrective action obligations under RCRA. RFCA also provides the regulatory framework for activities not regulated under the Federal Facility Compliance Act for treatment of mixed wastes generated by RFCA-regulated activities.

### **3.0 Decision Framework**

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The decision framework, described in Figure 4 and Table 1, provides a guide for when and how decisions will be made during IA characterization and remediation. The IA remediation goal is to achieve an endstate that is protective of human health and the environment. Decisions needed to reach this goal include final cleanup levels, final configuration of the IA, and appropriate characterization and remediation techniques.

The decision framework incorporates and links regulatory decisions, data inputs, technical decisions, and IA activities (Figure 4). Although the decision framework does not provide actual dates for decisions or activities, it illustrates when decisions and activities occur in the process. All decisions, data inputs, and IA activities support closure of the IA.

Key decisions in the decision framework are (1) early decisions on risk assessment methodology, (2) decisions on waste storage issues, and (3) decisions that affect the RFI/RI, CRA, and CAD/ROD(s). Decisions related directly to IA activities, such as the need for remediation at a specific IA Group, are integrated with the IA activities.

#### **3.1 Site Closure**

Closure of the IA at RFETS is an important and pivotal step toward total Site closure. The ability to close the IA on time will impact the entire RFETS closure process. In order for the Site to be closed and delisted from the NPL, specific analyses must be conducted and specific documents must be developed under the RFCA process. Much of what needs to be accomplished is a combination of regulatory and technical requirements.

Specific requirements of the RFCA process include the following:

- Characterize the IA, as necessary, to make remediation decisions;
- Develop an RFI/RI document that describes the Site and contaminants;
- Develop a decision document for each accelerated action to describe the treatment and/or remediation;
- Remediate the IA and/or treat wastes as necessary;

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**Table 1  
Industrial Area Decision Framework**

Framework Element	Activity, Data, and Decision Details	Responsibility
<ul style="list-style-type: none"> <li>Use Future Land Use Scenario for the IA and Site</li> </ul>	<p>RFETS may be designated as either limited industrial use or open space. Currently, the RFCA land use scenario is guiding decisions.</p>	<p>RFCA Parties and Stakeholders</p>
<ul style="list-style-type: none"> <li>Decide on Need for RFI/RI</li> </ul>	<p>RFI/RI may be needed for both the IA and BZ. One combined RFI/RI may be adequate, or there may not be a need for any RFI/RI.</p>	<p>RFCA Parties</p>
<ul style="list-style-type: none"> <li>Decide on Applicability of MARSSIM</li> </ul>	<p>Evaluate whether the MARSSIM approach is applicable to the IA risk assessment.</p>	<p>DOE with Regulatory Agency Concurrence</p>
<ul style="list-style-type: none"> <li>Evaluate Risk and Dose Assessment Methodology</li> </ul>	<p>Evaluate risk and dose assessment methodology in light of RFCA future land use, including exposure units and receptors. Use this information as input into DQO development.</p>	<p>DOE with Regulatory Agency Concurrence</p>
<ul style="list-style-type: none"> <li>Develop IA DQOs and SAP</li> </ul>	<p>The overall IA DQO data requirements will guide the SAP.</p>	<p>DOE with Regulatory Agency Approval</p>
<ul style="list-style-type: none"> <li>Evaluate whether the SAP addenda meet IA DQOs</li> </ul>	<p>If the IA Group SAP addenda meets IA DQO decision requirements, characterization will begin.</p>	<p>DOE with Regulatory Agency Approval</p>

**Table 1 (continued)  
Industrial Area Decision Framework**

Framework Element	Activity, Data, and Decision Details	Responsibility
<ul style="list-style-type: none"> <li>Characterize IA Groups</li> </ul>	<p>Field sampling will be used to characterize the IA. Resulting analytical data will be used for remediation decisions, the RFU/RI, and the CRA.</p>	DOE
<ul style="list-style-type: none"> <li>Compare PCOCs to RFCA ALs</li> </ul>	<p>Exposure areas with PCOCs greater than Tier I values will trigger an action decision.                      Exposure areas with PCOCs less than Tier II values will trigger the NFA process.                      Exposure areas with PCOCs less than Tier I and greater than Tier II values will be evaluated for potential action decisions.</p>	DOE with Regulatory Agency Concurrence
<ul style="list-style-type: none"> <li>Evaluate Remediation Options</li> </ul>	<p>Remediation options will be evaluated to determine appropriate actions.</p>	DOE with Regulatory Agency Concurrence
<ul style="list-style-type: none"> <li>Develop Decision Document</li> </ul>	<p>The decision document will describe the remedial action.</p>	DOE with Regulatory Agency Approval and Stakeholder Review
<ul style="list-style-type: none"> <li>Decide on Waste Storage Options</li> </ul>	<p>Waste storage options will be identified as necessary.</p>	DOE
<ul style="list-style-type: none"> <li>Decide on Need for CAMU</li> </ul>	<p>A CAMU may be evaluated for additional waste storage.</p>	DOE
<ul style="list-style-type: none"> <li>Apply Remedy</li> </ul>	<p>Appropriate remedial actions will be carried out.</p>	DOE

**Table 1 (continued)  
Industrial Area Decision Framework**

Framework Element	Activity, Data, and Decision Details	Responsibility
<ul style="list-style-type: none"> <li>Perform Confirmation Sampling</li> </ul>	<p>Samples will be collected and analyzed from remediated areas.</p>	DOE
<ul style="list-style-type: none"> <li>Are PCOCs &lt; RFCA Tier I values?</li> </ul>	<p>If PCOCs are less than Tier I values, a decision on whether remediation goals have been achieved will be made.</p>	DOE with Regulatory Agency Representatives
<ul style="list-style-type: none"> <li>Evaluate Whether Remediation Goals Have Been Achieved?</li> </ul>	<p>If remediation goals have been met, a closeout report will be prepared. If not, continued remediation may be required.</p>	DOE with Regulatory Agency Concurrence
<ul style="list-style-type: none"> <li>Decide on Need for Caps or Covers</li> </ul>	<p>Caps or covers may be needed to reduce erosion and protect surface water resources.</p>	DOE
<ul style="list-style-type: none"> <li>Develop Closeout Report</li> </ul>	<p>The closeout report will describe the remedial action and confirmation sampling results.</p>	DOE with Regulatory Agency Approval and Stakeholder Review
<ul style="list-style-type: none"> <li>Develop RFI/RI and CRA</li> </ul>	<p>The RFI/RI will describe results of the characterization and baseline risks. The CRA will describe potential risks, if any, from the remediated area.</p>	DOE
<ul style="list-style-type: none"> <li>Develop CAD/ROD(s)</li> </ul>	<p>The CAD/ROD (s) will describe closure and post-closure activities of the IA and Site, and will be based on information in decision documents, the RFI/RI, and the CRA.</p>	DOE with Regulatory Agency Approval and Stakeholder Review

**Table 1 (continued)  
Industrial Area Decision Framework**

Framework Element	Activity, Data, and Decision Details	Responsibility
<ul style="list-style-type: none"> <li>Complete IA Closure</li> </ul>	<p>Closure of the IA and Site will result in recommendations to delist the Site from the NPL.</p>	<p>RFCA Parties and Stakeholder Review</p>
<ul style="list-style-type: none"> <li>Perform Post-Closure Activities</li> </ul>	<p>Post-closure activities include ongoing operations, monitoring, and 5-year reviews.</p>	<p>DOE with Regulatory Agency Review</p>

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*The IA Strategy incorporates the RFCA future conceptual land use scenario.*

- Develop a closeout report for each accelerated action that describes the remediation and/or treatment, and includes documentation that the accelerated action has been performed;
- Develop NFA justifications, as appropriate;
- Develop a CRA that includes risks from the IA and BZ;
- Ensure the safety of the workers and public, as well as environmental compliance during remediation and closure; and
- Develop a CAD/ROD(s) that describes post-closure actions at the Site.

### 3.2 Future Land Use

The current future conceptual land use scenario for RFETS is shown on Figure 5, and described in RFCA Attachment 5, Figure 1, Action Levels and Standards Framework for Surface Water, Ground Water, and Soils (ALF). Of the total area shown on the map, 78 acres are identified as industrial use (southwestern corner of the current IA) and the remaining area is designated as open space. Cleanup actions, to date, have been consistent with this scenario.

The RFCA Parties and stakeholders are currently discussing future land use of RFETS, and a final decision has not been made. DOE will develop risk assessment methodologies and data quality objectives (DQOs) to accommodate several land uses (see Section 4.3).

### 4.0 Characterization and Remediation Approach

The overall strategy is presented on Figure 6. The IA Strategy combines technical activities with sitewide activities and policy decisions that provide a framework and guidance for making decisions, developing policy, and conducting key IA activities. Key IA activities, shown in the middle of Figure 6, are supported by the bulleted activities above and important policy decisions below. Ongoing or planned sitewide activities that support IA and RFETS closure are shown above and below the main body of Figure 6 as Stewardship and Environmental Monitoring, and Sitewide Activities.

The major technical activities that will be conducted to achieve Site closure are characterization and remediation of the IA. Strategies that protect human health and the environment, and reduce time and cost yet remain focused on meeting IA DQOs, will be implemented. These strategies are built around the grouping of IHSSs, PACs, and UBC sites, and their integration with the decommissioning.

#### Strategy

Group IHSSs, PACs, and UBC sites into the decommissioning project structure.

## 4.1 Grouping of Sites

The 194 IHSSs, PACs, and UBC sites in the IA were consolidated into 58 IA Groups using the following criteria:

- Dependency on decommissioning activities;
- Decommissioning schedule;
- Physical proximity to decommissioning activities and/or each other; and
- Potential contaminants of concern (PCOCs).

This grouping provides a consistent scheduling mechanism centered on the decommissioning schedule, and enables streamlining of decision document and sampling activities. The IA Groups were defined using the following decision criteria:

- (1) Can characterization of the UBC site be combined with other UBC sites based on similar PCOCs, schedule, or proximity?
- (2) Is characterization or potential remediation of the IHSS, PAC, original process waste lines (OPWL), or tank dependent on decommissioning activities because of its proximity to UBC sites or other infrastructure elements?
- (3) Is the IHSS or PAC of such a high priority that it must be characterized or remediated immediately?
- (4) Is the IHSS, PAC, UBC site, OPWL, or tank a potential NFA site?

The consolidated IA Groups, along with their building decommissioning dependency and grouping strategy, are listed in Table 2 and illustrated on Plate 2.

Since 1995, the RFCA Environmental Restoration (ER) Ranking has been used to address high-risk sites before low-risk sites. Because most of the high-risk sites have been addressed or are scheduled for action, future remedial actions will be addressed through the IA grouping. This approach allows IA remediation to be integrated with decommissioning, and also makes optimal use of resources. Through the decommissioning program, RFETS will address high-risk sites by removing nuclear materials and associated buildings.

### 4.1.1 No-Further-Action Sites

There are 60 potential NFA sites in 35 IA Groups. Some NFA sites were designated in stand-alone groups (100-3, 100-5, 300-2, 300-5, 300-6, 500-2, 500-6, 500-7, 600-2, 600-3, 600-5, 600-6, 700-6, 700-8, 700-10, 700-12,

**Table 2  
Industrial Area Groups**

IA Group	Description	IHSS/PAC/UBC	Decommissioning Dependency	Grouping Logic
000-1	Solar Ponds	000-101	Building 778	Grouped together because of proximity and association with Solar Evaporation Ponds
	Effluent Line	700-149.1		
	Effluent Line	700-149.2		
	Triangle Area	900-165		
	S&W Contractor Yard	000-176		
	ITS Water Spill (formerly 000-502)	900-1310		
000-2	OPWL	000-121	Infrastructure Removal	All are part of the same IHSS consisting of OPWLs not associated with buildings
	Valve Vault West of Building 707	700-123.2		
	Building 123 Process Waste Line Break	100-602		
	Tank 29 - OPWL	000-121		
	Tank 31 - OPWL	000-121		
	Low-Level Radioactive Waste Leak	700-127		
	Process Waste Line Leaks	700-147.1		
	Radioactive Site 700 Area	700-162		
000-3	Sanitary Sewer System	000-500	Infrastructure Removal	Grouped together because all are IHSSs/PACs that extend across IA
	Storm Drains			
	Old Outfall - Building 771	700-143		
	Central Avenue Ditch Caustic Leak	000-190		
000-4	New Process Waste Line		Infrastructure Removal	NPWL are separated from other lines because they may have not been in use as long
100-1	UBC 122 - Medical Facility	UBC 122	Building 122	Grouped together with UBC sites because tank is adjacent to building
100-2	Tank 1 - OPWL - Underground Stainless Steel Waste Storage Tank	000-121		
	UBC 125 - Standards Laboratory	UBC 125	Building 125	No associated IHSSs/PACs
100-3	Building 111 Transformer PCB Leak	100-607	Building 111	Not near any other IHSSs/PACs/UBC sites
100-4	UBC 123 - Health Physics Laboratory	UBC 123	None	Grouped with UBC sites because of proximity and building spills
	Waste Leaks	100-148		
	Building 123 Bioassay Waste Spill	100-603		
	Building 123 Scrubber Solution Spill	100-611		
100-5	Building 121 Security Incinerator	100-609	None	Contains unique PCOCs

Potential NFAs are shaded

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**Table 2 (continued)  
Industrial Area Groups**

IA Group	Description	IHSS/PAC/UBC	Decommissioning Dependency	Grouping Logic
300-1	Oil Burn Pit #1	300-128	Building 335	Grouped together because of proximity and overlap
	Lithium Metal Site	300-134(N)		
	Solvent Burning Grounds	300-171		
300-2	UBC 331 - Maintenance	UBC 331	Building 333	Grouped because of D&D dependence, proximity, and overlap
	Lithium Metal Destruction Site	300-134(S)		
300-3	UBC 371 - Plutonium Recovery	UBC 371	Building 371	Not grouped with other UBC sites to allow flexibility in the D&D schedule
300-4	UBC 374 - Waste Treatment Facility	UBC 374	Building 374	Not grouped with 300-3 to allow flexibility in the D&D schedule
300-5	Inactive D-836 HW Tank	300-206		Not grouped - potential NFA site
300-6	Pesticide Shed	300-702		Not grouped - potential NFA site, not near other sites
400-1	UBC 439 - Radiological Survey	UBC 439	Building 439	Not grouped so that UBC site is not dependent on other building decommissioning
400-2	UBC 440 - Modification Center	UBC 440	Building 440	Not grouped so that UBC site was not dependent on other building decommissioning
400-3	UBC 444 - Fabrication Facility	UBC 444	Buildings 444 and 447	Grouped together because of D&D dependence and proximity
	UBC 447 - Fabrication Facility	UBC 447		
	West Loading Dock Building 447	400-116.1		
	Cooling Tower Pond West of Building 444	400-136.1		
	Cooling Tower Pond East of Building 444	400-136.2		
	Buildings 444/453 Drum Storage	400-182		
	Inactive Building 444 Acid Dumpster	400-207		
	Inactive Buildings 444/447 Waste Storage Site	400-208		
	Transformer, Roof of Building 447	400-801		
	Beryllium Fire - Building 444	400-810		
	Tank 4 - OPWL Process Waste Pits	000-121		
	Tank 5 - OPWL Process Waste Tanks	000-121		
	Tank 6 - OPWL Process Waste Floor Sump and Foundation Drain Floor	000-121		
	South Loading Dock Building 444	400-116.2		
	Miscellaneous Dumping, Building 460 Storm Drain	400-803	Buildings 439, 440, 444, and 447	
Road North of Building 460	400-804			

Potential NFAs are shaded

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**Table 2 (continued)  
Industrial Area Groups**

LA Group	Description	IHSS/PAC/UBC	Decommissioning Dependency	Grouping Logic
400-5	Sump #3 Acid Site (Southeast of Building 460)	400-205	Building 460	Grouped together because of proximity, and to add flexibility to schedule
	RCRA Tank Leak in Building 460	400-813		
	RCRA Tank Leak in Building 460	400-815		
400-6	Radioactive Site South Area	400-157.2	Buildings 460, 439, 440, 444, and 447	Not grouped to allow flexibility in schedule
400-7	UBC 442 - Filter Test Facility	UBC 442	Buildings 442 and 443	Grouped together because of D&D dependence and proximity
	Radioactive Site North Area	400-157.1		
	Building 443 Oil Leak	400-129		
	Sulfuric Acid Spill Building 443	400-187		
400-8	UBC 441 - Office Building	UBC 441	Building 441	Grouped together because of D&D dependence and proximity
	Underground Concrete Tank	400-122		
	Tank 2 - Concrete Waste Storage Tank	000-121		
	Tank 3 - Concrete Waste and Steel Waste Storage Tanks	000-121		
400-10	Sandblasting Area	400-807		Grouped together because of proximity
	Fiberglass Area West of Building 664	600-120.2		
	Radioactive Site West of Building 664	600-161		
500-1	Valve Vaults 11, 12, 13	300-186	PA fence, Building 374	Grouped together because of D&D dependence and proximity
	Scrap Metal Storage Site	500-197		
	North Site Chemical Storage Site	500-117.1		
500-2	Radioactive Site Building 551	500-158	Building 551	D&D dependent
500-3	UBC 559 - Service Analytical Laboratory	UBC 559	Buildings 559 and 561	Grouped together because of D&D dependence
	UBC 528 - Temporary Waste Holding Building	UBC 528		
	Radioactive Site Building 559	500-159		
	Tank 7 - OPWL - Active Process Waste Pit	000-121		
	Tank 33 - OPWL - Process Waste Tank	000-121		
	Tank 34 - OPWL - Process Waste Tank	000-121		
	Tank 35 - OPWL - Building 561 Concrete Floor Sump	000-121		
500-4	Middle Site Chemical Storage	500-117.2		Not D&D dependent and unlike nearby IHSSs
500-5	Transformer Leak - 558-1	500-904		Not grouped because PCOCs different from surrounding IHSSs
500-6	Asphalt Surface Near Building 559	500-906		Not grouped - potential NFA site

Potential NFAs are shaded

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Table 2 (continued)  
Industrial Area Groups

IA Group	Description	IHSS/PAC/UBC	Decommissioning Dependency	Grouping Logic
500-7	Tanker Truck Release of Hazardous Waste from Tank 231B	500-907		Not grouped - potential NFA site
600-1	Temporary Waste Storage - Building 663	600-1001	Building 663	D&D dependent
600-2	Storage Shed South of Building 334	400-802	T452A, B, F, and G Trailers	Not grouped - potential NFA site
600-3	Fiberglass Area North of Building 664	600-120.1	Building 668	Not grouped - potential NFA site
600-4	Radioactive Site Building 444 Parking Lot	600-160		Not D&D dependent
600-5	Central Avenue Ditch Cleaning	600-1004		Not grouped - potential NFA site
600-6	Former Pesticide Storage Area	600-1005		Not grouped - potential NFA site not near other sites
700-1	Identification of Diesel Fuel in Subsurface Soil	700-1115	Building 708	D&D dependent but not associated with major 700 area buildings
700-2	UBC 707 - Plutonium Fabrication and Assembly	UBC 707	Buildings 707 and 731	Grouped because of D&D dependence and proximity
	UBC 731 - Building 707 Process Waste	UBC 731		
	Tank 11 - OPWL - Building 731	000-121		
	Tank 30 - OPWL - Building 731	000-121		
700-3	UBC 776 - Original Plutonium Foundry	UBC 776	Buildings 776, 777, 778, and 701	Grouped because of D&D dependence, proximity, and PCOC similarities
	UBC 777 - General Plutonium Research and Development	UBC 777		
	UBC 778 - Plant Laundry Facility	UBC 778		
	UBC 701 - Waste Treatment Research and Development	UBC 701		
	Solvent Spills West of Building 730	700-118.1		
	Radioactive Site 700 Area No.1	700-131		
	Radioactive Site West of Building 771/776	700-150.2(S)		
	Radioactive Site South of Building 776	700-150.7		
	French Drain North of Building 776/777	700-1100		
	Tank 9 - OPWL - Two 22,500-Gallon Concrete Laundry Tanks	000-121		
	Tank 10 - OPWL - Two 4,500-Gallon Process Waste Tanks	000-121		
	Tank 18 - OPWL - Concrete Laundry Waste Lift Sump	000-121		
	Solvent Spills North of Building 707	700-118.2		
	Sewer Line Overflow	700-144(N)		
	Sewer Line Overflow	700-144(S)		
	Transformer Leak South of Building 776	700-1116		
	Radioactive Site Northwest of Building 750	700-150.4		

Potential NFAs are shaded

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**Table 2 (continued)  
Industrial Area Groups**

IA Group	Description	IHSS/PAC/UBC	Decommissioning/Dependency	Grouping Logic
700-4	UBC 771 - Plutonium and Americium Recovery Operations	UBC 771	Buildings 771, 774, 770, and 1771G	Grouped because of D&D dependence, proximity, and PCOCs
	UBC 774 - Liquid Process Waste Treatment	UBC 774		
	Radioactive Site West of Buildings 771/776	700-150.2(N)		
	Radioactive Site 700 North of Building 774 (Area 3) Wash Area	700-163.1		
	Radioactive Site 700 Area 3 Americium Slab	700-163.2		
	Abandoned Sump Near Building 774 Unit 55.13 T-40	700-215		
	Hydroxide Tank, KOH, NaOH Condensate	700-139(N)(b)		
	30,000-Gallon Tank (68)	700-124.1		
	14,000-Gallon Tank (66)	700-124.2		
	14,000-Gallon Tank (67)	700-124.3		
	Holding Tank	700-125		
	Westernmost Out-of-Service Process Waste Tank	700-126.1		
	Easternmost Out-of-Service Process Waste Tank	700-126.2		
	Tank 8 - OPWL - East and West Process Tanks	000-121		
	Tank 12 - OPWL - Two Abandoned 20,000-Gallon Underground Concrete Tanks	000-121		
	Tank 13 - OPWL - Abandoned Sump - 600 Gallons	000-121		
	Tank 14 - OPWL - 30,000-Gallon Concrete Underground Storage Tank (68)	000-121		
	Tank 15 - OPWL - Two 7,500-Gallon Process Waste Tanks (34W, 34E)	000-121		
	Tank 16 - OPWL - Two 30,000-Gallon Concrete Underground Storage Tanks (66, 67)	000-121		
	Tank 17 - OPWL - Four Concrete Process Waste Tanks (30, 31, 32, 33)	000-121		
Tank 36 - OPWL - Steel Carbon Tetrachloride Sump	000-121			
Tank 37 - OPWL - Steel-Lined Concrete Sump	000-121			
Caustic/Acid Spills Hydrofluoric Tank	700-139.2			
Concrete Process 7,500-Gallon Waste Tank (31)	700-146.1			
Concrete Process 7,500-Gallon Waste Tank (32)	700-146.2			
Concrete Process 7,500-Gallon Waste Tank (34W)	700-146.3			
Concrete Process 7,500-Gallon Waste Tank (34E)	700-146.4			
Concrete Process 7,500-Gallon Waste Tank (30)	700-146.5			
Concrete Process 7,500-Gallon Waste Tank (33)	700-146.6			
Radioactive Site North of Building 771	700-150.1			
Radioactive Site Between Buildings 771 and 774	700-150.3			
700-5	UBC 770 - Waste Storage Facility	UBC 770	Building 770	Not dependent on 771/774, dependent on 770

Potential NFAs are shaded

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Table 2 (continued)  
Industrial Area Groups

LA Group	Description	IHSS/PAC/UBC	Decommissioning Dependency	Grouping Logic
700-6	Buildings 712/713 Cooling Tower Blowdown	700-137	Building 713	Grouped together because of potential NFA sites and proximity
700-7	Cause/Acid Spills Hydroxide Tank Area	700-1391(S)		
	UBC 779 - Main Plutonium Components Production Facility	UBC 779	Buildings 779 and 727	Grouped together because of D&D dependence on Building 779
	Building 779 Cooling Tower Blowdown	700-138		
	Radioactive Site South of Building 779	700-150.6		
	Radioactive Site Northeast of Building B779	700-150.8		
	Transformer Leak - 779-1/779-2	700-1105		
	Tank 19 - OPWL - Two 1,000-Gallon Concrete Sumps	000-121		
	Tank 20 - OPWL - Two 8,000-Gallon Concrete Sumps	000-121		
	Tank 38 - OPWL - 1,000-Gallon Steel Tanks	000-121		
700-8	750 Pad-Pondorete/Solherete Storage	700-214	750 Pad Tents	D&D-dependent potential NFA site
700-10	Laundry Tank Overflow - Building 732	700-1101		Not grouped - potential NFA site and different PCOC
700-11	Bowman's Pond	700-1108		Grouped together because of proximity and potential for early action
700-12	Hydroxide Tank, KOH, NaOH Condensate	700-1391(N) (a)		
800-1	Process Waste Spill - Portal 1	700-1106		Not grouped - potential NFA site
	UBC 865 - Materials Process Building	UBC 865	Building 865	Grouped together because of D&D dependence
	Building 866 Spills	800-1204		
	Building 866 Sump Spill	800-1212		
	Tank 23 - OPWL	000-121		
800-2	UBC 881 - Laboratory and Office	UBC 881	Building 881	Grouped together because of D&D dependence
	Building 881, East Dock	800-1205		
	Tank 24 - OPWL - Seven 2,700-Gallon Steel Process Waste Tanks	000-121		
	Tank 32 - OPWL - 131,160-Gallon Underground Concrete Secondary Containment Sump	000-121		
	Tank 39 - OPWL - Four 250-Gallon Steel Process Waste Tanks	000-121		
800-3	UBC 883 - Roll and Form Building	UBC 883	Building 883	Grouped together because of D&D dependence
	Valve Vault 2	800-1200		
	Tank 25 - OPWL - 750-Gallon Steel Tanks (18, 19)	000-121		
	Tank 26 - OPWL - 750-Gallon Steel Tanks (24, 25, 26)	000-121		
	Radioactive Site South of Building 883	800-1201		

Potential NFAs are shaded

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**Table 2 (continued)  
Industrial Area Groups**

IA Group	Description	IHSS/PAC/UBC	Decommissioning Dependency	Grouping Logic
800-4	UBC 886 - Critical Mass Laboratory	UBC 886	Building 886	Grouped together because of D&D dependence
	Tank 21 - OPWL - 250-Gallon Concrete Sump	000-121		
	Tank 22 - OPWL - Two 250-Gallon Steel Tanks	000-121		
	Tank 27 - OPWL - 500-Gallon Portable Steel Tank	000-121		
	Radioactive Site #2, 800 Area, Building 886 Spill	800-164.2		
800-5	UBC 887 - Process and Sanitary Waste Tanks	UBC 887	Building 887	Grouped together because of D&D dependence
	Building 885 Drum Storage	800-177		
800-6	UBC 889 - Decontamination and Waste Reduction	UBC 889	Building 889	Grouped together because of D&D dependence
	Radioactive Site 800 Area Site #2 Building 889 Storage Pad	800-164.3		
	Tank 28 - Two 1,000-Gallon Concrete Sumps	000-121		
	Tank 40 - Two 400-Gallon Underground Concrete Tanks	000-121		
900-1	UBC 991 - Weapons Assembly and R&D	UBC 991	Building 991	Grouped together because of D&D dependence
	Radioactive Site Building 991	900-173		
	Radioactive Site 991 Steam Cleaning Area	900-184		
	Building 991 Enclosed Area	900-1301		
900-3	904 Pad, Ponderate Storage	900-213	904 Tents	Not grouped - potential NFA site not near other sites
900-4&5	S&W Building 980 Contractor Storage Facility	900-175		Grouped together because of potential NFA sites and proximity
	Gasoline Spill Outside of Building 980	900-1308		
SW-2	Original Landfill	SW115		Grouped together because of proximity
	Water Treatment Plant Backwash	SW196		

Potential NFAs are shaded

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*The 2006 CPB integrates decommissioning and ER activities.*

**Strategy**  
Integrate IA remediation activities with decommissioning activities.

900-3, and 900-4&5). The remaining potential NFA sites were grouped within other IA Groups using the criteria listed above. This grouping of NFA sites allows for schedule flexibility and streamlining. Stand-alone NFA groups are flexible schedule components, whereas characterization of NFA sites within IA groups is accomplished as part of a larger effort resulting in streamlining of decision documents and characterization.

Potential NFA sites were designated based on current PCOC information for the IHSSs, PACs, and UBC sites. All potential NFA sites will be characterized and subsequently documented in the Annual Update to the Historical Release Report (HRR), as specified in RFCA Attachment 6.

## 4.2 Integration with Decommissioning

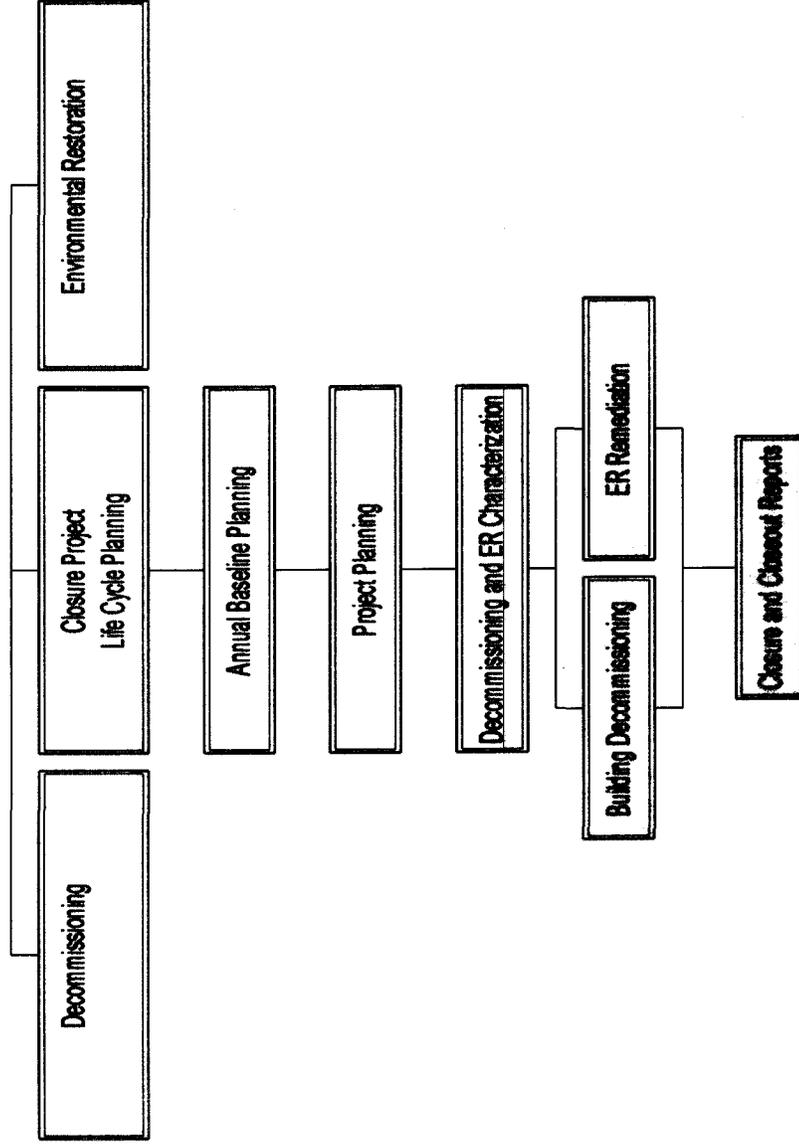
Remediation of the IA consists of decommissioning and ER activities integrated to enhance health and safety, environmental compliance, schedule efficiency, and cost effectiveness. Figure 7 illustrates major decommissioning and ER activities integrated into the overall closure project. Activities are scheduled to incorporate resource availability into scheduling and budgeting decisions. The Closure Project Baseline (CPB) identifies decommissioning and ER activities, and contains the appropriate connections to indicate the necessary sequencing of projects required for 2006 closure.

Approximately 90 percent of the potentially contaminated sites that may require remediation are associated with buildings or supporting infrastructure, including roads, parking lots, and utilities. These sites cannot be remediated until removal of the building or infrastructure is substantially complete. Consequently, remediation activities dependent on decommissioning are integrated with decommissioning in the 2006 CPB. The ER schedule is integrated with decommissioning schedules so that characterization activities start during building deactivation or decommissioning. Plate 3 illustrates the sequence of characterization, remediation, and closure of each IA Group for the accelerated 2006 closure.

Deactivation and decommissioning starts when the building mission ends; however, not all buildings require deactivation. Deactivation is the process of placing a building in a safe and stable condition, and can include removal of fuel, draining and/or de-energizing nonessential systems, removal of stored radiological and hazardous materials, and related actions (DOE, 1996). Decommissioning includes all activities that occur after deactivation, if required, including decontamination, dismantlement, demolition, and environmental restoration (DOE, 1996). Sampling during deactivation or decommissioning will allow soil characterization before building removal and excavation.

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Figure 7  
Decommissioning and ER Project Integration



**Strategy**

Use one subcontractor for demolition and remediation.

The decommissioning schedule is first driven by disposition of the highest-risk building, and then by available funding. ER activities dependent on decommissioning schedules follow the building risk-reduction design. ER activities that are not dependent on decommissioning are scheduled to maximize resource usage.

Whenever possible, the subcontractor with primary responsibility for building demolition will also conduct ER remediation. This strategy will reduce mobilization and demobilization time and costs, reduce procurement time, and streamline technical processes.

### 4.3 Risk and Dose Assessment Approach

The risk and dose assessment is a key component in IA and Site closure. This assessment will evaluate potential risks posed by the Site, and will be based on RFCA land use scenarios and protection of surface water quality. Risk and dose assessment methodologies for open space and industrial use of the IA will be developed. Post-remediation risk and dose will be evaluated in the CRA.

The risk and dose assessment strategy for the IA includes the following elements:

**Strategy**

Develop risk and dose assessment methodologies for open space and industrial use scenarios.

- Adopt a risk and dose assessment methodology that can be used to guide IA sampling DQOs and strategy; and
- Consider using the Multi-Agency Radiation Survey and Site Assessment Investigation Manual (MARSSIM) in ER activities. MARSSIM contains guidance on demonstrating compliance during final radiological status surveys and is currently applied to facility decommissioning activities at RFETS.

**Strategy**

Develop a risk assessment methodology that focuses on CRA requirements.

#### 4.3.1 Risk and Dose Assessment Methodology

Risk and dose assessment methodology must be determined early in the remediation process, because data collected in the IA will also be used for the risk and dose assessments. The risk and dose assessment methodology will provide decision statements for the DQO process for characterization, remediation, and analysis tasks by providing information on:

- Exposure units and potential receptors; and
- Type, quantity, and quality of samples needed to assess statistical significance.

*Risk and dose assessment data needs will guide DQOs and IA sampling activities.*

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*The CRA will determine onsite and offsite post-closure risks.*

*Data generated by the IMP, AME, Land Configuration Design Basis, and Site Water Balance study will be used in the risk and dose assessment.*

*The IMP provides information on environmental media in the IA and around decommissioning and remediation projects.*

*The AME Group analyzes Pu, Am, and U sources and mobility at RFETS.*

#### 4.3.2 Comprehensive Risk Assessment

The purpose of the CRA is to quantify potential residual risks posed by the Site, and demonstrate that the endstate is protective of human health and the environment. The CRA will evaluate post-remediation risks from the IA as well as the BZ, and will support an NFA CAD/ROD for the Site.

The CRA will address multiple exposure scenarios, pathways, and contaminants on a sitewide basis. Appropriate contaminant transport pathways will be evaluated including (1) subsurface soil to groundwater, (2) groundwater to surface water, (3) surface soil to surface water, and (4) surface soil to air. Exposure scenarios evaluated will include offsite impacts.

IA remediation data will be a primary source of data for the CRA; however, data from other projects will also be used. These projects include the Integrated Monitoring Plan (IMP), Actinide Migration Evaluation (AME), Land Configuration Design Basis, and Site Water Balance study.

##### Integrated Monitoring Plan

The IMP program was designed to integrate data collection requirements for groundwater, soil, surface water, air, and ecology in the IA and BZ, and around decommissioning and remediation projects. The IMP report describes monitoring activities and results on a yearly basis. Data generated as part of IMP activities will be used in making IA decisions and incorporated in the CRA. Data provided by IMP activities include:

- Current groundwater, surface water, air, and ecological conditions at the Site and Site boundary, and around decommissioning and remediation projects;
- Soil contaminant distributions; and
- Groundwater plume definition and movement.

##### Actinide Migration Evaluation

A multiyear AME Group was established to analyze the behavior and mobility of actinides (plutonium [Pu], americium [Am], and uranium [U]) in surface water, groundwater, and soil. The goals of the AME are to answer the following questions:

- (1) What are the important actinide migration sources and migration processes that account for recent surface water quality standard exceedences?

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- (2) What will be the impacts of actinide migration on planned remedial actions? To what level do sources need to be cleaned up to protect surface water from exceeding action levels for actinides?
- (3) How will actinide migration affect surface water quality after Site closure (or what soil action levels will be sufficiently protective of surface water over the long term)?
- (4) What is the long-term actinide migration and will it impact downstream areas (e.g. accumulation)?

This information will be used to help characterize current environmental conditions at RFETS, as input into remediation decisions and to recommend a path forward for long-term protection of surface water quality during and after Site closure.

#### Land Configuration Design Basis

Information such as seismic and slope stability data, required to design the final land surface configuration for RFETS, will be generated during the Land Configuration Design Basis study. The final configuration will be engineered to enhance the IA closure goal of protection of human health and the environment.

Several other ongoing studies as well as National Environmental Policy Act (NEPA) and ecological analyses will contribute vital information to the design criteria for final surface configuration. These include the IMP, AME, and Site Water Balance study. Applicable information from these studies will be incorporated to support design of a final topography.

#### Site Water Balance

A Site Water Balance that quantifies Site hydrology (surface water and groundwater) will be completed to support the CRA, final site configuration, and, along with AME information, long-term protection of surface water quality.

The Site Water Balance study will be implemented in two phases. Phase I will evaluate surface water hydrology to develop management options for final Site configuration and long-term surface water protection. Phase II will evaluate groundwater hydrogeology and impacts to surface water from current and future groundwater fluxes. Data generated during this study will be used in the CRA and Land Configuration Design Basis.

*Geotechnical data needed for the final land configuration will be generated during the Land Configuration Design Basis study.*

*The Site Water Balance study includes evaluation of current and future hydrology at RFETS.*

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### 4.3.3 Data Quality Objectives

DQOs specify the quality and quantity of data needed to support decisions. The IA Strategy incorporates qualitative guidelines for developing DQOs that will support IA decisionmaking. Detailed DQOs will be developed as part of the IA Sampling and Analysis Plan (IASAP) and individual group sampling addenda. IA DQOs will focus on identifying the type, quantity, and quality of data needed to support specific decisionmaking needs as specified in RFCA.

The overall goal of IA remediation and Site closure is protection of human health and the environment. IA data requirements to achieve this goal are the following:

- Collect appropriate data to support remediation decisions; and
- Collect appropriate data to support the CRA.

The IA data requirements will drive future characterization and remediation activities, and provide a basis for the detailed DQOs required for the IASAP. The IA DQO strategy provides a starting point for refining (i.e., identifying existing data, specific data needs, and schedules) or expanding (i.e., adding specific decision rules, acceptable errors, and data collection design) the detailed DQOs for characterization and remediation of the IA. The detailed IA characterization and remediation DQOs will incorporate appropriate current IMP and decommissioning DQOs.

## 4.4 Characterization Approach

Characterization of the IA is required as part of the remediation process to: (1) identify NFA sites, (2) identify IA Groups that require remediation, (3) determine the size and type of remediation, and (4) provide data for the CRA. Because one of the goals of the IA Strategy is to streamline schedules to meet 2006 closure, characterization will begin during deactivation or decommissioning of associated buildings or infrastructure items as described in Section 4.2. ER activities that are not dependent on decommissioning activities have been scheduled for characterization based on resource availability.

A comprehensive Sampling and Analysis Plan (SAP) for the IA (the IASAP) will be developed instead of individual SAPs for each IA Group. IASAP addenda for the individual IA Groups will be prepared as necessary. The IASAP will include:

- DQOs for characterization and remediation sampling;
- Sampling and analysis methods and protocols;
- Data analysis methods and protocols;
- Data management methods;

#### Strategy

Formulate DQOs that include characterization, remediation, and Site closure requirements.

#### Strategy

Begin characterization during deactivation or decommissioning.

*Characterize as necessary to define remediation constraints and provide data for the CRA.*

- Quality assurance (QA) and quality control (QC) methods and protocols; and
- Health and Safety Plan (HASP).

The IASAP addenda will address group-specific information including (1) sampling location, (2) sample quantity, (3) sampling methods, (4) required analytes, and (5) required QA samples and procedures.

Because the goal of sampling at the IA Groups is to provide data for remediation decisions and the CRA, the IASAP will be developed to:

- Avoid sampling activities that do not contribute to remediation planning;
- Use innovative sampling technologies, where appropriate;
- Use ER/decommissioning lessons learned at RFETS and other sites;
- Combine IA Groups where possible for increased schedule streamlining and cost savings;
- Identify areas that require remediation; and
- Provide appropriate data for closure decisions.

IA Group characterization strategy includes using existing data (validated analytical data, historic data, and decommissioning data) whenever possible to reduce the required number of samples. The sample number reduction process includes the following tasks:

- Compare existing validated analytical data to RFCA action levels (ALs) (this activity will be conducted in Fiscal Year [FY]00 and FY01 before characterization activities);
- Develop DQOs for sampling at the IA Groups;
- Compare existing data to DQOs to determine data gaps; and
- Evaluate decommissioning data for usability.

#### 4.5 Remediation Approach

The goal of IA remediation is to achieve an endstate that is protective of human health and the environment. To achieve this goal, remediation options will be selected based on nine CERCLA criteria:

- Overall protection of human health and environment;

**Strategy**  
Optimize sampling activities and only sample once.

**Strategy**  
Use existing data whenever possible to eliminate redundant sampling efforts.

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- Compliance with applicable or relevant and appropriate requirements (ARARs);
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume;
- Short-term effectiveness;
- Implementability;
- Cost;
- State acceptance; and
- Community acceptance (EPA, 1988).

Remediation options and strategies will incorporate innovative technologies and lessons learned from remediation projects at RFETS and other sites, as appropriate.

Although individual remediation options will be developed for each IA Group, efforts will be made to combine IA Group remediations to make optimal use of Site resources. Remediation projects will be grouped (1) by similar remedial actions, (2) by proximity to other remediation projects, (3) by similar PCOCs, (4) to streamline schedules, or (5) to maximize resources.

Potential remediation options can include the following:

- NFA;
- Removal and offsite disposition;
- Caps and covers; and
- Plume remediation.

Substantial amounts of particulate emissions may be generated by remediation projects. Emissions at these levels have the potential to raise a variety of Clean Air Act (CAA) permitting, emission control, and monitoring issues that may need to be negotiated with the regulatory agencies. The IA project team will interface with IMP staff to ensure that onsite and Site boundary monitoring requirements are observed. Fugitive dust potential will be evaluated to determine whether additional monitoring or mitigation activities are needed.

#### 4.5.1 No Further Action

NFA will be proposed when analytical results are less than RFCA Tier II ALs, and will be considered when analytical results are less than RFCA Tier I ALs. NFA documentation will be in accordance with RFCA Attachment 6.

#### 4.5.2 Removal and Offsite Disposition

The preferred option for contaminated soil in the IA is excavation and immediate disposition offsite. This option is effective and efficient and meets

#### Strategy

Combine IA Group remediation activities whenever possible.

*Fugitive dust emissions may require additional regulatory permits.*

**Strategy**

Excavate and package for immediate disposition.

*The decision to use caps or covers will be made based on data from characterization, the IMP, AME, Land Configuration Design Basis, and Site Water Balance study.*

the goal of 2006 closure. Contaminated soil areas will be identified and excavated. The material will be placed in lined roll-offs or encased in polyethylene according to disposal site waste acceptance criteria (WAC). Soil will be sampled, characterized, and prepared for shipment to approved facilities. Section 5.2 describes other options for the disposition of remediation waste.

**4.5.3 Caps and Covers**

Future land use and surface water quality protection influence decisions related to the RFETS endstate goal of protecting human health and the environment, cleanup levels, and post-closure conditions for the IA. Although the RFETS Vision (RFCA, Appendix 9) committed to cleanup the Site where possible and to the extent feasible, the ability to remediate the Site to background levels is neither technically nor financially achievable at this time. Capping or covering areas of the Site, in combination with other remediation, is a potential strategy for achieving the endstate goal.

Cap and cover designs can vary considerably. Engineered caps use multiple layers of soil and aggregate including water-impermeable clay, as well as geomembranes to protect underlying materials. Soil covers rely on the principle of evapotranspiration rather than impermeability to achieve the same objective. Soil covers can vary in thickness from a few inches to several feet.

The decision to cap or cover parts of the IA has not yet been made. Current information indicates that a post-remediation cover could enhance the ability to meet the endstate goal in the Solar Evaporation Ponds (SEP) area and 700 Area. This decision will be based on long-term maintenance considerations, as well as results of further characterization and information from the IMP, AME, Land Configuration Design Basis, and Site Water Balance study.

**4.5.4 Plume Remediation**

Remediation of groundwater plumes at RFETS is driven by the unique geologic characteristics at the Site. These characteristics include a shallow, low-volume groundwater underlain by thick claystone with low permeability. Groundwater moves from west to east along the claystone layer, and surfaces in the eastern portions of the Site. Although these characteristics render some remediation technologies ineffective, they enhance others.

Remediation of groundwater plumes is guided by a three-part strategy. The elements of the strategy apply individually or in combination depending on the situation. First, plumes that pose an immediate threat to surface water are remediated using reactive barrier systems. Reactive barriers use a subsurface impermeable barrier wall to intercept a plume and direct it downgradient to a flow-through reactor vessel. The reactor vessel contains media that reduces contaminants to precipitates or innocuous breakdown products that flow out of

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**Strategy**

Remediate plumes using reactive barriers, source removal, and monitored natural attenuation.

the vessel. The media, containing precipitates, is periodically replaced and dispositioned as remediation waste.

Plumes that pose an immediate threat to surface water are those that have migrated from the IA into the inner BZ. These plumes have been characterized, and the final reactive barrier to remediate them will be installed by the end of 1999. Plumes in the IA may be single or commingled multiple plumes. Although the outer boundaries of the plume complex have been well documented, individual plumes have not been fully identified. As characterization and remediation of the IA progresses, the IA plume complex will become better understood. If data indicate the plume complex is a threat to surface water, the threat will be mitigated by reactive barrier technology.

The second part of the groundwater plume remediation strategy is to remediate the source contributing to the plume, if the source is still present. One volatile organic compound (VOC) source has been identified in the IA that may be contributing to the IA plume complex. This source will be remediated when access to the area becomes possible following decommissioning of the buildings in the area.

The third part of the groundwater plume remediation strategy is to remediate groundwater using monitored natural attenuation (MNA). Natural attenuation relies on natural processes such as biodegradation to break down contaminants in groundwater. Information from monitoring wells managed under the IMP suggests that natural breakdown of VOCs is occurring at the Site.

EPA provides the decision framework and technical guidelines for implementation of the MNA remediation option (EPA, 1999). Consistent with EPA guidance, MNA will be considered as a component of the total remedy, as the total remedy itself, or as a follow-up measure.

The current plume remediation strategy could be modified as more information on subsurface conditions is developed, or as new technologies become available.

#### 4.5.5 Surface Water and Groundwater

The IA project team will coordinate with the RFETS Surface Water and Groundwater Groups during implementation of the IA Strategy. During remediation, surface water and groundwater will be monitored at points of evaluation defined in the IMP. If analytical results indicate values above RFCA ALs, the evaluation of elevated values, potential subsequent sampling, and potential mitigation actions will be conducted as part of the IA activities and integrated with IMP requirements.

**Strategy**  
Develop an RSOP for remediation.

**Strategy**  
Work with regulatory agencies to streamline the review process.

*Remediation challenges include OPWL, NPWL, sanitary sewers, storm drains, and UBC sites.*

#### 4.5.6 Decision Documents

IA characterization and environmental remediation decision documents currently developed include proposed action memoranda (PAMs), interim measures/interim remedial actions (IM/IRAs), SAPs, and closeout reports. These documents have been scheduled in the 2006 CPB for each IA Group. Figure 8 illustrates the current ER decision document schedule. As the schedule indicates, requirements for regulatory agency review and/or approval of ER decision documents will increase dramatically in FY02 through FY06.

Because many decision documents will be developed and reviewed, the process will be streamlined to ensure IA closure in 2006. Potential options for streamlining the decision document process include the following:

- Develop a RFCA Standard Operating Protocol (RSOP) for remediation of the IA similar to current RFCA decommissioning RSOPs. The RSOP, after review by stakeholders and approved by the regulatory agencies, will serve as the single decision document for remediation of ER sites. Under this approach, a letter to the regulatory agencies will identify specific remedial actions, including the location, depth of remediation, and confirmation sampling activities. A RFCA decision document will be required only for those remediation issues not already addressed in the approved RSOP; and
- Include CDPHE and EPA staff on IA project teams. These staff will review documents and work with the project teams to resolve issues and enhance communication between agencies and Site staff. This strategy will reduce review time because the regulatory agencies and Site staff will agree on sampling and remediation actions up front, potential issues will be identified and resolved, and agency input will be written into the decision document.

#### 4.6 Characterization and Remediation Challenges

Several areas in the IA present significant technical challenges, including the OPWL, new process waste lines (NPWL), other underground pipelines, and UBC sites. Innovative sampling and remediation technologies and lessons learned from characterization, remediation, and decommissioning projects at RFETS and other sites will be incorporated into remediation strategies as appropriate.

##### 4.6.1 Underground Pipeline Systems

The underground pipeline systems include OPWL, NPWL, sanitary sewer system, and storm drains. Unique challenges associated with these systems that could affect remediation are discussed below.

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	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
		◆ B371/374 SAP						
◆ Group 500-4 SAP								
◆ Group 800-4 SAP								
◆ Group 000-1 SAP								
◆ Group 700-7 SAP								
◆ Group 800-4 Decision Document								
◆ Group 700-1 SAP								
◆ Group 700-4 SAP								
◆ Group 500-4 Decision Document								
◆ Group 000-4 SAP								
◆ Group 400-4 SAP								
◆ Group 100-5 SAP								
◆ Group 300-6 SAP								
◆ Group 600-5 SAP								
◆ Group 600-6 SAP								
◆ Group 900 Area SAP								
◆ Group SW-1 Decision Document								
◆ Group 500-3 SAP								
◆ Group 700-3 SAP								
◆ Group 700-7 Decision Document								
◆ Original Landfill PAM								
◆ Original Landfill Hot Spot Closeout Report								
◆ Group 800-4 Closeout Report								
◆ Group 700-5 SAP								
◆ Group 000-3 SAP								
◆ Group 900-1 SAP								
◆ Group 800-5 SAP								
◆ Group 400-4 Decision Document								
◆ Group 700-2 SAP								
700 Area Cap Decision Document								
◆ Group SW-1 Closeout Report								
◆ Group 000-1 Decision Document								
◆ Group 500-3 Decision Document								
◆ Group 500-5 SAP								
◆ Group 100-4 SAP								
◆ Group 400-10 SAP								

Activity Description	Early Finish
B371/374 SAP	28NOV00*
Group 500-4 SAP	27NOV01*
Group 800-4 SAP	27NOV01*
Group 000-1 SAP	27NOV01*
Group 700-7 SAP	26DEC01*
Group 800-4 Decision Document	15OCT02*
Group 700-1 SAP	23OCT02*
Group 700-4 SAP	23OCT02*
Group 500-4 Decision Document	29OCT02*
Group 000-4 SAP	25NOV02*
Group 400-4 SAP	25NOV02*
Group 100-5 SAP	25NOV02*
Group 300-6 SAP	25NOV02*
Group 600-5 SAP	25NOV02*
Group 600-6 SAP	25NOV02*
Group 900 Area SAP	25NOV02*
Group SW-1 Decision Document	26DEC02*
Group 500-3 SAP	26DEC02*
Group 700-3 SAP	30DEC02*
Group 700-7 Decision Document	20JAN03*
Original Landfill PAM	04MAR03*
Original Landfill Hot Spot Closeout Report	11JUN03*
Group 800-4 Closeout Report	05AUG03*
Group 700-5 SAP	06AUG03*
Group 000-3 SAP	11AUG03*
Group 900-1 SAP	25AUG03*
Group 800-5 SAP	26AUG03*
Group 400-4 Decision Document	03SEP03*
Group 700-2 SAP	24SEP03*
700 Area Cap Decision Document	29SEP03*
Group SW-1 Closeout Report	30SEP03*
Group 000-1 Decision Document	30SEP03*
Group 500-3 Decision Document	30OCT03*
Group 500-5 SAP	25NOV03*
Group 100-4 SAP	25NOV03*
Group 400-10 SAP	25NOV03*

Sheet 1 of 4

**Figure 8**  
**Industrial Area**  
**Decision Document Schedule**

Project Start	01OCT98
Project Finish	31OCT06
Data Date	01OCT98
Run Date	24SEP98

AGCY

Legend:  
 Early Bar  
 Progress Bar  
 Critical Activity

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	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
Group 600-4 SAP								◆ Group 600-4 SAP
Group 800-6 SAP								◆ Group 800-6 SAP
Group 300-3 SAP								◆ Group 300-3 SAP
Group 300-4 SAP								◆ Group 300-4 SAP
Group 800-2 SAP								◆ Group 800-2 SAP
Group 700-6 SAP								◆ Group 700-6 SAP
Group 700-8 SAP								◆ Group 700-8 SAP
Group 300-5 SAP								◆ Group 300-5 SAP
Group 500-6 SAP								◆ Group 500-6 SAP
Group 500-7 SAP								◆ Group 500-7 SAP
Group 700-10 SAP								◆ Group 700-10 SAP
Group 700-12 SAP								◆ Group 700-12 SAP
Group 400-3 SAP								◆ Group 400-3 SAP
Group 000-4 Decision Document								◆ Group 000-4 Decision Document
Group 300-1 SAP								◆ Group 300-1 SAP
Group 500-1 SAP								◆ Group 500-1 SAP
Group 700-3 Decision Document								◆ Group 700-3 Decision Document
Group 500-4 Closeout Report								◆ Group 500-4 Closeout Report
Group 700-7 Closeout Report								◆ Group 700-7 Closeout Report
Group 700-1 Decision Document								◆ Group 700-1 Decision Document
Group 700-4 Decision Document								◆ Group 700-4 Decision Document
Group 000-3 Decision Document								◆ Group 000-3 Decision Document
Group 400-1 SAP								◆ Group 400-1 SAP
Group 400-2 SAP								◆ Group 400-2 SAP
Group 800-5 Decision Document								◆ Group 800-5 Decision Document
Group 100-1 SAP								◆ Group 100-1 SAP
Group 700-11 Decision Document								◆ Group 700-11 Decision Document
Group 000-1 Closeout Report								◆ Group 000-1 Closeout Report
Group 700-2 Decision Document								◆ Group 700-2 Decision Document
Group 100-2 SAP								◆ Group 100-2 SAP
Group 000-2 SAP								◆ Group 000-2 SAP
Group 800-1 SAP								◆ Group 800-1 SAP
Group 800-3 SAP								◆ Group 800-3 SAP
Group 600-3 SAP								◆ Group 600-3 SAP
Group 600-1 SAP								◆ Group 600-1 SAP
Group 300-3 Decision Document								◆ Group 300-3 Decision Document
Group 300-4 Decision Document								◆ Group 300-4 Decision Document
Group 400-8 SAP								◆ Group 400-8 SAP
Group 400-7 SAP								◆ Group 400-7 SAP

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Activity Description	Early Finish	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
Group 700-5 Decision Document	20SEP04*								
Group 500-5 Decision Document	01OCT04*								
Group 800-6 Decision Document	01OCT04*								
Group 400-6 SAP	07OCT04*								
Group 400-5 SAP	14OCT04*								
OU7 Closeout Report	28OCT04*								
Group 100-4 Decision Document	28OCT04*								
Group 400-10 Decision Document	28OCT04*								
Group 600-4 Decision Document	28OCT04*								
Group 800-2 Decision Document	28OCT04*								
Foundation Removal SAP	17DEC04*								
Group 300-1 Decision Document	20DEC04*								
Group 500-1 Decision Document	20DEC04*								
Group 400-3 Decision Document	19JAN05*								
Group 000-4 Closeout Report	15FEB05*								
Group 700-11 Closeout Report	25FEB05*								
Group 800-5 Closeout Report	03MAR05*								
Group 000-3 Closeout Report	09MAR05*								
Group 400-1 Decision Document	10MAR05*								
Group 400-2 Decision Document	10MAR05*								
Group 300-2 SAP	26APR05*								
Group 500-2 SAP	26APR05*								
Group 700-1 Closeout Report	02MAY05*								
Group 900-3 SAP	26MAY05*								
Group 600-2 SAP	26MAY05*								
Group 500-3 Closeout Report	02JUN05*								
Group 600-1 Decision Document	09JUN05*								
Group 100-1 Decision Document	09JUN05*								
Group 100-2 Decision Document	09JUN05*								
Group 800-3 Decision Document	09JUN05*								
Group 400-8 Decision Document	14JUN05*								
Group 700-5 Closeout Report	15JUN05*								
Group 400-7 Decision Document	23JUN05*								
Group 800-1 Decision Document	29JUN05*								
Group 400-6 Decision Document	15JUL05*								
Group 400-5 Decision Document	22JUL05*								
Group 000-2 Decision Document	22JUL05*								
Group 700-2 Closeout Report	02AUG05*								
Group 500-5 Closeout Report	15AUG05*								
Group 800-6 Closeout Report	15AUG05*								

- ◆ Group 700-5 Decision Document
- ◆ Group 500-5 Decision Document
- ◆ Group 800-6 Decision Document
- ◆ Group 400-6 SAP
- ◆ Group 400-5 SAP
- ◆ OU7 Closeout Report
- ◆ Group 100-4 Decision Document
- ◆ Group 400-10 Decision Document
- ◆ Group 600-4 Decision Document
- ◆ Group 800-2 Decision Document
- ◆ Foundation Removal SAP
- ◆ Group 300-1 Decision Document
- ◆ Group 500-1 Decision Document
- ◆ Group 400-3 Decision Document
- ◆ Group 000-4 Closeout Report
- ◆ Group 700-11 Closeout Report
- ◆ Group 800-5 Closeout Report
- ◆ Group 000-3 Closeout Report
- ◆ Group 400-1 Decision Document
- ◆ Group 400-2 Decision Document
- ◆ Group 300-2 SAP
- ◆ Group 500-2 SAP
- ◆ Group 700-1 Closeout Report
- ◆ Group 900-3 SAP
- ◆ Group 600-2 SAP
- ◆ Group 500-3 Closeout Report
- ◆ Group 600-1 Decision Document
- ◆ Group 100-1 Decision Document
- ◆ Group 100-2 Decision Document
- ◆ Group 800-3 Decision Document
- ◆ Group 400-8 Decision Document
- ◆ Group 700-5 Closeout Report
- ◆ Group 400-7 Decision Document
- ◆ Group 800-1 Decision Document
- ◆ Group 400-6 Decision Document
- ◆ Group 400-5 Decision Document
- ◆ Group 000-2 Decision Document
- ◆ Group 700-2 Closeout Report
- ◆ Group 500-5 Closeout Report
- ◆ Group 800-6 Closeout Report

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Activity Description	Early Finish	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
Group 700-4 Closeout Report	18AUG05*								
Group 100-3 SAP	09SEP05*								
Group 700-3 Closeout Report	23SEP05*								
Group 900-1 Closeout Report	17NOV05*								
Group 400-1 Closeout Report	05DEC05*								
Group 400-2 Closeout Report	05DEC05*								
Group 100-4 Closeout Report	15FEB06*								
Group 600-4 Closeout Report	15FEB06*								
Group 100-1 Closeout Report	07MAR06*								
Group 100-2 Closeout Report	07MAR06*								
Group 400-4 Closeout Report	09MAR06*								
Foundation Removal Closeout Report	30MAR06*								
Group 600-1 Closeout Report	30MAR06*								
Group 800-1 Closeout Report	30MAR06*								
Group 800-3 Closeout Report	30MAR06*								
Group 400-8 Closeout Report	04APR06*								
Group 500-1 Closeout Report	05APR06*								
Group 400-7 Closeout Report	13APR06*								
Group 300-1 Closeout Report	02MAY06*								
Group 800-2 Closeout Report	02MAY06*								
Group 400-3 Closeout Report	04MAY06*								
Group 400-5 Closeout Report	05MAY06*								
Group 400-6 Closeout Report	05MAY06*								
Group 000-2 Closeout Report	11MAY06*								
Group 300-4 Closeout Report	05JUN06*								
Group 300-3 Closeout Report	06JUN06*								
Group 000-1 Cap Closeout Report	07JUN06*								
Old Landfill Cap Closeout Report	06JUL06*								
700 Area Closeout Report	31OCT06*								

Group 700-4 Closeout Report ◆  
 ◆ Group 100-3 SAP  
 Group 700-3 Closeout Report ◆  
 Group 900-1 Closeout Report ◆  
 Group 400-1 Closeout Report ◆  
 Group 400-2 Closeout Report ◆  
 Group 100-4 Closeout Report ◆  
 Group 600-4 Closeout Report ◆  
 Group 100-1 Closeout Report ◆  
 Group 100-2 Closeout Report ◆  
 Group 400-4 Closeout Report ◆  
 Foundation Removal Closeout Report ◆  
 Group 600-1 Closeout Report ◆  
 Group 800-1 Closeout Report ◆  
 Group 800-3 Closeout Report ◆  
 Group 400-8 Closeout Report ◆  
 Group 500-1 Closeout Report ◆  
 Group 400-7 Closeout Report ◆  
 Group 300-1 Closeout Report ◆  
 Group 800-2 Closeout Report ◆  
 Group 400-3 Closeout Report ◆  
 Group 400-5 Closeout Report ◆  
 Group 400-6 Closeout Report ◆  
 Group 000-2 Closeout Report ◆  
 Group 300-4 Closeout Report ◆  
 Group 300-3 Closeout Report ◆  
 Group 000-1 Cap Closeout Report ◆  
 Old Landfill Cap Closeout Report ◆  
 700 Area Closeout Report ◆

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*OPWL and NPWL will be incorporated into IHSS, PAC, and UBC site remediations, where possible.*

### Original Process Waste Lines

OPWL is a network of tanks, underground pipelines, and aboveground pipelines used to transport and temporarily store aqueous chemical and radioactive process wastes (Plate 2). OPWL potentially transported a variety of wastes including acids, bases, solvents, radionuclides, metals, oils, polychlorinated biphenyls (PCBs), biohazards, paints, and other chemicals (DOE, 1994).

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 characterized as part of those systems. The current OPWL system contains approximately 28,638 feet of pipeline. Approximately 13,317 feet of pipeline will be characterized and remediated as a single project in IA Group 000-2. The remaining 15,321 feet of pipeline will be characterized and remediated as part of other IA Groups. Table 3 summarizes the OPWL pipelines.

### New Process Waste Lines

NPWL, illustrated in Figure 9, consists of pipelines, tanks, and valve vaults that overlap extensively with OPWL. 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 will require characterization. This estimate does not include sections of pipeline that overlap with OPWL.

### Sanitary Sewer System

The sanitary sewer system consists of approximately 36,480 feet of pipeline, and 25 valve vaults, pump vaults, and similar structures that will require characterization (Figure 9). This estimate includes only main pipelines. Remaining pipelines will be characterized with UBC sites or other IHSSs or PACs. No previous characterization of the sanitary sewer system exists.

The sanitary sewer system has been used for the transport, storage, and treatment of sanitary wastes since 1952. Historically, waste streams other than typical sanitary wastes have been discharged to the sanitary sewer system, including a variety of chemical and radioactive wastes from laboratories, process buildings, and laundries. Additionally, hazardous and radioactive liquids from spills and accidental discharges have entered the sanitary sewer system. Historic discharges to the system may include acids, bases, beryllium, chromic acid, chromium, film processing chemicals, laundry waste, nitrates, oils, paint, radionuclides, solvents, sulfuric acid, and tritium (DOE, 1992).

**Table 3  
OPWL Pipelines**

Segment Name	Length (feet)	IA Grouping	Location
121-P26	2,750	000-1	700 Area (also referred to as IHSSs 149.1 and 149.2)
121-P47	135	000-1	700 Area
121-P48	0	000-1	700 Area
121-P49	85	000-1	700 and 900 Areas
121-P50	105	000-1	900 Area
121-P57	0	100-1	Building 122
121-P06	1,300	000-2	Building 881
121-P11	175	000-2	700 and 800 Areas (also referred to as IHSS 147.1)
121-P12	510	000-2	700 Area (also referred to as IHSSs 123.2 and 147.1)
121-P13	0	000-2	700 Area (also referred to as IHSSs 123.2 and 147.1)
121-P15	785	000-2	700 Area (also referred to as IHSS 123.2)
121-P16	170	000-2	500 and 700 Areas
121-P21	386	000-2	Building 774
121-P25	562	000-2	700 Area
121-P27	185	000-2	Building 774
121-P28	128	000-2	700 Area (also referred to as IHSS 127)
121-P29	197	000-2	700 Area (also referred to as IHSS 127)
121-P35	142	000-2	700 Area
121-P36	599	000-2	700 and 900 Areas
121-P37	1,449	000-2	700 and 900 Areas
121-P38	800	000-2	700 and 900 Areas
121-P39	1,817	000-2	900 Area
121-P40	232	000-2	900 Area
121-P41	1,537	000-2	700 Area
121-P43	100	000-2	700 Area
121-P44	0	000-2	700 Area
121-P45	130	000-2	700 Area
121-P46	0	000-2	700 Area
121-P58	90	000-2	Building 703
121-P59	0	000-2	Building 703
121-P60	180	000-2	180 ft; Building 774
121-P61	70	000-2	Building 774
121-T-29	0	000-2	Tank T-29
121-P57	0	100-1	Building 122
121-P01	180	100-4	Building 123
121-P02	452	100-4	Building 123
121-P03	162	100-4, 400-8	Building 441
121-P52	280	400-7	Building 443
121-P05	1,561	400-8	Building 444
121-P17	1,130	500-3	Building 559
121-P18	0	500-3	Building 559
121-P62	42	500-3	Building 559
121-P14	648	700-2	700 Area (also referred to as IHSS 123.2)

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**Table 3 (continued)**  
**OPWL Pipelines**

Segment Name	Length (feet)	IA Grouping	Location
121-P19	603	700-2	Building 707
121-P20	499	700-3	700 Area
121-P30	0	700-3	Building 777
121-P32	907	700-3	Building 776
121-P51	170	700-3	Building 778
121-P22	1,205	700-4	Building 771
121-P23	410	700-4	Building 771
121-P24	306	700-4	Building 771
121-P31	167	700-4	Buildings 771 and 774
121-P33	140	700-4	700 Area
121-P56	170	700-4	Buildings 771 and 774
121-P34	198	700-4, 000-2	700 Area
121-P42	213	700-7	700 Area
121-P10	1,190	800-1, 800-6	Buildings 865/889
121-P07	440	800-2	Building 881
121-P08	0	800-2	Building 881
121-P53	78	800-2	Building 881
121-P54	138	800-2	Building 881
121-P55	158	800-2	Building 881
121-P09	504	800-3	Building 883
121-P63	100	800-4	Building 886
121-P64	65	800-4	Building 886
121-P65	80	800-4	Building 828
121-P66	50	800-4	Building 886

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### Storm Drains

There are 239 storm drains at RFETS as shown on Figure 9. Of these, 139 require characterization as part of IA Group 000-3. The remaining 100 storm drains will be characterized with associated buildings and 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).

#### **Strategy**

Remediate contaminated pipelines and soil; stabilize in place noncontaminated pipelines.

#### **Strategy**

Focus on remediating contaminated soil rather than the location of pipeline leaks.

*Challenges to remediation of OPWL, NPWL, sanitary sewers, and storm drains are:*

- *Extent,*
- *Location,*
- *Composition,*
- *Undocumented leaks, and*
- *Many potential waste streams and PCOCs.*

### Remediation Strategies

The key remediation strategy for OPWL, NPWL, the sanitary sewer system, and storm drains is to remediate contaminated soil, process lines, and other pipelines, and stabilize in place those segments with contaminant concentrations below RFCA ALs. Because it is not clear where or when pipelines may have broken and leaked, characterization at these IA Groups will focus on identifying contaminated soil and specific areas of concern, rather than on the integrity and precise location of each pipeline leak.

Issues that add to the complexity of characterizing and remediating OPWL, NPWL, the sanitary sewer system, and storm drains are:

- Extent and size of systems;
- Systems under buildings, roads, and other infrastructure;
- Conflicting information on pipeline locations and use;
- Pipelines collocated with other utilities;
- Pipelines and utility corridors are potential groundwater migration pathways;
- Varying or unknown pipeline depths;
- Various pipeline compositions (polyvinyl chloride [PVC], stainless steel, cement asbestos, cast iron, Saran-lined steel, vitrified clay, ribbed hose fiberglass, reinforced epoxy pipe, black iron, polyethylene, glass, and Schedule 40 steel);
- Documented leaks and releases from many pipelines, or pipelines listed as leaking with no supporting evidence; and
- Many potential waste streams and PCOCs.

**Strategy**

Develop OPWL, NPWL, and utility remediation approaches based on lessons learned at other sites.

Remediation of OPWL, NPWL, the sanitary sewer system, and storm drains requires development of innovative approaches that achieve cost-effective results. Potential strategies for characterization and remediation of these systems may include the following elements:

- Consult with the DOE Office of Science and Technology to explore innovative sampling and remediation techniques;
- Use commercially available, proven pipe locating methods to locate pipelines;
- Develop a statistical sampling approach that includes a bias toward areas where potential leaks are documented, but also achieves adequate sampling coverage;
- Use Site Water Balance and other groundwater data to help define data needs and remediation options;
- Conduct a cost/benefit analysis of sampling methods to determine which sampling strategy provides the most information for the least cost; and
- Use Geoprobe sampling methods rather than excavation to reduce costs, schedule, and health and safety (H&S) concerns.

#### 4.6.2 Under-Building Contamination

There are 31 designated UBC sites in the IA (Table 2). Past and current operations in these buildings have included production and waste management activities. These buildings were designated as UBC sites because of documented spills or releases in the buildings or routine operations that may have resulted in contamination (DOE, 1992). OPWL, NPWL, sanitary sewer segments and storm and foundation drains beneath the buildings will also need to be investigated for remediation. Accurate drawings of the systems beneath most buildings are not always available, and the location, length, and composition of the pipelines are not always known. Issues associated with characterization of these UBC sites include the following:

- Potentially unknown spills, releases, and contamination;
- OPWL and other utilities beneath buildings;
- More than one type of pipeline beneath building;
- Unknown conditions;
- Free-standing water beneath buildings;
- Basements or foundations below the water table or the top of bedrock;
- Additional PCOCs because of associated IHSSs;
- Potentially wide range of PCOCs;

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- Accessibility; and
- Structural integrity of foundations.

Characterization of UBC sites will begin during deactivation as soon as building floors and slabs are accessible, usually during the last 50 percent of deactivation. The timing of characterization will be determined on a building-by-building basis as safety and security allows. Characterization techniques will include soil sampling by drilling through building slabs or directional drilling. Technical challenges will include developing plans that (1) include OPWL, NPWL, sanitary sewer lines and storm and foundation drains beneath buildings, (2) do not impact other Site utilities (e.g., alarms and security systems), and (3) incorporate the characterization needs of associated IHSSs and PACs. For buildings not requiring deactivation, characterization will begin as early in the decommissioning phase as possible, usually during decontamination.

**Strategy**

Characterize UBC sites early, where appropriate.

Early characterization to determine the presence or absence of hazardous substances at UBC sites is being initiated at some facilities. The first effort is at UBC sites 371 and 374, where operational history suggests there is clean soil beneath the buildings. If it is determined that Buildings 371 and 374 are free of UBC, the buildings will be left in place to support the closure mission for an additional 1½ years. In addition, lessons learned from early UBC site characterization will provide opportunities for refinement of integration and characterization activities and schedules. Early characterization may include drilling through concrete floors and basements, directional drilling, and sampling drains and valve vaults.

#### 4.7 Data Management

The data management function is critical to closure of the IA and Site. Data relied on must be technically defensible and acceptable to the regulatory agencies. The data must be managed and accurately validated so that the analytical results, as well as sampling locations, can be evaluated. The data will be used to:

- Determine existing data gaps;
- Enable comparison to RFCA ALs;
- Determine the lateral and vertical extent of contamination and required remediation;
- Support NFA determinations; and
- Support the CRA and CAD/ROD analyses.

*IA data must be managed to ensure acceptable data.*

*Existing data are being compiled from a variety of sources.*

#### 4.7.1 Existing Data

A key IA strategy is to use as much existing data as possible. As part of the IA Strategy, existing analytical and documented spill and leak data are being compiled. These data will be used to provide information on PCOCs in IA Groups and identify potential data sources. The data will form the basis for a comprehensive data compilation and data gap analysis to be conducted as part of IA efforts over the next 2 years.

Data are being collected from a number of existing sources. Examples of analytical data sources include the following:

- ER documents (RFI/RI reports, data summaries, Sitewide reports, HRRs from 1992 to 1998);
- RCRA Contingency Implementation Plans;
- Electronic records for groundwater monitoring wells, surface water and sediment sampling stations, and boreholes in the IA; and
- Soil disturbance permits.

Additional data that contain information on spills and leaks were compiled from a variety of sources. Examples of these sources include Incident Reports, Occurrence Reports, and Radiological Incident Reports. A review of sitewide document titles and Geographic Information System (GIS) map titles was conducted to identify additional data sources.

Validated surface soil, subsurface soil, groundwater, and surface water data are being collected for each IHSS, PAC, and UBC site. Data quality and data gap analyses will be conducted during the comprehensive data compilation task in FY00 and FY01.

#### 4.7.2 Comprehensive Data Compilation

*A comprehensive data compilation task will be conducted during the next 2 years.*

The comprehensive data compilation task includes data collection, usability assessment, and data gap analysis. This task will provide a comprehensive and consistent set of existing data for use in the IASAP, NFA justifications, and Site closure documents.

The data usability assessment will evaluate existing records using the following criteria:

- Are the data valid and of known quality to meet DQOs?
- Are the data critical to IA decision documents?
- Are the data critical to the understanding of the IA?

- Are the data critical to determining remediation strategy?
- Do the data decrease the number of new IA samples required?
- Will the data be necessary for the CRA?

After the data usability assessment has been completed, a data gap analysis will be conducted to determine whether additional data are needed to support remediation decisions and decision documents.

#### 4.7.3 New Data

New data collected during IA characterization activities will be managed to ensure that a comprehensive, consistent, and defensible set of data is available for making remediation decisions and using in decision documents.

IA characterization and remediation data will undergo data assessment that consists of review, verification, and validation. Verification is a graded process to assess both compliance of the data package with project requirements and acceptability of the data. Validation will consist of inspecting the data package contents for compliance with project requirements and validity.

#### 4.7.4 Data Management Challenges

The Site data management system is a critical component in achieving 2006 closure and supporting post-closure activities. The ability to provide users with accurate and complete information will expedite the development of decisions, decision documents, the CRA, and CAD/ROD(s).

Potentially useful data generated by a number of Site organizations exist in databases across the Site. These data are not always easy to access nor are they compatible with Soil Water Database (SWD) or GIS formats. To evaluate and apply these data sources to Site closure activities, all site databases will be transferred to a common platform. This will facilitate the integration of information among decommissioning, ER, and other Site organizations that collect potentially relevant data.

#### Soil Water Database

The SWD is the repository for Site environmental data, and contains between 3 and 4 million analytical records. These data include field parameters and analytical results for characterization and remediation projects, ongoing monitoring programs, and other miscellaneous projects. The usability of the SWD to IA and Site closure can be enhanced by initiating the following approaches:

- Eliminate redundant data from the SWD;

**Strategy**

Transfer Site databases to a common platform.

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**Strategy**  
Organize the SWD so that it becomes the Site closure database.

- Identify existing data that cannot be used in decisionmaking, and eliminate it from further consideration in the existing data compilation. These data include data known to be unusable because of field contamination, validation errors, or laboratory errors;
- Organize the database so that only data needed to support the CRA and other Site closure documents are represented. This organized database will contain final analytical data from remediated areas, characterization data from NFA sites, and applicable groundwater and surface water analytical data;
- Enhance the process for data collection, labeling, data entry, and coding to ensure long-term usability; and
- Enhance the data labeling system to include meaningful locations (IHSS, PAC, UBC site, and IA Group) by considering user needs. This will enable quick data searches by location, and will integrate with GIS.

**Strategy**  
Enhance GIS so that project managers and staff have access to information.

Geographic Information System

GIS is a valuable, cost-effective tool for remediation that provides a visual analysis of PCOCs so that areas of concern and remediation volumes can be identified and calculated, respectively. Existing and new data must be easily transferred to the GIS mapping system. Two GIS programs are being evaluated and tested that will allow effective and efficient database interfacing, as well as provide real-time analysis capability to RFETS users: ARCVIEW and the Spatial Database Engine. These two new tools will greatly enhance the ability of the data user to quickly visualize and use available data.

In order for data to correlate and interface with mapping systems, it must be in a systematic format with associated location coordinates. More importantly, the data validation protocol must be firmly in place so that analytical measurements taken for characterization and remediation purposes agree with the mapping information.

**Strategy**  
Integrate with all appropriate Site organizations.

**5.0 Project Interfaces**

Site organizations that will be significantly influenced by IA closure, and will require close interaction with IA activities are H&S, the Waste Management Program, Analytical Services Division (ASD), and Procurement. Interaction with these organizations begins in the life cycle planning phase for Site closure. Many other groups such as radiological operations, radiological engineering, planning and integration, and site landlord services will have day-to-day responsibilities in IA activities. Additional support services throughout the Site will be used as needed to accomplish IA and Site closure.

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*H&S is an RFETS priority.*

Figure 10 illustrates the anticipated level of effort for various Site organizations during IA remediation activities.

## **5.1 Health and Safety**

The protection of Site workers and the surrounding community is a priority at RFETS. Worker safety is maintained through implementation of the Integrated Safety Management System (ISMS), which includes five key elements:

- Define scope of work;
- Analyze hazards;
- Develop and implement controls;
- Perform work within controls; and
- Provide feedback and continuous improvement.

Protection of surrounding communities is maintained by RFETS routine and special monitoring programs through the IMP. Groundwater, surface water, air, and ecology are monitored on a routine basis. Additional monitoring is conducted around decommissioning and remediation projects to detect potential releases before they can move offsite.

Characterization and remediation of the IA will create new H&S challenges that could affect Site workers and surrounding communities. These will include, but will not be limited to, the following:

- Excavation and removal of slabs and foundations around UBC sites will disturb potentially contaminated soil;
- Remediation will consist of excavating significant volumes of soil;
- Concurrent decommissioning, characterization, and remediation projects will challenge H&S resources, as well as increase the potential for industrial accidents; and
- Offsite disposal of contaminated soil may result in a significant increase in truck traffic along local roads.

The number of decommissioning, characterization, and remediation projects ongoing each year will increase considerably by the year 2002 and will continue increasing until 2006. The increase in projects, and consequently heavy machinery and equipment required for decommissioning and remediation, will impact H&S staff participation and oversight requirements demanding additional vigilance by both H&S staff and workers.

Figure 10  
Anticipated Level of Effort for Integrated Industrial Area Remediation

Site Organization	Planning	Characterization	Remediation	Decision Documents	Site Closure Activities
Analytical Services Division	●	◆	◆	NA	NA
Communications	◆	◆	◆	◆	◆
Data Management	●	◆	◆	◆	◆
Decommissioning	◆	◆	◆	●	■
Emergency Response	■	◆	◆	NA	NA
Environmental Restoration	◆	◆	◆	◆	◆
Fire Department	■	◆	◆	NA	NA
Health and Safety	●	◆	◆	■	■
Human Resources	◆	●	●	■	■
IMP - Groundwater and Surface Water	●	●	●	●	●
Legal	●	■	■	◆	●
Nuclear Safety	■	■	NA	NA	NA
Planning and Integration	●	■	■	■	■
Procurement	●	■	■	NA	NA
Quality Assurance	●	◆	◆	◆	◆
Radiological Safety	●	◆	◆	■	■
Records Management	●	●	●	◆	◆
Regulatory Compliance	◆	●	●	●	●
Security	■	◆	■	NA	NA
Site Facilities	●	◆	◆	NA	NA
Stewardship	●	●	●	◆	◆
Traffic	■	◆	◆	NA	NA
Waste Management Program	●	■	●	●	NA

◆	Intensive
●	Moderate
■	Low
NA	Not Applicable

**Strategy**

Use railroad transportation to reduce the impact to local roads.

The volume of soil that will be excavated and removed from the Site will increase to almost 30,000 cubic meters in FY05 and 40,000 cubic meters in FY06. Transportation of this material will have a significant impact on local roads and communities. Transportation impacts may be mitigated by using railroad transportation whenever possible. This may include consideration of expanding onsite rail lines.

**Strategy**

Identify and plan for waste storage challenges.

## 5.2 Waste Management Program

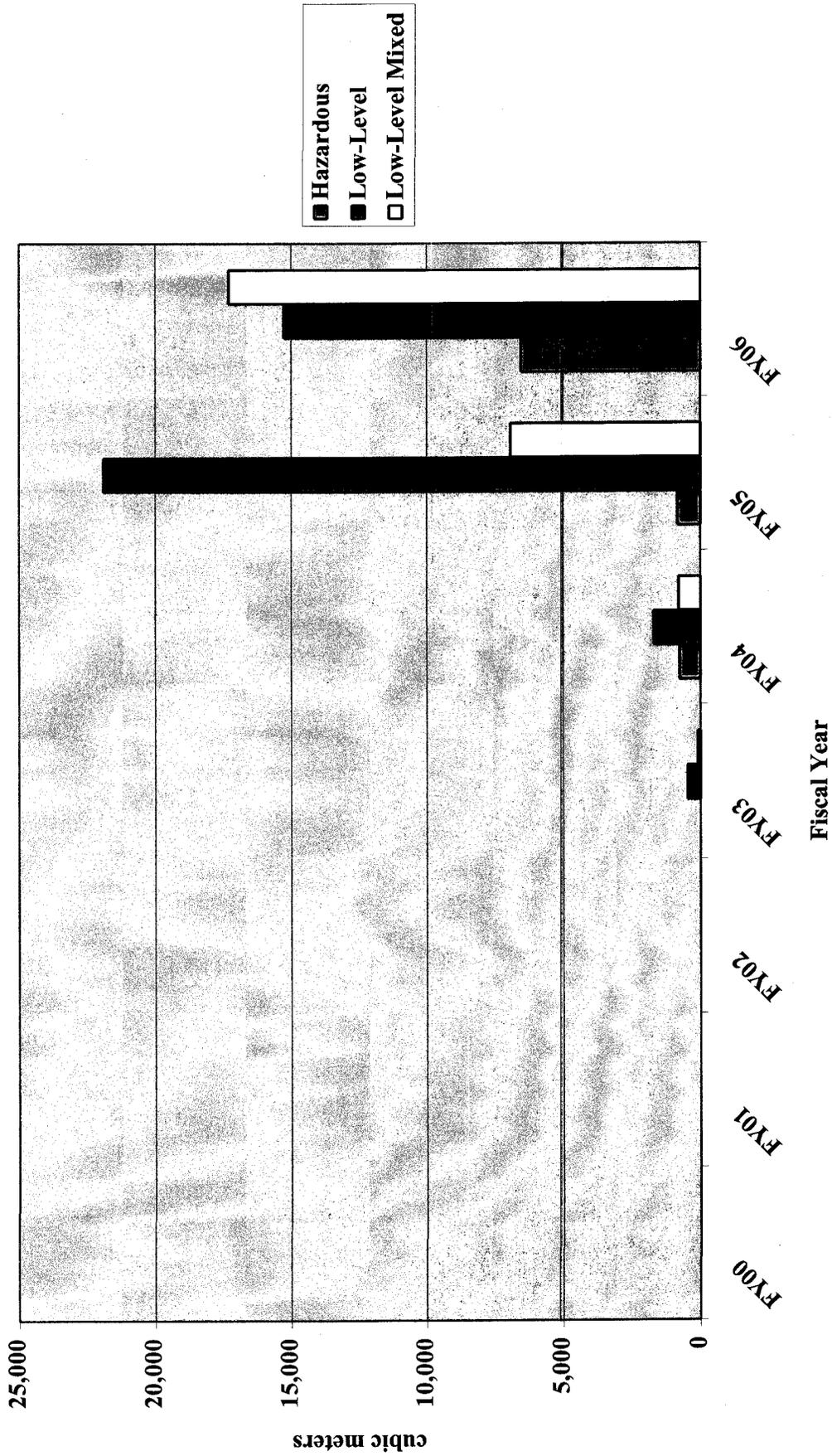
The Waste Management Program interface will be a key component in achieving 2006 closure. The Waste Management Program has responsibility for sitewide water operations and waste disposition. Groundwater or surface water generated as part of IA remediation will be dispositioned through Water Operations. The Waste Management Program will also provide procedures for sampling and containerizing waste, and arrange for storage or direct disposition of remediation-generated waste. The Waste Management Program will develop Waste Generating Instructions that will describe characterization, containerization, documentation, and labeling requirements.

Onsite treatment of waste may be considered in certain circumstances. Mixed RCRA characteristic wastes may be pretreated onsite to meet the various low-level disposal facility WAC. Listed wastes may be pretreated for shipping or WAC considerations; however, they will be managed as RCRA wastes for final disposition. Soil contaminated with hazardous constituents may be treated to meet RFCA put-back standards and returned to the remediation area. For example, it may be cost effective to treat VOC-contaminated soil and return it to the remediation area. Treated soil must, however, meet RFCA radionuclide put-back ALs before being returned to the remediation area.

ER remediation of the IA will generate significant volumes of hazardous, low-level, and low-level mixed wastes in the form of contaminated soil and associated contaminated debris, such as broken pipe, asphalt, and personal protective equipment (PPE). Estimated types and volumes of remediation wastes by FY are summarized on Figure 11. Generation of transuranic (TRU) waste from ER remediation is not anticipated. However, if TRU waste is generated during ER remediation, it will be dispositioned through the existing RFETS TRU Waste Program.

Offsite disposal immediately following remediation is the preferred option for wastes generated from IA remediation. Wastes will be properly characterized, packaged, and shipped offsite for final disposition at approved facilities. However, temporary onsite storage might be required to accommodate fluctuations in waste generation.

Figure 11  
Industrial Area Projected Remediation Waste Volumes



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*Temporary onsite waste storage may be necessary if disposal sites are unavailable.*

*The volume of decommissioning, characterization, remediation, and WAC analytical samples will increase dramatically.*

**Strategy**  
Identify and eliminate potential ASD resource challenges.

Temporary onsite storage capacity for low-level and low-level mixed waste is currently 9,921 and 14,865 cubic meters, respectively. These limits will be exceeded in FY05 and FY06, respectively. Potential strategies to ensure that waste volume does not become a limiting issue include:

- Package IA wastes for immediate disposition;
- Identify other potential offsite disposal options (this may not be within the control of RFETS);
- Identify and manage waste streams with no current disposition options; and
- Reevaluate the need for a corrective action management unit (CAMU) for storage of wastes generated by IA remediation. A CAMU designed for storage of all types of remediation waste, including "orphan waste" (>10 and < 100 nanocuries per gram of Pu and Am), would also provide temporary storage for IA remediation waste.

### 5.3 Analytical Services Division

Currently, approximately 55,000 environmental, waste management, and decommissioning samples are managed by ASD each year. This number will increase dramatically in response to increased decommissioning, characterization, and remediation efforts. Figure 12 illustrates the anticipated number of surface and subsurface soil samples that will be required for IA characterization and remediation activities. Additional decommissioning and waste management samples will also be required. ASD estimates the number of samples will dramatically increase from the current rate of 55,000 samples per year to well over 100,000 samples per year by FY03. This number is expected to increase even more significantly in FY04.

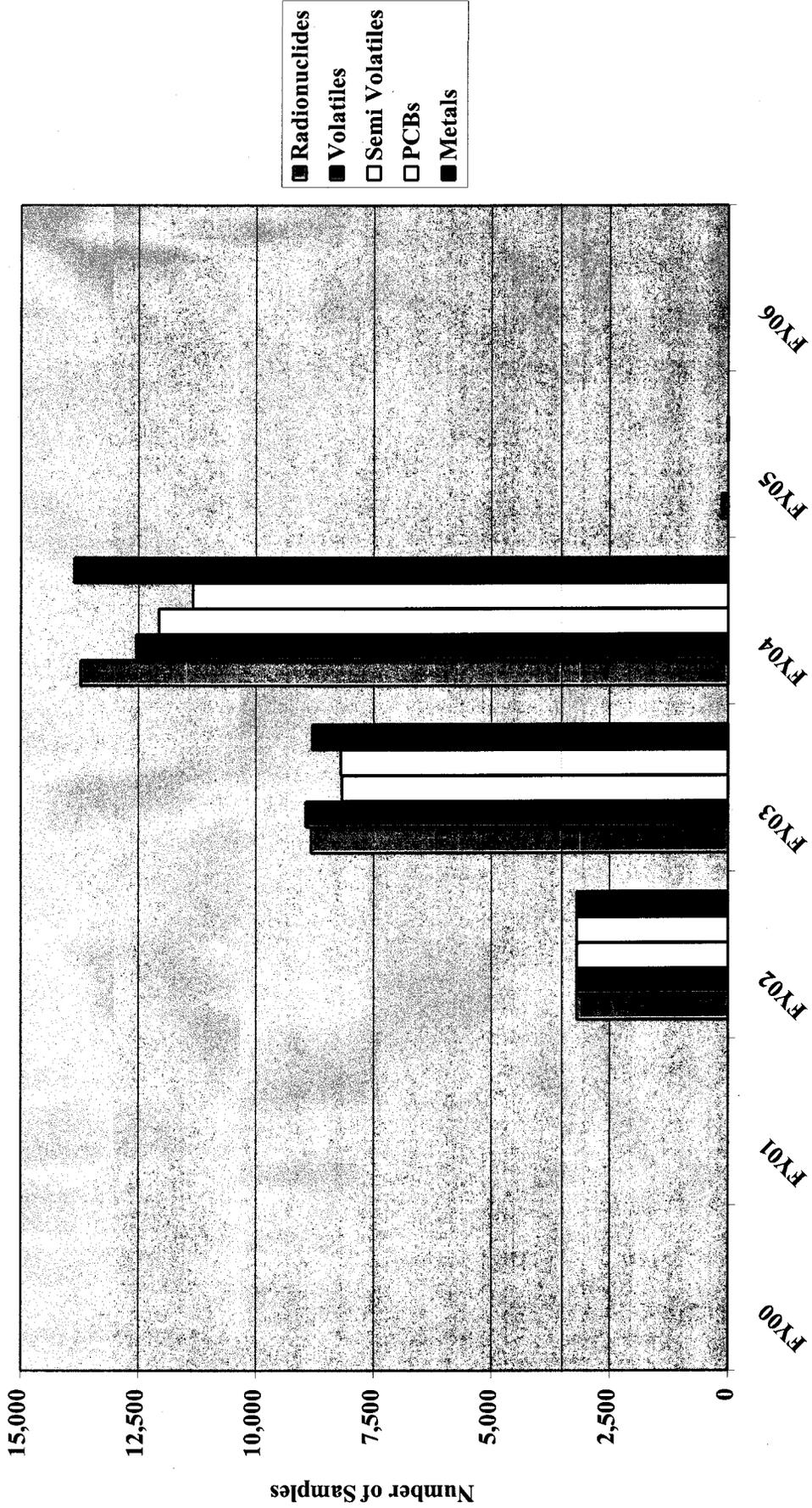
The volume of decommissioning and ER data that will be collected over the next several years will be of a larger magnitude, and collected within a shorter time span than during any previous sampling efforts at RFETS. Key challenges associated with the anticipated sample volume are (1) laboratory capacity, (2) data validation capacity, and (3) sample management capacity. To keep pace with ER needs, capacity in each of these areas will need to be increased.

Potential strategies to ensure adequate capacity include the following:

Evaluate ASD to identify and address potential challenges within the next 2 years;

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Figure 12  
Industrial Area Projected Characterization and Remediation Soil Samples



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**Strategy**

Identify additional laboratory and data validation capacity.

- Identify, audit, and procure additional offsite laboratory capacity within the next 2 years so that capacity is in place as needed;
- Develop additional onsite laboratory capacity; and
- Identify additional data validation resources.

### 5.4 Procurement

The RFETS Procurement process has been designed to provide the Site with qualified subcontractors who can meet and exceed the technical, QA/QC, and cost goals of 2006 closure. To provide the required characterization and remediation services for the Site, the IA project team (see Section 5.6) will provide a detailed Statement of Work (SOW) for each IA Group characterization and remediation. The SOW will include, at a minimum, a clearly defined technical scope, QA/QC requirements, personnel qualification requirements, and schedule requirements. The IA project team will work closely with Procurement to ensure the SOW is accurate and complete.

Strategic options that will eliminate redundant efforts and reduce procurement time include the following:

- The SOW development process will be streamlined through use of general characterization and remediation SOWs that can be modified to address specific IA Group needs;
- Additional streamlining of the process may be accomplished by combining decommissioning and ER procurements, and selecting key subcontractors able to perform design-build, decommissioning, characterization, and remediation or treatment. These subcontractors will be used for the majority of the work; and
- The opportunity for assigning a construction management firm to manage remediation subcontracting, scheduling, and change orders will be reviewed.

**Strategy**

Eliminate redundant procurements.

### 5.5 Resource Strategies

The scope of IA remediation activities over the next several years will impact all Site operations. The increase in the number of remediation projects will result in a need for additional technical and management resources. It is anticipated that decommissioning and remediation resource needs will

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increase as deactivation needs decrease. Additional resources that will be needed throughout the Site include, but are not limited to, the following:

- ER—environmental engineers, project managers, field crews, and equipment;
- H&S—RFETS-qualified H&S professionals;
- Radiological safety—RFETS-qualified Radiological Control Technicians;
- Data management—data management specialists to handle the large amount of data that will be entering the system; and
- QA/QC—QA/QC professionals for planning, field, data, and technical QA/QC.

Retaining knowledgeable staff, and recruiting and training new staff for a project with a limited life will challenge Site resources. The following strategies will be initiated:

- Retain key employees who have valuable knowledge and experience working at RFETS. A plan is being developed to provide incentives to retain key employees through the 2006 closure;
- Use decommissioning staff as appropriate. This strategy will help retain Site knowledge and streamline decommissioning and ER integration; and
- Hire and train staff 3 to 6 months in advance of the work curve. Much of the staff will be required to have RFETS-specific training and will need to become familiar with RFETS technical and regulatory requirements.

## 5.6 Project Communication

The complexities of IA remediation and its dependency on many RFETS organizations will require consistent and appropriate communication. Communication can always be improved and will be continuously addressed. Potential strategies include the following:

- Integrate ER and decommissioning staff into IA Group remediation project teams. This will provide total interaction, involvement, and integration from decommissioning through closure, and provide experienced staff for future projects. Project team members will be assigned different levels of responsibility during various phases of each project.

### Strategy

Retain key employees and train new employees in advance of the work curve.

### Strategy

Communicate with all appropriate RFETS organizations, regulatory agencies, and stakeholders.

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The project teams will include:

- ASD
- Data Management
- Decommissioning
- ER
- Facility Operations
- H&S
- QA
- Regulatory Agencies
- Regulatory Compliance
- Stewardship and Post-Closure Monitoring
- Waste Management Program;

- Interface with other key sitewide organizations that will provide direction, support, and/or oversight of the project teams. These organizations include, but are not limited to, the following:

- Community Relations
- Groundwater
- Legal
- Planning and Integration
- Radiological Engineering
- Radiological Operations
- Security
- Site Landlord Services
- Surface Water
- Water Operations; and

- Make communication a Site priority. Site priorities become part of the Site culture and everyday working experience.

## 5.7 Stakeholder Involvement

Stakeholder involvement is essential to closure of the IA. Stakeholder input to the IA Strategy is solicited and received through a variety of public forums including:

- IA Focus Group Meetings;
- The Citizens Advisory Board (CAB);
- Decontamination and Decommissioning (D&D) Focus Group Meetings;
- The Rocky Flats Water Working Group; and
- The Rocky Flats Coalition of Local Governments (RFCLOG).

### Strategy

Enhance the collaborative process.

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There will be continuing interaction with stakeholders throughout remediation of the IA. These opportunities for interaction will include, but not necessarily be limited to, stakeholder review and comment on the following:

- IA Focus Group Meetings;
- Proposed RFCA milestones and target activities;
- PAMs, IM/IRAs, or RSOPs;
- Proposed Plan, and
- CAD/ROD.

## **6.0 Summary**

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The IA Strategy describes key decisions, activities, and strategies to achieve IA closure as part of the 2006 Site closure. The decision framework incorporates decisions, data inputs, and activities into a logical structure that maps key decisions.

Key strategies for closure of the IA are streamlining regulatory and technical processes; integrating Site schedules and functions; consolidating IHSSs; PACs, and UBC sites into IA Groups; and eliminating potential resource roadblocks. IA activities and strategies are focused on achieving the goal of 2006 closure, as well as protection of human health and the environment.

Several IA Strategy activities will be initiated in FY00, including the following:

- Developing risk and dose assessment methodology;
- Developing DQOs;
- Developing the IASAP;
- Compiling existing data; and
- Evaluating potential ASD challenges.

As RFETS staff continues to decommission buildings, evaluate results of ongoing projects, and encounter new challenges, IA strategies will evolve. Existing strategies will be refined, and new strategies will be developed in response to lessons learned and new challenges. This information will be presented in annual updates to this IA Strategy (to be inserted in Appendix C).

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**THIS TARGET SHEET REPRESENTS AN  
OVER-SIZED MAP / PLATE FOR THIS  
DOCUMENT**

**Industrial Area Characterization  
and Remediation Strategy  
September 1999**

**Plate 1  
IHSS, PAC, UBC**

**Map ID: 99-0427**

**September 9, 1999**

CERCLA Administrative Record document, IA - A - 000555

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ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

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DOCUMENT**

**Industrial Area Characterization  
and Remediation Strategy  
September 1999**

**Plate 2  
Industrial Area  
Strategy Groups**

**Map ID: 99-0427**

**September 9, 1999**

CERCLA Administrative Record document, IA - A - 000555

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**Industrial Area Characterization  
and Remediation Strategy  
September 1999**

**Plate 3  
Industrial Area Strategy  
Accelerated Closure Program**

**Map ID: 99-0427**

**September 8 1999**

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**Appendix B**  
**Comment Response**

**Appendix C**  
**Annual Updates**

**Industrial Area  
Characterization and  
Remediation Strategy  
FY2000 Update**

**Appendix C**

**September 2000**

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## Acronyms

AL	action level
AME	Actinide Migration Evaluation
ASD	Analytical Services Division
BZ	Buffer Zone
CD	compact disk
CDPHE	Colorado Department of Public Health and Environment
CPB	Closure Project Baseline
CRA	Comprehensive Risk Assessment
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DOP	Decommissioning Operation Plan
DQO	data quality objective
EDDIE	Environmental Data Dynamic Information Exchange
EMWD	Environmental Measurement While Drilling
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ft	Feet
FY	fiscal year
GC/MS	gas chromatography/mass spectrometry
GIS	Geographic Information System
HDD	Horizontal Directional Drilling
HPGe	High Purity Germanium
HRR	Historical Release Report
IA	Industrial Area
IA Strategy	Industrial Area Characterization and Remediation Strategy
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Sites
IWCP	Integrated Work Control Package
LIBS	Laser Induced Breakdown Spectroscopy
m	meter
m <sup>2</sup>	square meter
NFA	No Further Action
NLR	no longer representative
NPWL	New Process Waste Line
OPWL	Original Process Waste Line
PA	Protected Area
PAC	Potential Area of Concern
PAM	Proposed Action Memorandum
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RSOP	RFCA Standard Operating Protocol
SNL	Sandia National Laboratory
SWD	Soil Water Database

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SWWB  
UBC  
VOC  
XRF

Site-Wide Water Balance  
Under Building Contamination  
volatile organic compound  
X-Ray Fluorescence

## **1.0 INTRODUCTION**

The Industrial Area (IA) Characterization and Remediation Strategy (IA Strategy) (DOE 1999a) was developed by the U.S. Department of Energy (DOE) during Fiscal Year (FY) 1999 to provide a roadmap for final closure of the Rocky Flats Environmental Technology Site (RFETS) IA and ensure full integration of remediation efforts, including facility decommissioning, characterization, remediation, and regulatory agency and stakeholder participation. This FY2000 (October 1, 1999 through September 30, 2000) IA Strategy Update describes progress on IA Strategy components and changes to the IA Strategy. This update is Appendix C to the IA Strategy.

Major accomplishments during FY2000 are data management upgrades and the draft Industrial Area Sampling and Analysis Plan (IASAP) (DOE 2000a). Key components of these two projects include the following:

### Data Management

- Development of the Data Quality Filter;
- Implementation of the Data Quality Filter to create a subset of soil data for use in the IA;
- Documentation of the soil data set in the IA Data Summary Report (DOE 2000b); and
- Soil Water Database (SWD) upgrades.

### IASAP

- Development of an "in-process" sampling and analysis methodology;
- Development of a hot spot methodology;
- Evaluation of IA data using SmartSampling;
- IASAP Addenda; and
- Development of a draft Comprehensive Risk Assessment (CRA) Methodology (DOE 2000c).

Other projects and programs that have an impact on IA activities, including the Soil Management Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP), the Annual Update to the Historical Release Report (HRR), and Decontamination and Decommissioning (D&D) interactions, are discussed in the appropriate sections.

## **2.0 REGULATORY FRAMEWORK**

There are no updates to the IA Strategy regulatory framework.

## **3.0 DECISION FRAMEWORK**

### **3.1 SITE CLOSURE**

There are no updates to the Site closure strategy.

### **3.2 FUTURE LAND USE**

During FY2000, the RFCA Parties discussed the possibility of preparing either an Interim Record of Decision or a RFCA Integrating Decision Document. Discussions will continue into FY2001. While neither document will ultimately change the Site closure strategy, they could enhance the accelerating streamlining efforts to close RFETS.

There are no changes to future land use assumptions; however, Colorado Senator Wayne Allard and Colorado Representative Mark Udall introduced joint legislation to make RFETS a National Wildlife Refuge. The proposed bill calls for 6,400 acres of the site to become a refuge after cleanup and closure is complete. At that time, the Site would be transferred to the U.S. Department of the Interior and maintained and protected as a refuge. DOE would retain any residual responsibilities for cleanup under existing environmental laws. If the proposed bill becomes law, RFCA Attachment 5, Action Level Framework may need to be modified. In addition, an onsite wildlife refuge worker exposure scenario is being developed through the risk assessment working group.

## **4.0 CHARACTERIZATION AND REMEDIATION APPROACH**

### **4.1 GROUPING OF SITES**

There are no updates to the grouping of sites.

### **4.2 INTEGRATION WITH DECOMMISSIONING**

Integration with decommissioning projects during FY2000 includes the following:

- Revision of the IA characterization and remediation schedule to reflect the current 2005-working schedule. In the 2005 schedule, all characterization and remediation activities are finished by December 2006. The schedule is illustrated on Figure 1 which is a revision of the FY1999 IA Strategy Plate 3;
- Development of the Environmental Restoration (ER)/D&D interface for the Facility Disposition RSOP (DOE 2000d);

- Development of a Proposed Action Memorandum (PAM) for remediation of Under Building Contamination (UBC) at Buildings 771, 774, and 770 which has been included in the 771 Closure Project Decommissioning Operation Plan (DOP) (DOE 2000e);
- Development of the D&D/ER interface for the Building 707 DOP (DOE 2000f);
- Development of the D&D/ER interface for the Building 776/777 DOP (DOE 2000g);
- Participation in D&D Advance Planning and Characterization projects at Buildings 371, 707, and 111; and
- Assignment of ER liaisons to each of the D&D projects.

FY2000 D&D accomplishments and activities that impact IA activities include the following:

- Approval of the RSOP for Concrete Recycling (DOE 1999b);
- Demolition of Building 779, Former Weapons Research and Development Laboratory;
- Completion of the 771 Closure Project DOP;
- Completion of the 776/777 Closure Project DOP;
- Completion of the Facility Disposition RSOP; and
- Preparation of the Building 707 DOP.

D&D activities forecast for FY2001 that will have a significant impact on the IA include the following:

- Consolidation of plutonium and special nuclear material in Building 371 and the associated shrinking of the Protected Area (PA) fence. After a new fence is built around Buildings 371/374, the PA will be open for general Site access. Opening of the PA will result in easier and consequently faster access to project work sites. The existing PA fence will be removed later in the decommissioning process.
- Decommissioning of the 771/774, 776/777, 707, and 886 building clusters will be ongoing in FY2001.

#### **4.3 RISK AND DOSE ASSESSMENT METHODOLOGY**

##### **4.3.1 Risk and Dose Assessment Methodology**

A draft risk and dose assessment methodology, the draft CRA Methodology (DOE 2000c), was developed so that sampling and analysis methods planned for the IA will meet CRA requirements. This will result in the following:

- IA characterization and post-remediation sampling will be adequate for the CRA and additional sampling will not be required for the CRA.

- Analytical results (field and/or laboratory) will be of adequate quality for CRA analyses.
- Sampling density will be adequate for CRA analyses.

The draft CRA Methodology contains the following elements:

- Data aggregation;
- Contaminant of concern selection;
- Human health risk characterization;
- Exposure unit assessment; and
- Ecological risk assessment.

The draft CRA Methodology is being reviewed by the Colorado Department of Public Health and Environment (CDPHE) and the U.S. Environmental Protection Agency (EPA), and will be available on the Environmental Data Dynamic Information Exchange (EDDIE) Web Site in early 2001.

#### **4.3.2 Comprehensive Risk Assessment**

In response to the Allard/Udall proposed legislation (Section 3.1.2) an onsite wildlife refuge worker exposure scenario has been added to the draft CRA Methodology.

##### ***Actinide Migration Evaluation***

The Erosion Modeling study, part of the Actinide Migration Evaluation (AME), was completed in FY2000. The project goal was to evaluate the behavior and mobility of actinides (plutonium, americium, and uranium) in surface water, groundwater, and soil. The key conclusions of the Erosion Modeling study are the following:

- Results indicate that remediation alone will not guarantee that surface water standards will always be met.
- A combination of remediation, erosion, and runoff controls, and sediment containment will be necessary to achieve surface water standards.

AME information is being used for the following purposes:

- Remediation to protect surface water;
- Remedial alternative development;
- Final Site configuration design;
- Watershed management and design; and
- Human and ecological risk assessments.

### ***Site Water Balance***

A Site-Wide Water Balance (SWWB) that will predict Site hydrology (surface water and groundwater) at Site closure was started during FY2000. Closure activities and the final end-state configuration have the potential to significantly alter groundwater, surface water, and near-surface flow at RFETS. Additionally, many Site closure decisions cannot be made without first considering quantified predictions of effects on groundwater and surface water flow. The purpose of the SWWB is to provide a management tool to evaluate how the Sitewide hydrology is likely to change from current to final Site configuration.

The SWWB will provide information for the future IA configuration to protect surface water quality, the CRA, and the final Corrective Action Decision/Record of Decision. The SWWB will also be used in predictions of surface water impacts from groundwater, current and final Site configuration, and final configurations of the Walnut Creek and Woman Creek drainages.

Several future scenarios are being evaluated in the SWWB including the following:

1. Ending the importing of offsite water onto RFETS;
2. Plugging all subsurface footing drains, storm sewers, and sanitary sewers;
3. Covering 90 acres with an engineered and vegetated surface;
4. Removing all existing roads, pavement, and buildings within and near the IA and covering with native soil and compatible vegetation, at grade; and
5. Combining scenarios 3 and 4 and adding reconfiguration of the Buffer Zone (BZ).

### **4.3.3 Data Quality Objectives**

Data quality objectives (DQOs) for IA sampling and analysis were developed and are presented in the draft IASAP (DOE 2000a). Preliminary DQOs for the IASAP are provided in the Preliminary Data Quality Objectives for the Industrial Area Sampling and Analysis Plan (DOE 2000h).

## **4.4 CHARACTERIZATION APPROACH**

The draft IASAP was developed during FY2000 to provide sampling and analysis methods for IA characterization and remediation sampling. The IASAP includes several innovative approaches designed to streamline and ensure consistent sampling and analysis methods. Significant components of the IASAP include the following:

- In-process sampling and analysis;
- Hot spot methodology;
- SmartSampling; and
- IASAP Addenda.

Additionally, the draft CRA Methodology was developed and will be an appendix to the Final IASAP.

### ***In-Process Sampling and Analysis***

The primary focus of the draft IASAP is the in-process sampling and analysis approach that combines statistical methods with field instrumentation analysis of soil samples. Sampling locations, based on existing data, are determined using standard statistical methods, biased sampling methods, SmartSampling, or a combination of methods. Soil is analyzed either insitu or at an onsite mobile laboratory. In-situ analysis methods include High Purity Germanium (HPGe), Laser-Induced Breakdown Spectroscopy (LIBS), or X-Ray Fluorescence (XRF) techniques. Organic compound analysis methods consist of gas chromatography/mass spectrometry (GC/MS).

These methods will result in the following:

- Real-time determination of where contamination exists above background or RFCA action levels (ALs);
- Real-time remedial decisions (i.e., whether remediation is required); and
- Real-time determination whether remediation goals have been met.

### ***Hot Spot Methodology***

A hot spot methodology specific to Individual Hazardous Substance Sites (IHSSs), Potential Areas of Concern (PACs), UBC Sites, and IA White Space Areas was developed to augment statistical sampling location and traditional data analysis methods. The size of a hot spot will define the sampling location grid.

The hot spot size for IHSSs, PACs, and UBC sites is 11 meters (m) (36 feet [ft]) in diameter. This corresponds to the field of view for the HPGe and provides for radionuclide analysis of 90 percent of IHSSs, PACs, and UBC Sites.

The hot spot size outside of IHSSs, PACs, and UBC Sites (White Space Areas) is 10,000 square meters (m<sup>2</sup>). A 10,000 m<sup>2</sup> hot spot is small in comparison and results in conservative sampling location grids for this large area.

### ***SmartSampling***

SmartSampling is a geostatistical approach that combines several statistical software packages to determine sampling and remediation locations. SmartSampling was developed at Sandia National Laboratory (SNL) and is currently used at several DOE sites.

The use of SmartSampling in the IA will accomplish the following:

- Optimize the number and locations of characterization samples;

- Develop maps of the areas requiring remediation at a given level of probability;
- Optimize the number and location of confirmation samples;
- Achieve DQO-specified limits on decision errors; and
- Link onsite analysis with sampling to allow near real-time remediation decisions (i.e., determine whether remediation is required).

SmartSampling is an iterative process based on remediating the site to required ALs at a specified level of confidence. SmartSampling will use existing and IA-generated data to map the probability of exceeding RFCA ALs in IHSSs, PACs, UBC Sites, and White Space Areas.

#### ***IASAP Addenda***

The IA consists of 194 IHSSs, PACs, UBC Sites and tanks that were consolidated into 58 IA Groups (DOE 1999a) to streamline decision document efforts and coordinate with the D&D schedule. To further streamline the decision document process, IASAP Addenda that will contain IA Group-specific sampling and analysis requirements will supplement the IASAP. This will eliminate the need for developing separate sampling and analysis plans for each IA Group. The draft IASAP Addendum for IA Group 700-4 is included as an example of an IASAP Addendum as Appendix A to the draft IASAP.

CDPHE and EPA are reviewing the draft IASAP. The final IASAP will be available in early 2001 on the EDDIE Web Site.

## **4.5 REMEDIATION APPROACH**

### **4.5.1 No Further Action**

CDPHE and EPA provided comments on the 1997, 1998, and 1999 HRR Annual Updates. These comments were addressed in a response to the regulatory agencies and the data are incorporated in the 2000 Annual Update to the HRR (DOE 2000i). To date, 94 sites have been accepted as No Further Action (NFA) recommended sites, 174 require additional characterization, and DOE will provide additional data on 63 sites.

### **4.5.2 Removal and Offsite Disposition**

There are no updates to the removal and offsite disposition strategy.

### **4.5.3 Caps and Covers**

The proposed 700 Area Cap has been removed from the Closure Project Baseline (CPB). Reevaluation of existing historical data indicates remediation of the 700 Area will provide the appropriate level of protection for human health and surface water resources. Costs for remediating IHSSs, PACs, and UBC Sites in the 700 Area are in the current CPB.

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#### **4.5.4 Plume Remediation**

The groundwater plume map that illustrates the extent of volatile organic compound (VOC) and nitrate plumes in the IA has been revised and is presented in the 1999 Annual RFCA Groundwater Monitoring Report (DOE 2000j).

#### **4.5.5 Groundwater and Surface Water**

Updates to groundwater and surface water are discussed in Section 4.3.3.

#### **4.5.6 Decision Documents**

An RSOP for Soil Management is being developed to combine existing discrepant soil management activities into one process to ensure consistency and protection of human health and the environment. This RSOP contains a decision tree for appropriate soil management options based on RFCA Tier I and Tier II values. Site personnel will follow this RSOP regardless of whether the soil was disturbed for maintenance, construction, characterization, or other Site activities. Once approved, the RSOP will replace the existing FO.23 and FO.29 Site procedures and ensure appropriate soil management in support of closure.

### **4.6 CHARACTERIZATION AND REMEDIATION CHALLENGES**

#### **4.6.1 Underground Pipeline Systems**

Original Process Waste Lines (OPWL), New Process Waste Lines (NPWL), Sanitary Sewer System, and Storm Drains exist within and outside of existing IHSSs, PACs, and UBC Sites. Pipelines within or close to IHSS, PAC, or UBC Site boundaries will be included in the area of concern for characterization. OPWL will be characterized and remediated according to the current CPB, but Resource Conservation and Recovery Act (RCRA) closure of the OPWL will take place after appropriate characterization and remediation.

Existing OPWL data were compiled onto a map that illustrates documented OPWL leaks. This map is included as Figures 22 and 25A through 25F in the draft IASAP (DOE 2000a).

#### **4.6.2 Under Building Contamination**

Two UBC sites, UBC 123 and UBC 886, are being investigated during FY2000 and FY2001. An innovative technique using horizontal directional drilling (HDD) coupled with the Environmental-Measurement-While-Drilling (EMWD) is being used to evaluate potential contamination beneath the UBC Sites. HDD is a technology that drills horizontal boreholes. EMWD is a gamma measurement instrument that monitors radionuclides in a borehole. This project also includes drilling through floor slabs using conventional techniques.

HDD and EMWD techniques will be compared to conventional techniques to determine the following:

- Whether HDD/EMWD are effective in characterizing soil under active buildings;
- Whether HDD/EMWD are effective in characterizing soil around OPWL and other underground utilities; and
- Whether HDD/EMWD provide health and safety, cost, or schedule benefits.

Field work is scheduled for October 2000. Results will be available in early 2001.

#### **4.7 DATA MANAGEMENT**

##### **4.7.1 Existing Data**

Existing IA data were evaluated to determine their applicability to IA sampling and analysis activities. Because most FY2000 work is applicable to existing and new data, data management activities are described in Section 4.7.4, Data Management Challenges.

##### **4.7.2 Comprehensive Data Compilation**

A compilation of existing IA data is presented in the IA Data Summary Report (DOE 2000b) and Appendix B of the draft IASAP (DOE 2000a).

##### **4.7.3 New Data**

New data collected during IA characterization and remediation activities will consist of field analytical and laboratory analytical data. Field analytical data generated during IA sampling activities will be managed so that data are easily configured and transferred to the appropriate Site databases. All field instrumentation will be equipped with instrument-specific software that will record and report all relevant environmental and quality control data generated. Field measurements will be downloaded daily, or at the end of the sampling event if it is less than 1 day. A field data system will stream data from the analytical instruments into a relational Microsoft Access database. Data will be configured for the following uses:

- ER data evaluation according to DQOs;
- SmartSampling;
- Analytical Services Toolkit; and
- SWD.

Offsite laboratory analytical data will be managed in accordance with current Analytical Services Division (ASD) procedures.

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#### **4.7.4 Data Management Challenges**

Effective management of environmental data is critical to the success of the IA Closure. Quality data is required for remedial decisions and for use in the CRA. Because much of the existing data in the IA have not been evaluated according to RFETS quality assurance requirements nor presented to the regulatory agencies, this was an important task in preparing for Site closure. Several data management tasks were completed during FY2000.

##### ***Data Quality Filter***

A Data Quality Filter was developed to evaluate all data sets used for IA decisions. The IA Data Quality Filter was used with existing SWD to develop a set of data that is the starting point for IA characterization planning. Additionally, all data developed during IA characterization and post-remediation sampling activities will be processed through the filter. This process will result in a CRA data set. Records in SWD will be marked with the appropriate qualifiers to identify IA and CRA data.

The Data Quality Filter provides a step-by-step process for evaluating the quality of environmental data. Key components of the filter include the following:

- Evaluate data to determine whether the data meet documented laboratory procedures and analyses were conducted according to standard laboratory procedures;
- Evaluate data to determine whether the data meet laboratory validation and verification guidelines;
- If data have not met all the quality criteria, evaluate data uses to determine whether data are qualified for limited use;
- Evaluate data against field procedures and work plans to determine whether data were collected correctly;
- Evaluate data to determine whether locations have been remediated and are no longer representative of Site conditions; and
- Evaluate data to determine whether there are limitations on the data due to regulatory or user concerns.

These specific criteria are itemized and systematically evaluated through research and database queries and the data are individually "flagged," by record, in the digital data sets used to support IA activities.

Further details on the Data Quality Filter are in the Preliminary DQOs for the IASAP (DOE 2000h) and the Draft IASAP (DOE 2000a).

##### ***Implementation of the Data Quality Filter to Create the Soil Data Set***

The Data Quality Filter was implemented by developing a set of database queries that systematically evaluated each record against the Data Quality Filter criteria. The results

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of these analyses are presented in the IA Data Summary Report (DOE 2000b) and briefly described below.

### ***Industrial Area Data Summary Report***

The IA Data Summary Report is a compilation of existing surface and subsurface soil data in the IA. Data from the SWD were evaluated through the Data Quality Filter and against additional IA-specific criteria to develop a data set of usable quality data.

Approximately 1 million analytical records within the IA boundary were evaluated through the filter including 136,608 subsurface soil and 68,893 surface soil records. Fifty-nine percent of the subsurface soil records are usable without qualification, 15 percent were rejected, and the remaining records are usable with qualification. Fifty-two percent of the surface soil records are usable without qualification, two percent were rejected, and the remaining records are usable with qualification.

The IA Data Summary Report contains maps of all IHSSs, PACs, and UBC Sites in the IA that have existing data with the locations and types of data available. The complete data set, including location, analytical data, and qualifiers are included on a compact disk (CD). The Industrial Area Data Summary Report is available on the EDDIE Web Site.

### ***Soil Water Database***

Several tasks that improved data quality and accommodated the needs of IA characterization and remediation and eventual CRA analysis were completed by the cooperative efforts of the ER and Environmental Systems and Stewardship Groups. These accomplishments include the following:

1. Standard Query Tool - Developed a standard query tool so that users can transfer data out of SWD and into database or spreadsheet programs. Retrieving SWD data no longer requires programming skill.
2. Corrected and Correlated Location Data - Reviewed sampling locations to ensure consistency between SWD and the Site Geographic Information System (GIS) including:
  - Reviewed and updated 1,125 borehole locations; and
  - Reviewed and updated 1,234 well locations.
3. Missing Field Data - Added Missing Field Data for environmental sampling projects (especially those associated with the IA) to link location code to electronic analytical data.
4. Created Master Location Table - Created a link between SWD and GIS to store sampling locations for spatial analysis. This new table provides a single source of quality control-reviewed environmental data locations for RFETS. The table will significantly help users find and map data.

5. Coded Data by Logical Groups - Added codes to SWD for project names, IHSS, PAC, UBC Site and other common designations to help users find data fast.
6. Fixed Pick-Lists –Reviewed and edited project name and sample type pick lists for better data coding and sorting.
7. Added NLR (No Longer Representative) Field - Allows projects to code data that are “no longer representative” of site conditions (i.e., waste shipped offsite or soil removed).
8. Fixed Soil and Surface Water Locations - Reviewed and corrected 3,000 surface soil and surface water sampling locations.
9. Delete Tool – Created a tool to allow SWD administrators to remove duplicate data resulting from laboratory issues.
10. Location Control and Surveying Procedure – Developed a new procedure for location control and surveying.

## **5.0 PROJECT INTERFACES**

### **5.1 HEALTH AND SAFETY**

The Integrated Work Control Package (IWCP) process is being evaluated and revised to be more effective. The new IWCP process is expected to reduce redundancy while focusing efforts on health and safety improvements. Key features of the IWCP revision include new requirements for lockout/tagout and increased use of preventative maintenance and standard operating procedures.

### **5.2 WASTE MANAGEMENT PROGRAM**

There are no updates to the Waste Management Program.

### **5.3 ANALYTICAL SERVICES DIVISION**

ER staff will use field analytical instruments for characterization and remediation sample analyses in the IA in addition to ASD offsite laboratory capabilities. ER and ASD will interface throughout FY2001 on several issues that will affect IA characterization activities as follows:

- Quality assurance for field analytical instruments;
- Data management; and
- Offsite analytical laboratory use.

#### **5.4 PROCUREMENT**

ER staff is formulating characterization and remediation procurement strategies. The ER procurement strategy includes obtaining the following services:

- IA field sampling;
- IA field analytical capabilities; and
- IA remediation.

#### **5.5 RESOURCE STRATEGIES**

As part of the new Kaiser-Hill Company, L.L.C. contract with DOE, many Site functions were reorganized to focus on project-oriented goals. The reorganization will enhance communication between and among projects and help focus on Sitewide closure issues.

#### **5.6 PROJECT COMMUNICATION**

ER staff communicate with a variety of Site organizations on both ongoing and as-needed bases. ER interaction with the D&D organization is described in Section 4.2.

#### **6.0 REFERENCES**

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**THIS TARGET SHEET REPRESENTS AN  
OVER-SIZED MAP / PLATE FOR THIS  
DOCUMENT**

**Industrial Area Characterization  
and Remediation Strategy  
September 1999**

**Plate 3  
Figure 1  
Industrial Area Schedule**

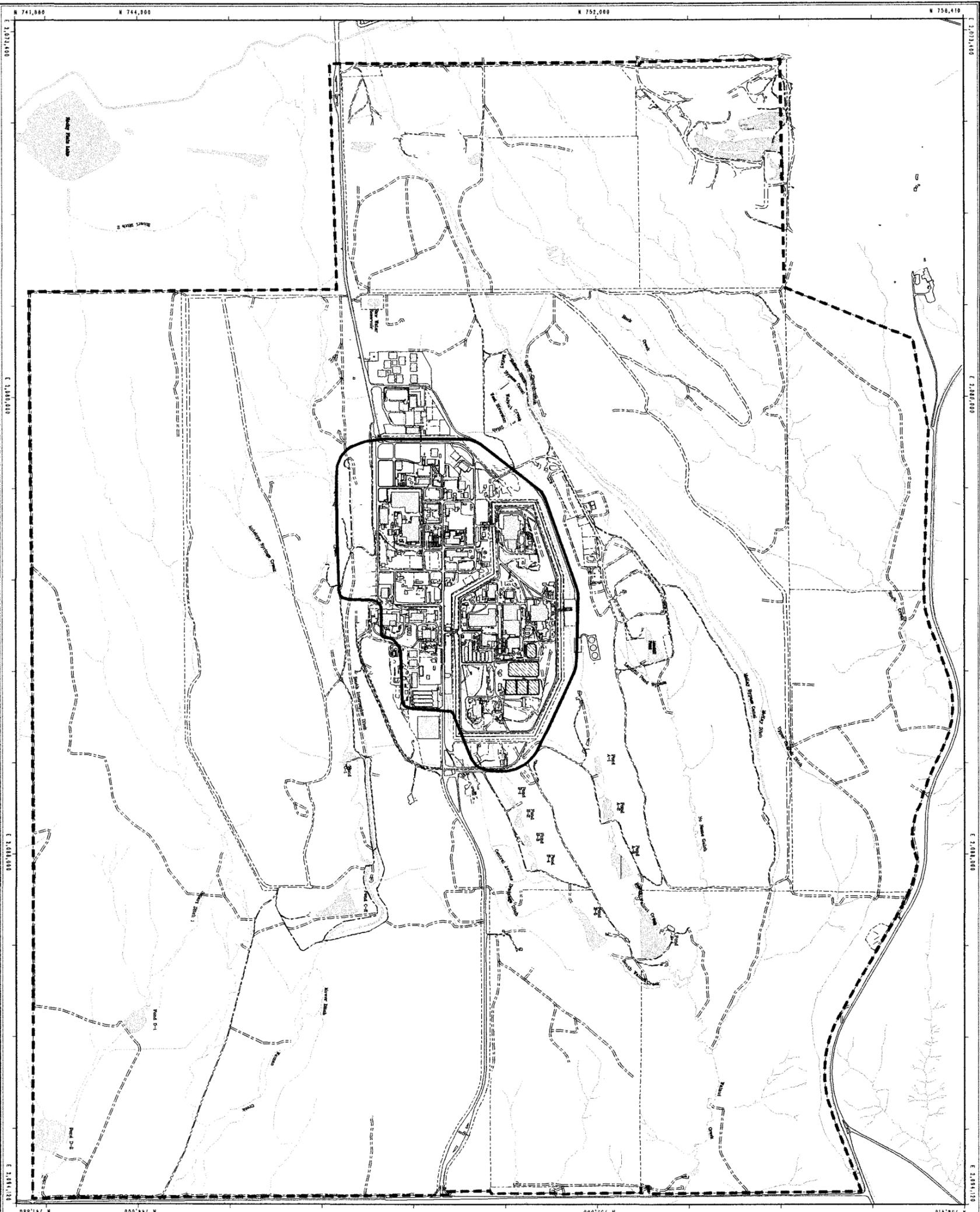
**Map ID: 2k-0614**

**September 25, 2000**

CERCLA Administrative Record document, IA - A - 000555

U.S. DEPARTMENT OF ENERGY  
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO



**Figure 1**  
**Rocky Flats Environmental**  
**Technology Site**

**EXPLANATION**

- Standard Map Features**
- Buildings and other structures
  - Solar Evaporation Ponds (SEP)
  - Lakes and ponds
  - Streams, ditches, or other drainage features
  - Fences and other barriers
  - Rocky Flats boundary
  - Paved roads
  - Dirt roads

DATA SOURCE:  
 Topographic, hydrographic, and other  
 information from 1988 aerial imagery data  
 acquired by ES&S, Inc., Vienna, VA  
 Digitized from the original analog data.



Scale = 1 : 21330  
 1 inch represents approximately 1778 feet



State Plane Coordinate Projection  
 Colorado Central Zone  
 Datum: NAD27

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

**RMRS**  
 Rocky Mountain  
 Remediation Services, L.L.C.  
 Rocky Flats Environmental Technology Site  
 Golden, CO 80424-1614

MAP ID: 89-0382

September 15, 1989

Figure 2  
Site Closure Strategy

Vision, RFCA and 2006 Closure Assumptions



Pre-CAD/ROD Monitoring

Operations and Maintenance

IA Remediation

Ongoing Operations  
Deactivation  
Decommissioning  
Environmental Restoration

Comprehensive  
Risk  
Assessment

CAD/ROD(s)

Delisting from NPL

Post-Closure  
Monitoring, Operations,  
and  
Maintenance/Stewardship

5-Year Review(s)

BZ Remediation

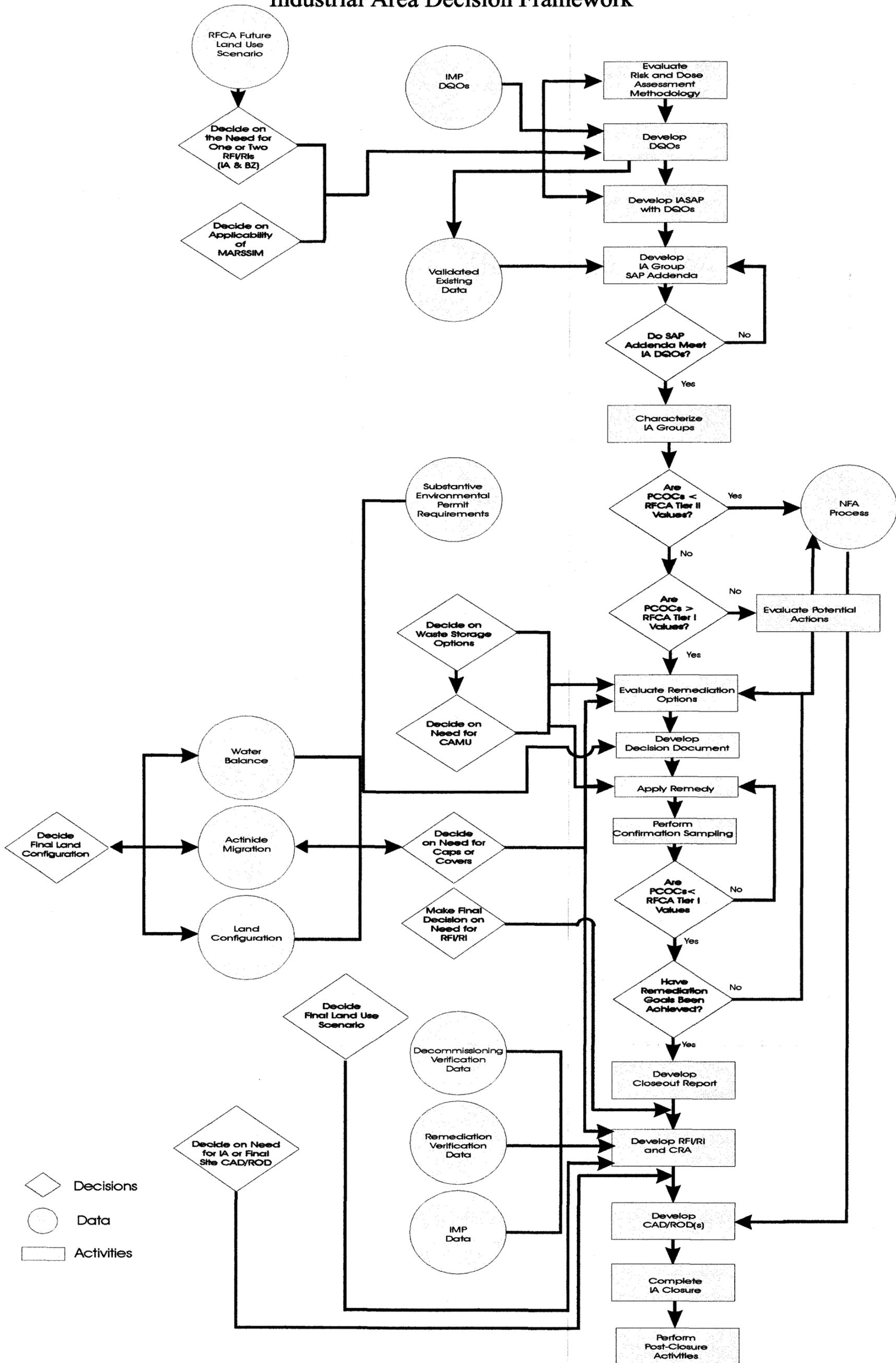
Post-CAD/ROD Monitoring and Stewardship

Figure 3  
Industrial Area Strategy Elements

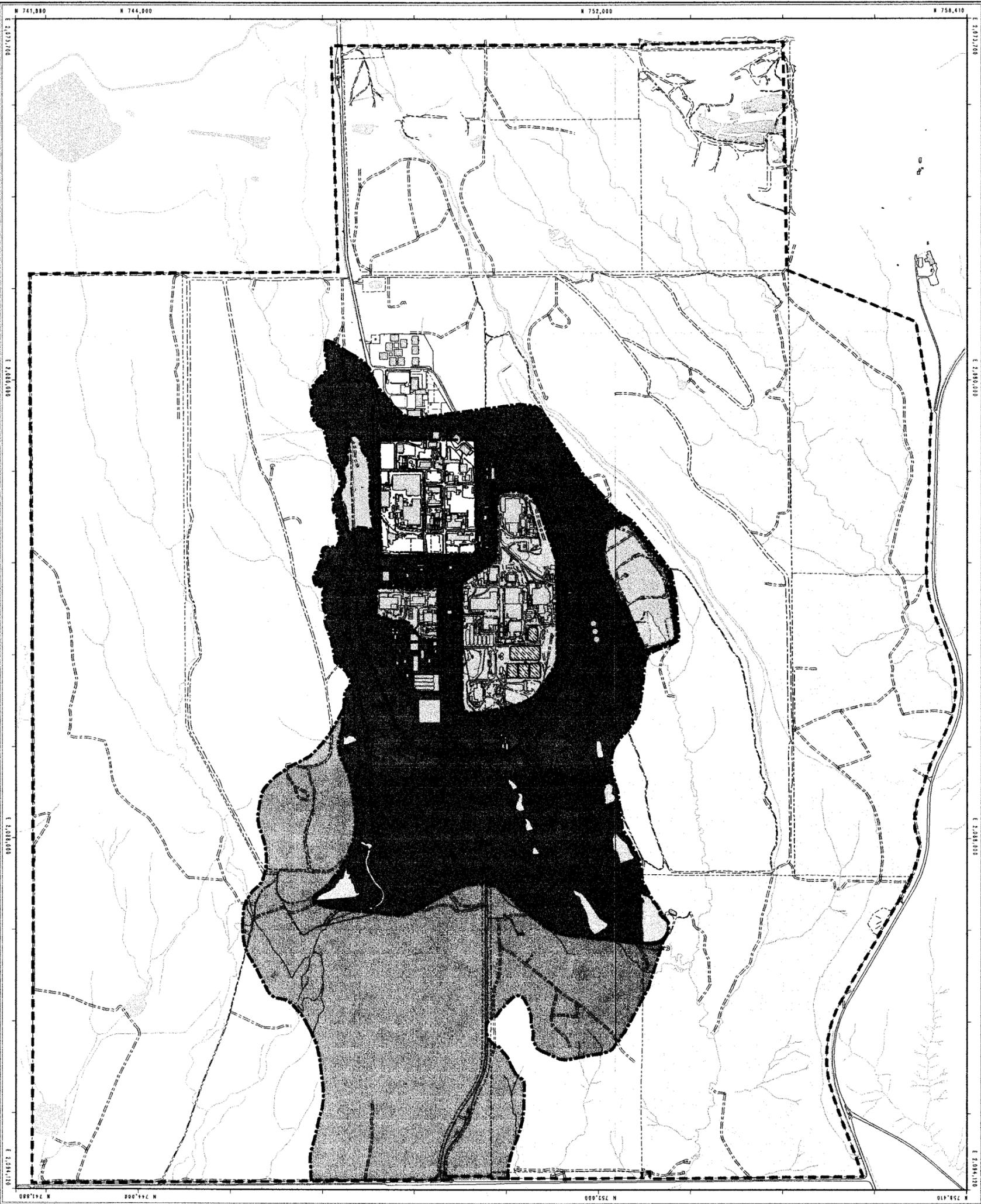
**Strategy:**  
Integrate regulatory and technical strategies to achieve 2006 closure through streamlining schedules and eliminating unnecessary or redundant efforts.

Characterization and Remediation	Risk Assessment	Data Management	Project Interface
<p><b>Strategy:</b> Group IHSSs, PACs, and UBC sites into the decommissioning project structure.</p>	<p><b>Strategy:</b> Combine IA Group remediation activities whenever possible.</p>	<p><b>Strategy:</b> Develop risk and dose assessment methodologies for open space and industrial use scenarios.</p>	<p><b>Strategy:</b> Transfer Site databases to a common platform.</p>
<p><b>Strategy:</b> Integrate IA remediation activities with decommissioning activities.</p>	<p><b>Strategy:</b> Excavate and package for immediate disposition.</p>	<p><b>Strategy:</b> Develop a risk assessment methodology that focuses on CRA requirements.</p>	<p><b>Strategy:</b> Organize the SWD so that it becomes the Site closure database.</p>
<p><b>Strategy:</b> Use one subcontractor for demolition and remediation.</p>	<p><b>Strategy:</b> Remediate plumes using reactive barriers, source removal, and monitored natural attenuation.</p>	<p><b>Strategy:</b> Enhance GIS so that project managers and staff have access to information.</p>	<p><b>Strategy:</b> Identify and plan for waste storage challenges.</p>
<p><b>Strategy:</b> Formulate DQOs that include characterization, remediation, and Site closure requirements.</p>	<p><b>Strategy:</b> Develop an RSOP for remediation.</p>		<p><b>Strategy:</b> Identify and eliminate potential ASD resource challenges.</p>
<p><b>Strategy:</b> Begin characterization during deactivation or decommissioning.</p>	<p><b>Strategy:</b> Work with regulatory agencies to streamline the review process.</p>		<p><b>Strategy:</b> Identify additional laboratory and data validation capacity.</p>
<p><b>Strategy:</b> Optimize sampling activities and only sample once.</p>	<p><b>Strategy:</b> Remediate contaminated pipelines and soil; stabilize in place noncontaminated pipelines.</p>		<p><b>Strategy:</b> Eliminate redundant procurements.</p>
<p><b>Strategy:</b> Use existing data whenever possible to eliminate redundant sampling efforts.</p>	<p><b>Strategy:</b> Focus on remediating contaminated soil rather than the location of pipeline leaks.</p>		<p><b>Strategy:</b> Retain key employees and train new employees in advance of the work curve.</p>
	<p><b>Strategy:</b> Develop OPWL, NPWL, and utility remediation approaches based on lessons learned at other sites.</p>		<p><b>Strategy:</b> Communicate with all appropriate RFETS organizations, regulatory agencies, and stakeholders.</p>
	<p><b>Strategy:</b> Characterize UBCs sites early, where appropriate.</p>		<p><b>Strategy:</b> Enhance the collaborative process.</p>

Figure 4  
Industrial Area Decision Framework



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**Figure 5**  
**(RFEIS Figure 1)**  
**Conceptual RFEIS Land Use**

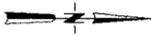
**EXPLANATION**

- Area 3 - Unrestricted Open Space (4545 Acres)
- ▒ Area 4 - Restricted Open Space (Low-Level Surface Pu Contamination) (611 Acres)
- Area 2 - Restricted Open Space (799 Acres)
- Area 1 - Industrial Use Area (78 Acres)
- Area 0 - Potential Capped Area and Retrieval, Monitored Storage (183 Acres)

**Standard Map Features**

- ▒ Buildings and other structures
- ▒ Solar Evaporation Ponds (SEP)
- ▒ Lakes and ponds
- ▒ Streams, ditches, or other drainage features
- ▒ Fences and other barriers
- ▒ Rocky Flats boundary
- ▒ Paved roads
- ▒ Dirt roads

**DATA SOURCE:**  
Digitized from the original maps and other information provided by the Rocky Flats Environmental Technology Site.



Scale = 1 : 21,330  
1 inch represents approximately 1778 feet



State Plane Coordinate Projection  
Colorado Central Zone  
Datum: NAD27

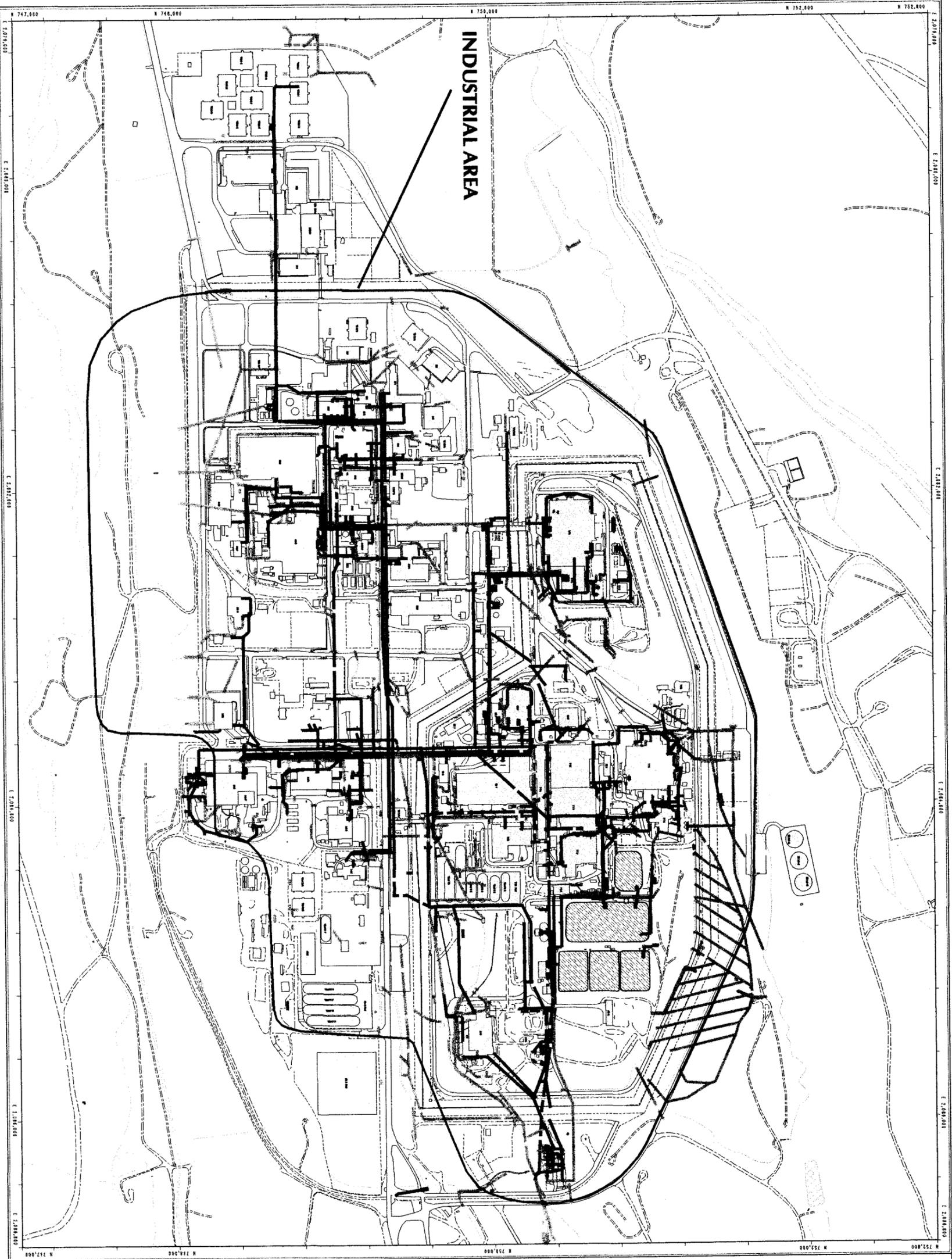
U.S. Department of Energy  
Rocky Flats Environmental Technology Site



Rocky Mountain  
Remediation Services, LLC  
Remedial Investigation Systems Group  
Rocky Flats Environmental Technology Site  
1500 W. 10th Avenue, Suite 1000  
Boulder, CO 80502-4044

MAP ID: 99-0427

September 16, 1999



**Figure 9**  
**IA Strategy Groups for**  
**New Process Waste Lines (NPWL),**  
**Sanitary Sewer System and**  
**Storm Drains**

- IBSS Groupings**
- N** New Process Waste Lines - 000-4
  - N** Storm Drain - 000-3
  - N** Sanitary Sewer System - 000-3

- Other Map Features**
- Buildings and other structures
  - ▨ Solar Evaporation Ponds (SEP)
  - Lakes and ponds
  - Streams, ditches, or other drainage features
  - Fences and other barriers
  - Paved roads
  - - - Dirt roads
  - N Industrial Area Operable Unit Boundary

**AREA NOTES**

The map shows the location of the proposed remedial action units (RAUs) for the Rocky Flats Environmental Technology Site. The RAUs are shown in black outlines. The map also shows the location of the existing process waste lines (PWL), sanitary sewer system (SSS), and storm drains (SD). The map is based on aerial photography and ground truthing. The map is not to scale. The map is for informational purposes only. It is not intended to be used for legal or regulatory purposes. The map is the property of Rocky Flats Environmental Technology Site. It is to be used only for the purposes for which it was prepared. It is not to be reproduced or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of Rocky Flats Environmental Technology Site.

Scale = 1 : 7720  
 1 inch represents approximately 643 feet

State Plane Coordinate Projection  
 Colorado Central Zone  
 Datum: NAD27

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

**RMRS**  
 Rocky Mountain  
 Remediation Services, L.L.C.  
 Geospatial Information Systems Group  
 Rocky Flats Environmental Technology Site  
 Golden, CO 80602-2044

MAP ID: 99-0382-IA-STRA1-APV11 September 20, 1999

Figure 6 Industrial Area Strategy

**Stewardship and Environmental Monitoring** Surface Water, Groundwater, Soil, Ecology, Air, and Meteorology

**Key Activities to Support the IA Strategy**

<ul style="list-style-type: none"> <li>○ Maintain consistency with decommissioning schedule</li> <li>○ Maintain flexibility between decommissioning and ER to change sequence, as needed, to be protective of human health and the environment</li> <li>○ Integrate decommissioning and ER</li> <li>○ Identify sequence of building remediation</li> </ul>	<ul style="list-style-type: none"> <li>○ Integrate environmental DQOs from the IMP and D&amp;D Characterization Protocols, where appropriate</li> <li>○ Develop environmental media DQOs to support: Characterization Remediation Confirmation sampling CRA</li> <li>○ Maximize data usability</li> </ul>	<ul style="list-style-type: none"> <li>○ Maintain data</li> <li>○ Use Final Status Survey Plan</li> <li>○ Review existing data</li> <li>○ Identify data gaps</li> <li>○ Use data of sufficient quality</li> <li>○ Identify sufficient laboratory capacity and analytical protocols</li> <li>○ Develop IA Group sampling addenda</li> </ul>	<ul style="list-style-type: none"> <li>○ Consider building remediation: No Action Mothball Reuse Remove</li> <li>○ Evaluate environmental media remediation options: NFA Excavation/Removal Treatment Stabilize and Cover Natural Attenuation</li> <li>○ Maintain documents in AR</li> </ul>	<ul style="list-style-type: none"> <li>○ Verify status of AR</li> <li>○ Complete CRA</li> </ul>
<p>Identify IHSS Groups 1999</p>	<p>Develop DQOs for Environmental Media 2000</p>	<p>Develop Comprehensive SAP 2000</p>	<p>Conduct Remedial Actions 2002 - 2006</p>	<p>Complete Remedial Actions 2006</p>
<p><b>Key Policy Decisions to Support the IA Strategy</b></p>				
<ul style="list-style-type: none"> <li>○ Shift approach from addressing highest ER risk to highest building priority and opportunity, while still being protective of surface water quality</li> <li>○ Identify proper skill mix</li> </ul>	<ul style="list-style-type: none"> <li>○ Develop DQOs based on RFCA anticipated land use</li> <li>○ Develop CRA methodology to support final CAD/ROD(s)</li> <li>○ Determine applicability of MARSSIM</li> </ul>		<ul style="list-style-type: none"> <li>○ Develop RSOP for remediation</li> <li>○ Find appropriate waste disposition facilities</li> <li>○ Adhere to document review schedules</li> <li>○ Recontour Site</li> <li>○ Update NFA process in RFCA Attachment 6</li> <li>○ Decide on need for retrievable storage or onsite disposal (CAMU)</li> </ul>	

**Sitewide Activities:**

Integrated Monitoring Plan  
Monitor and evaluate environmental media Sitewide, and around decommissioning and remediation projects. 2000 - 2006

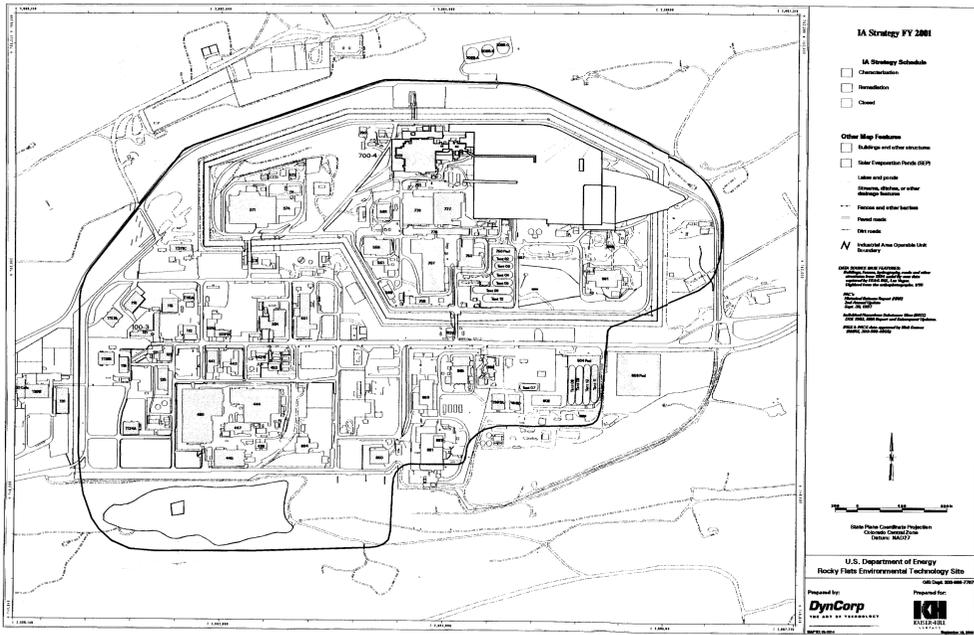
Actinide Migration Evaluation  
Evaluate actinide sources and mobility. Use in CRA and management strategies. Ongoing

Land Configuration Design Basis  
Collect geotechnical data for use in final land surface design. 2000

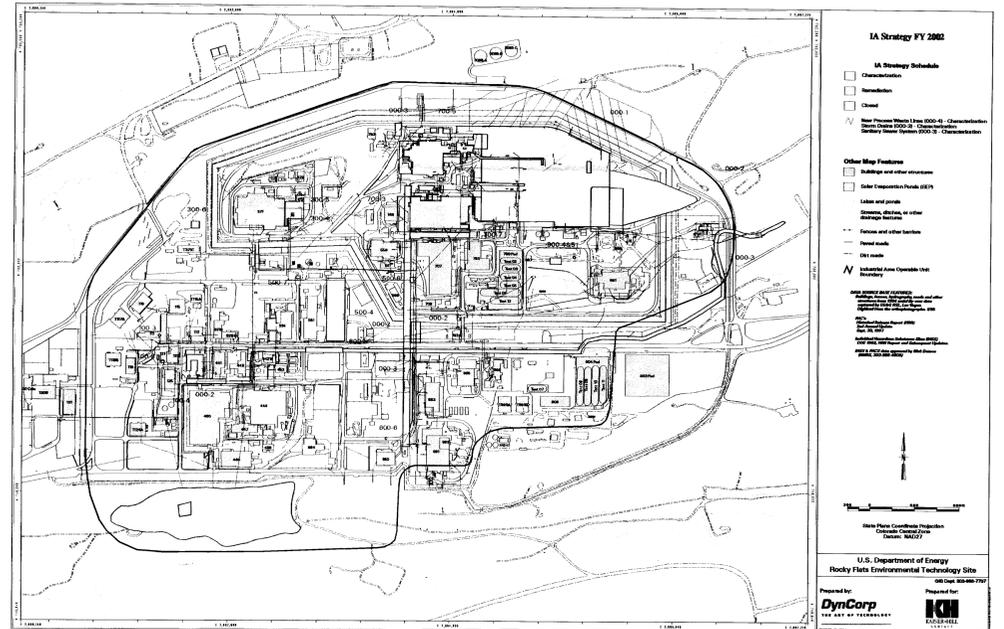
Site Water Balance  
Evaluate surface water and groundwater hydrology. Use in cap design and other management actions. 2002

# Figure 1 Industrial Area Schedule

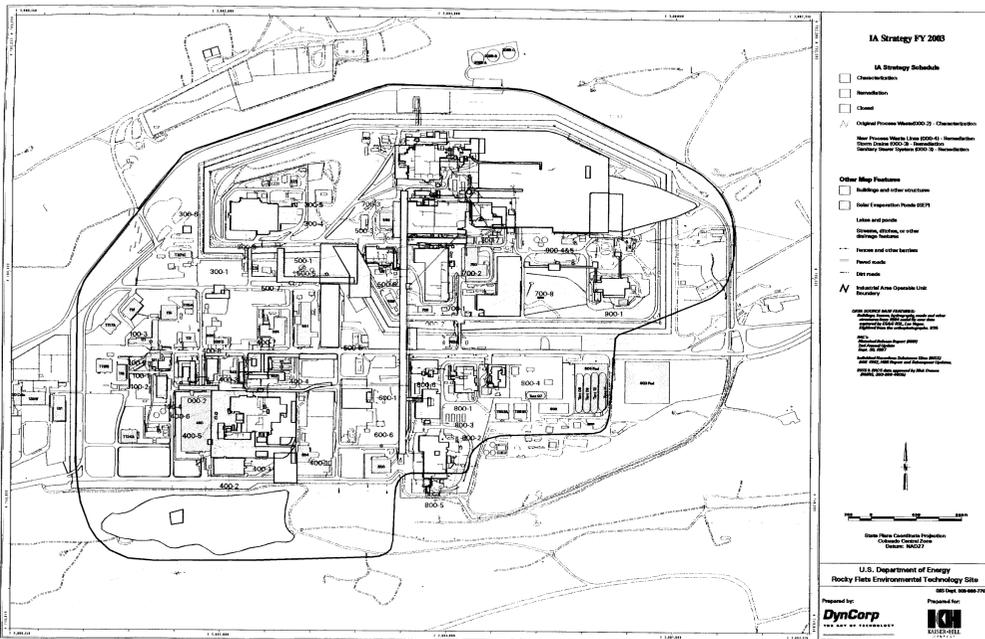
## FY 2001



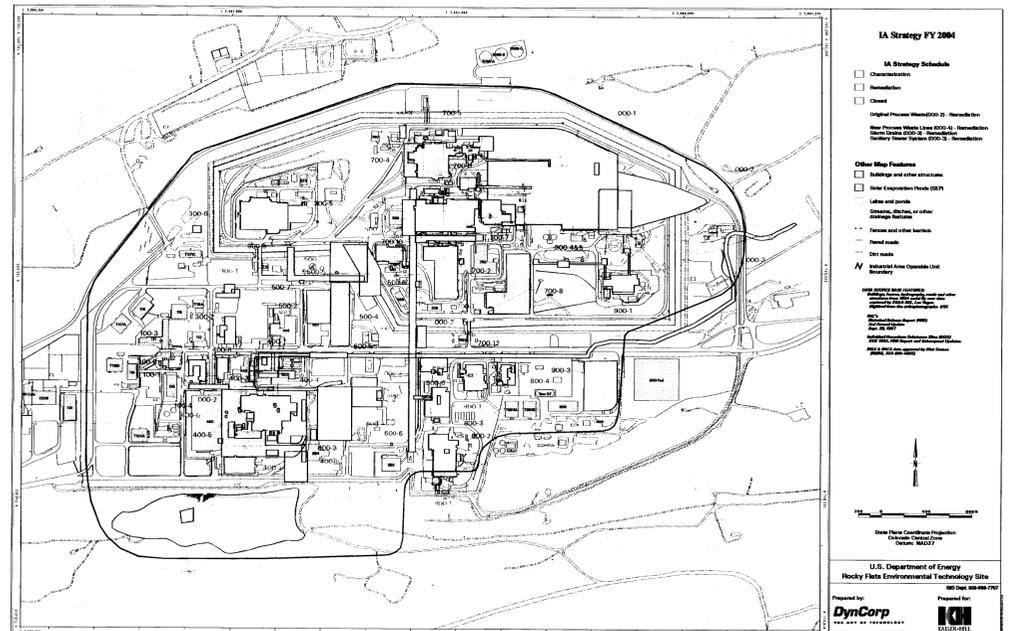
## FY 2002



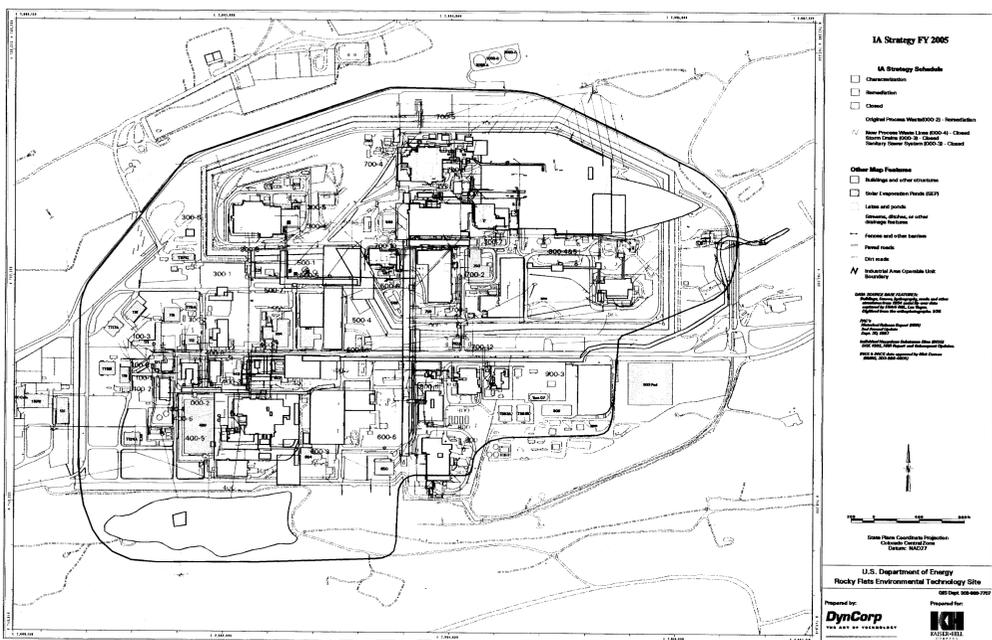
## FY 2003



## FY 2004



## FY 2005



## FY 2006

