Draft
Environmental Restoration
RFCA Standard Operating Protocol for Routine Soil Remediation

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APPENDICES

Appendix A RSOP Modifications (to be provided when completed)
Appendix B Notifications (to be provided when completed)

ACRONYMS

ACM	asbestos-containing material
AL	action level
ALARA	As Low As Reasonably Achievable
ALF	Action Levels and Standards Framework for Surface Water, Ground Water, and Soils
Am	americium
AME	Actinide Migration Evaluation
AOC	area of concern
APEN	Air Pollution Emission Notice
AR	Administrative Record
ARAR	Applicable or Relevant and Appropriate Requirement
ASD	Analytical Services Division
bgs	below ground surface
BMP	best management practice
BS	building sump
BZ	Buffer Zone
BZSAP	Buffer Zone Sampling and Analysis Plan
CAD/ROD	Corrective Action Decision/Record of Decision
CAQCC	Colorado Air Quality Control Commission
CCR	Code of Colorado Regulations
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CID	Cumulative Impacts Document
CHWA	Colorado Hazardous Waste Act
cm/sec	centimeters per second
CMS/FS	Corrective Measure Study/Feasibility Study
CO	carbon monoxide
COC	contaminant of concern
cpm	counts per minute
CRA	Comprehensive Risk Assessment
CRZ	Contaminant Reduction Zone
CWA	Clean Water Act
D&D	Decontamination & Decommissioning
DAC	derived air concentration
DNAPL	dense nonaqueous phase liquid
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
dpm	disintegrations per minute
DQO	data quality objective
EDDIE	Environmental Data Dynamic Information Exchange
EDE	effective dose equivalent

EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ER RSOP	ER RSOP for Routine Soil Remediation
ESA	Endangered Species Act
EZ/SCA	Exclusion Zone/Soil Containment Area
FD	foundation drain
FIDLER	Field Instrument for the Detection of Low Energy Radiation
FIP	Field Implementation Plan
ft	feet
ft^2	square feet
ft/sec	feet per second
FWPCA	Federal Water Pollution Control Act
FY	fiscal year
GIS	Geographic Information System
GPS	Global Positioning System
H&S	health and safety
HAP	hazardous air pollutant
HASP	Health and Safety Plan
HI	hazard index
HPGe	high-purity germanium
HRR	Historical Release Report
IA Strategy	Industrial Area Characterization and Remediation Strategy
IA	Industrial Area
IAG	Interagency Agreement
IASAP	Industrial Area Sampling and Analysis Plan
IDC	Item Description Code
IDW	inverse distance weighting
IGD	Implementation Guidance Document
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
IMP	Integrated Monitoring Plan
ISEDS	Integrated Sitewide Environmental Data System
ISMS	Integrated Safety Management System
IWCP	Integrated Work Control Program
JHA	Job Hazard Analysis
K-H	Kaiser-Hill Company, L.L.C.
L-A	Labat-Anderson
LCDB	Land Configuration Design Basis
LDR	Land Disposal Restriction
LHSU	lower hydrostratigraphic unit
LL	low-level
LLM	low-level mixed
LNAPL	light nonaqueous phase liquid
LRA	Lead Regulatory Agency
m^3	cubic meters
mrem	millirem

mrem/yr	millirems per year
NAAQS	National Ambient Air Quality Standard
nCi/g	nanocurie per gram
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOx	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPWL	New Process Waste Lines
NSD	new source detection
NSR	New Source Review
NTS	Nevada Test Site
OPWL	Original Process Waste Lines
OSHA	Occupational Safety and Health Act
OU	Operable Unit
PAC	Potential Area of Concern
PAM	Proposed Action Memorandum
PCB	polychlorinated biphenyl
PCi/L	picocuries per liter
PCOC	potential contaminant of concern
PM	particulate matter
PMJM	Preble's meadow jumping mouse
POC	point of compliance
POE	point of evaluation
PPE	personal protective equipment
ppm	parts per million
PSD	Prevention of Significant Deterioration
Pu	plutonium
PU&D	Property Utilization and Disposal
QA	quality assurance
QAPP	Quality Assurance Program Plan
QC	quality control
R&D	research and development
RAAMP	Radioactive Ambient Air Monitoring Program
RACT	reasonably available control technology
RADMS	Remedial Action Decision Management System
RADP	Remedial Action Decontamination Pad
RAO	remedial action objective
RBZ	Radiological Buffer Zone
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
RFCA	Rocky Flats Cleanup Agreement
RFCAB	Rocky Flats Citizen Advisory Board
RFCoLG	Rocky Flats Coalition of Local Governments
RFETS (or Site)	Rocky Flats Environmental Technology Site
RFFO	Rocky Flats Field Office
RFI/RI	RCRA Facility Investigation/Remedial Investigation

RSAL	Radionuclide Soil Action Level
RSOP	RFCA Standard Operating Protocol
RSP	Radiological Safety Practices
RWP	Radiological Work Permit
SAP	Sampling and Analysis Plan
SCO	surface-contaminated object
SEP	Solar Evaporation Ponds
SID	South Interceptor Ditch
SNM	Special Nuclear Material
STP	Sewage Treatment Plant
SVOC	semivolatile organic compound
SWD	Soil Water Database
SWWB	Site-Wide Water Balance
TEDE	total effective dose equivalent
TPH	total petroleum hydrocarbons
TRU	transuranic
TSCA	Toxic Substance Control Act
TSP	total suspended particulate
U	uranium
UBC	Under Building Contamination
UCL	upper confidence limit
$\mu g/100cm^2$	micrograms per 100 square centimeter
UHSU	upper hydrostratigraphic unit
UST	underground storage tank
VOC	volatile organic compound
WEMS	Waste and Environmental Management System
WGI	Waste Generating Instruction
WIPP	Waste Isolation Pilot Plant
WRE	waste release evaluation
WRR	Waste Requirements Representative

EXECUTIVE SUMMARY

The Environmental Restoration (ER) Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) for Routine Soil Remediation (ER RSOP) addresses routine remediation of soil and associated debris at Individual Hazardous Substance Sites (IHSSs), Potential Areas of Concern (PACs), Under Building Contamination (UBC) Sites, and other areas, as necessary, at the Rocky Flats Environmental Technology Site (RFETS). Routine remediation of soil and buried debris will primarily consist of excavation and offsite disposal, with offsite treatment as required to meet regulatory and receiver site requirements.

This ER RSOP does not address remediation at the Present Landfill, Original Landfill, Solar Evaporation Ponds (SEP), 903 Lip Area and Americium Zone, groundwater contaminant plumes, or other nonroutine remediations. These projects will be addressed in separate decision documents.

The ER RSOP will:

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

There are more than 200 potential release sites in the RFETS Buffer Zone (BZ) and Industrial Area (IA). These sites are being considered for routine remediation under this RSOP because (1) the sites have similar potential contaminants of concern (PCOCs) that consist of radionuclides, organic compounds, or metals; (2) the sites may have debris (pipelines, wood, concrete, asphalt, drums, metal, plastics, rubber, fiberglass, or other debris) associated with the soil; (3) contamination is limited to surface or subsurface soil contamination; (4) subsurface soil can be associated with UBC Sites and pipelines; (5) remediation of these sites does not require special engineering designs; and (6) these sites can be remediated by excavation and shipment of waste to offsite locations. The ER RSOP also covers foundation drains, tanks, and asphalt and concrete that are part of roads, parking lots, and orphan slabs.

The ER RSOP remediation process starts after characterization of the potential release sites. RFETS staff, in consultation with the regulatory agencies, reviews the characterization data and a decision is made whether site remediation is required, and if so, how much. Remediation decisions include evaluation of stewardship and As Low As Reasonably Achievable (ALARA) considerations. The remediation activities are planned through the Integrated Safety Management System (ISMS). Excavation of soil and debris is conducted in conjunction with “in-process” sampling to determine when remediation goals are achieved. The excavated soil and debris are segregated by waste type for disposal. This process results in an efficient, almost

real-time implementation of characterization and remediation activities. Confirmation sampling will verify that remediation goals are met. All excavations will be backfilled, stabilized, and revegetated.

Supporting information provided in this RSOP includes regulatory requirements, and requirements and processes for environmental protection, work controls, waste management, decision management, health and safety (H&S), and quality assurance (QA).

RFCA mandates the incorporation of National Environmental Policy Act (NEPA) values into RFETS decision documents. This ER RSOP describes potential environmental impacts that may be associated with activities covered under this RSOP and satisfies the RFCA requirement for a "NEPA-equivalency" assessment of environmental consequences.

1.0 INTRODUCTION

Nearly 40 years of nuclear weapons production at the Rocky Flats Environmental Technology Site (RFETS or Site) resulted in soil and debris potentially contaminated with chemical and radioactive substances, which may pose a hazard to human health and the environment. Potential contaminants of concern (PCOCs) in soil and debris are related to plutonium (Pu) and uranium (U) processing activities and associated support facilities and functions. The locations and nature of processes that contributed to the potential releases are well documented. PCOCs associated with past operations are fairly well understood and are similar at many release sites. PCOCs include radionuclides, metals, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs).

Potential soil and debris (pipelines, wood, concrete, asphalt, drums, metal, plastic, rubber, fiberglass, or other debris) contamination from past operations at RFETS may exist in a number of configurations, including surface contamination (within top 6 inches), subsurface contamination (below top 6 inches but without structural complications), contamination under building floor slabs, and subsurface contamination associated with process waste pipelines, storm drains, and sanitary sewer lines. Regardless of the configuration, remediation options for contaminated soil and debris are limited because of technical feasibility constraints related to effectiveness, implementability, and cost.

The Environmental Restoration (ER) Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) for Routine Soil Remediation (ER RSOP) addresses routine remediation of soil and associated debris at Individual Hazardous Substance Sites (IHSSs), Potential Areas of Concern (PACs), Under Building Contamination (UBC) Sites, and other areas, as necessary, at RFETS. The following routine actions are described in this RSOP:

- Excavation of soil contaminated above agreed-upon action levels (ALs) and associated debris, and offsite disposal with or without offsite treatment; and

- Excavation of soil contaminated above agreed-upon ALs and associated debris, onsite thermal desorption treatment of VOC-contaminated soil, and onsite backfilling or offsite disposal.

The term “routine” as used in the ER RSOP, is generally consistent with other industry definitions of the term, (i.e., activities of a repetitive nature guided by procedures). Three key considerations support the ER RSOP concept of routine (versus non-routine):

1. ER RSOP actions all involve the excavation of soil and associated debris. Furthermore, the range of PCOCs is fairly narrow and remediation options are limited.

2. While both the amount of contamination and configuration of contaminant release sites vary, the remediation options remain limited. The variation in configuration and amount of contamination may change the complexity of the cleanup action; however, the essential repetitiveness of the remediation action remains the same. Variations in complexity are addressed through application of the appropriate work controls.

3. Nonroutine remediation actions are those that require special engineering design and/or regulatory agency approval. These actions are not covered under the ER RSOP and include closure of the two landfills and the Solar Evaporation Ponds (SEP), and remediation of groundwater plumes, the 903 Lip Area and Americium (Am) Zone, source removal for groundwater remediation, and, perhaps, a portion of the Original Process Waste Lines (OPWL).

It is anticipated that contaminated soil and debris in all IHSSs, PACs, and UBC Sites, except those excluded above, will be remediated under the ER RSOP. This would include the OPWL, New Process Waste Lines (NPWL), sanitary sewers, and storm drains as well as several other belowground structures (slabs, foundation drains, and tanks) that will not be dealt with during decommissioning.

Routine remediation of contaminated soil and buried debris will primarily consist of excavation and offsite disposal, with offsite treatment as required to meet regulatory and disposal site requirements. The ER RSOP also provides for onsite treatment using thermal desorption, with soil backfilling if the treated soil meets onsite backfill criteria and thermal desorption is economically favorable and protective of human health and the environment. Routine remediation of contaminated pipelines, drains, slabs, and foundations will primarily consist of excavation and offsite disposal. Consistent with previous remediations and investigations, it is anticipated that most contaminated soil and debris will be low-level (LL), low-level mixed (LLM), or hazardous waste. Nonroutine sanitary waste and small amounts of transuranic (TRU) and TRU-mixed waste may also be found.

The ER RSOP provides for the interim cleanup of soil and debris and is consistent with the long-term remediation objectives of leaving RFETS in a condition that is protective of human health and the environment and allows future land uses consistent with the Rocky Flats Vision. While the final cleanup levels and long-term monitoring requirements will be determined in the Corrective Action Decision/Record of Decision (CAD/ROD), it is anticipated that the Comprehensive Risk Assessment (CRA) will show that no further action is required at sites covered under this RSOP. Long-term monitoring requirements will integrate Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) requirements with CRA requirements. Post-remediation stewardship of remediated areas will include routine monitoring under the Integrated Monitoring Plan (IMP) (DOE 2000a), maintenance of revegetated areas, and if necessary, additional monitoring around in-place stabilization remediation. Because the RSOP addresses accelerated actions, long-term stewardship activities cannot be fully addressed at this time. These activities will be described in the RFETS Stewardship Plan (in preparation).

1.1 PURPOSE AND GOALS

The purpose of the ER RSOP is to serve as the decision document for routine soil and debris remediation at RFETS. This RSOP addresses soil accelerated action decisions and routine remediation processes for surface and subsurface soil and debris.

The goal of the ER RSOP is to provide for safe and effective accelerated actions to address risks posed by contaminated soil and debris in IHSSs, PACs, and UBC Sites at RFETS. To meet this goal, the following actions will be implemented through the ER RSOP:

- Define a process for implementing soil and associated debris remediation that:
  - Protects human health and the environment,
  - Meets RFCA cleanup goals,
  - Minimizes generation of waste,
  - Favors offsite disposal of waste, and
  - Is cost effective;
- Coordinate remediation with the decommissioning schedule;
- Use the RFCA consultative process for accelerated action decisions;
- Ensure that remediation does not pose unacceptable risks to workers or the public; and
- Provide documentation for closure of IHSSs and PACs that are also RCRA units.

1.2 REGULATORY FRAMEWORK

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

RFCA provides the regulatory framework for DOE response obligations under CERCLA and corrective action obligations under RCRA. The RFCA accelerated action process incorporates the requirements of CERCLA and RCRA. After accelerated actions are complete, DOE will develop a RCRA Facility Investigation/Remedial Investigation (RFI/RI) to describe the completed actions and a CRA to verify that potential contamination remaining at RFETS is within acceptable risk levels as defined by CERCLA and implemented through RFCA. DOE will also develop a CAD/ROD that will include the final action, post-closure monitoring and operation requirements, including five-year reviews of the Site, to evaluate whether the remedies, including any institutional controls, are effective.

Attachment 5 to RFCA, Action Levels and Standards Framework for Surface Water, Ground Water, and Soils (ALF), provides the rationale and numeric ALs for surface soil. As stated in the ALF, ALs “are numeric levels that, when exceeded, trigger an evaluation, remedial action, and/or management action” (DOE et al. 1996). Surface soil interim cleanup levels are equal to Tier I ALs unless protection of surface water requires a greater level of cleanup. Subsurface soil interim cleanup goals are equal to the agreed-upon cleanup levels. Although final cleanup levels will be determined in the CAD/ROD, it is anticipated that the interim cleanup will meet the final cleanup requirements.

During the remediation process, personnel from the DOE Rocky Flats Field Office (RFFO); its contractor, Kaiser-Hill Company, L.L.C. (K-H); CDPHE; and EPA will use the RFCA consultative process to establish and maintain effective working relationships with each other and with the general public.

1.3 ER RSOP MODIFICATIONS

This ER RSOP follows the RSOP approach outlined in RFCA and the Implementation Guidance Document (IGD) (DOE et al. 1999). As this RSOP is implemented through Site closure, new information may require that the document be modified. Modifications to this RSOP will be designated sequentially and will be placed in the Administrative Record (AR) and in Appendix A of this document.

1.4 ER RSOP NOTIFICATION

After the regulatory agencies approve this RSOP, no further formal approvals are required. DOE will notify the Lead Regulatory Agency (LRA) prior to implementing this RSOP for each specific project. A Notification will be prepared at the beginning of the fiscal year and as the need to remediate arises. A map of potential remediation targets and contaminants of concern (COCs), as well as a list of documents making up the AR file for the individual project will be included in the Notification. The Notification will become part of the AR and will be placed in Appendix B of this document.

2.0 REGULATORY AND STAKEHOLDER INTERFACES

DOE will use the consultative process to establish and maintain effective working relationships with the regulatory agencies and public through out the accelerated action process. The consultative process, regulatory agency oversight roles, and public participation are discussed in the following sections.

2.1 RFCA CONSULTATIVE PROCESS

The RFCA consultative process will be used throughout the ER RSOP remediation process during planning and at decision points. Figure 1 illustrates the overall remediation process and activities where regulatory agency consultation is expected. As shown on Figure 1, regulatory agencies will be part of the decision process starting with developing the overall remediation strategy and continuing through all decision-making phases. Regulatory agency consultation will occur during the following activities:

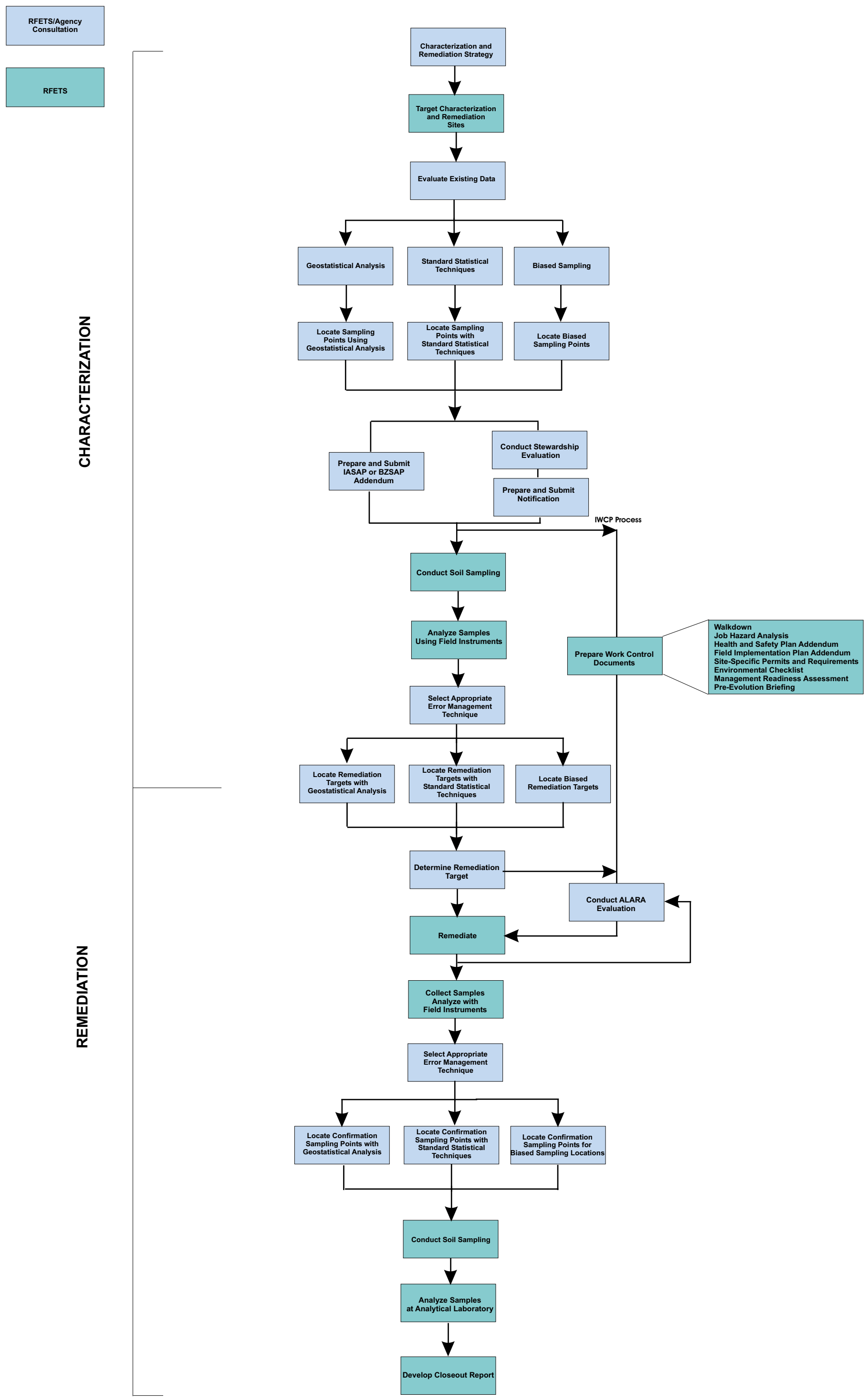
- Evaluation of existing characterization data;
- Location of characterization sampling points;
- Development of the Notification;
- Location of remediation areas and identification of COCs;
- Determination whether remediation objectives have been achieved; and
- Location of confirmation sampling locations.

Because DOE and K-H will use the RFCA consultative process throughout the remediation process, opportunities for consultation are highlighted on activity, decision, and process flow diagrams throughout this RSOP.

The regulatory agencies will have access to project-specific data in the following formats:

- Soil Water Database (SWD) – The regulatory agencies have access to the sitewide environmental database through the Integrated Sitewide Environmental Data System (ISEDS).
- The Buffer Zone Data Summary Report (DOE 2001a) and the Industrial Area Data Summary Report (DOE 2000b) – These reports contain all existing qualified data for the Industrial Area (IA) and Buffer Zone (BZ) and are updated at least yearly.
- The Remedial Action Decision Management System (RADMS) (Section 12.1) – This system provides access to all characterization data, remediation data, and visualization and "what if scenario" tools at their onsite RFETS offices. RADMS also provides data tables and maps to offsite regulatory agency offices.

Figure 1
Overall Accelerated Action Process



RADMS will provide the regulatory agencies with access to characterization and remediation data at the same time the ER staff has access to the data. Additionally, the regulatory agencies will have the capability to query data, map data, and run statistical and geostatistical algorithms.

The use of RADMS at RFETS will facilitate full regulatory agency consultation on all decisions. Results of the characterization and remediation processes will be formalized in a Closeout Report for each IHSS Group. The Closeout Report will be approved by the regulatory agencies.

2.2 REGULATORY OVERSIGHT

ER RSOP activities have three phases: planning, implementation, and closeout. Each phase provides the opportunity for interaction between the regulatory agencies and DOE. Each phase has one or more RFCA decision points and additional checks and balances through which CDPHE and EPA will fulfill their regulatory oversight obligations. Decision points and additional checks and balances are briefly described below and summarized in Table 1.

2.2.1 Planning

The key planning decision documents supporting the accelerated actions are the Industrial Area Sampling and Analysis Plan (IASAP) (DOE 2001b), the Draft Buffer Zone Sampling and Analysis Plan (BZSAP) (DOE 2001c), and the ER RSOP. The IASAP and BZSAP guide all characterization required to support accelerated action activities under the ER RSOP. The sampling plans contain two key features, each with its own regulatory agency involvement and decision points. First, the sampling plans regard the IA and BZ as single projects and contain all Data Quality Objectives (DQOs) and sampling methodologies to guide characterization of these areas through closure.

While the regulatory agencies' initial checkpoint is approval of these decision documents, the sampling plans contain a provision for formal modification if changes to DQOs or methodologies not addressed by the original plans are required. Modification of the plans requires agency approval.

Second, the sampling plans contain an Addendum element. The Addendum accommodates the Site's obligation to administratively disposition every IHSS, PAC and UBC Site. It acts as a tracking vehicle over the period required to complete ER RSOP actions by identifying sites that will be characterized. The Addendum contains the target sites, site maps, site-specific PCOCs, existing qualified sampling data, starting-point sampling locations, and sampling methodology. The Addendum is prepared in consultation with the agencies and is subject to their approval.

The first agency checkpoint in the ER RSOP process is approval of the decision document itself. The intent to invoke the RSOP is provided through a Notification issued by DOE to the regulatory agencies. As provided in RFCA, the Notification is not subject to agency approval. However, the Notification is designed to reflect the sampling Addendum, which creates a checkpoint. That is, the Notification will contain the same target remediation sites described in the sampling Addendum for the same performance period. Because remediation cannot begin

Table 1
Regulatory Agency Oversight of ER RSOP Accelerated Actions

	ACTIVITY	DESCRIPTION	AGENCY INTERFACE	AGENCY CHECKPOINT
PLANNING	Prepare IASAP and BZSAP	The sampling and analysis plans (SAPs) are RFCA decision documents that describe the strategy, methods, and data quality requirements for characterizing contaminant release sites in soil at RFETS.	• Continuous agency/DOE consultation throughout development of drafts and resolution of agency and public comments • Consultation on document modification, if necessary	• Approval of Final Draft IASAP and BZSAP • Approval of modifications to the two documents
	Prepare SAP Addenda (annual and opportunity)	The addenda describe the release sites targeted for characterization during a fiscal year (FY) and when Site closure activities provide unanticipated characterization opportunities.	• Consultation regarding target sites and sampling methods	• Approval of the Addenda
	Prepare ER RSOP	The ER RSOP is a RFCA decision document for remediation of routine contaminant release sites in soil at RFETS.	• Continuous agency/DOE consultation throughout development of drafts and resolution of agency and public comments • Consultation on document modification, if necessary	• Approval of the Final Draft ER RSOP • Approval of modifications to the document
	Prepare RSOP Notification (annual and opportunity)	The Notification is the RFCA-required declaration of intent by DOE to invoke the RSOP. Notification will be made on an annual (FY) basis and when Site closure activities provide unanticipated remediation opportunities. Release sites targeted in the Notification will match those in the corresponding sampling Addendum.	• Consultation regarding target sites, work planning, and schedule	• Concurrence on the Notification • Approval of the sampling Addendum

	ACTIVITY	DESCRIPTION	AGENCY INTERFACE	AGENCY CHECKPOINT
IMPLEMENTATION	Perform characterization and remediation	This activity consists of sampling target release sites as described in the approved Addendum and in accordance with IASAP and BZSAP methods and data requirements. Implementation tasks include defining the area of concern (AOC), excavating remediation areas, performing confirmation sampling, reviewing confirmation results, excavating more if needed, and backfilling the excavation.	• Continuous agency/DOE consultation during the sampling, data interpretation, excavation and confirmation activities. Requires agency presence at RFETS and active participation in the day-to-day decision-making regarding shifts in sampling strategy, data sufficiency, and remediation stopping point.	• Approval of Closeout Report • Issuance of a Stop Work Order
CLOSEOUT	Prepare Closeout Report	The Closeout Report is the RFCA decision document that describes the results of the remediation, including demarcation of the excavation, confirmation sampling results, and waste disposition.	• Review and comment on Draft Closeout Report	• Approval of Closeout Report

until the sampling Addendum is approved, approval of the Addendum is also the checkpoint for the Notification.

As with the sampling plans, the ER RSOP contains a provision for modification. If, during implementation, it is determined that a substantive change to the RSOP is required for routine soil remediation, it will be modified accordingly. The modification will be developed in consultation with the agencies and is subject to their approval.

2.2.2 Implementation

Characterization sampling is performed largely with portable field instruments, and the data are immediately translated to remediation maps to guide the remediation crews. As sampling progresses, new data could indicate a needed shift in the sampling strategy. This could include taking more or fewer samples than anticipated or applying a different statistical analysis method. While a shift in approach would not necessarily require additional agency approval, the sampling plans are designed to accommodate real-time agency participation to ensure concurrence (Sections 2.1 and 12.1). This is a checkpoint because it is not in DOE's interest to proceed to remediation without regulatory agency knowledge and concurrence on sampling locations and methodology.

The regulatory agencies have the authority to stop work. This RFCA-defined decision point is a drastic measure and, if invoked, would indicate a complete breakdown in the RFCA consultative process. The potential schedule and administrative impacts of a stop work order encourage full and open discussions on remediation activities by the RFCA Parties.

2.2.3 Closeout

The purpose of closeout is to document the accelerated action activities. The Closeout Report summarizes characterization data, the action taken, demarcation of excavation, confirmation sampling results, remediation waste volume and disposition, any changes in remediation approach and the rationale behind the change, and the demarcation of residual contamination left in place.

The Closeout Report is a RFCA decision document and the vehicle by which the regulatory agencies approve completion of the accelerated action. Until the agencies approve the Closeout Report, the accelerated action performed under the ER RSOP is not finished. Consequently, the Closeout Report not only serves as the RFCA-defined decision point, but as a checkpoint during the implementation phase. That is, DOE's interest is best served by achieving concurrence on the cleanup progress during implementation rather than at the end when resources have been re-directed to the next site.

2.3 PUBLIC PARTICIPATION

Stakeholder input to the ER RSOP and the ER RSOP process is solicited and received through:

- The formal RFCA RSOP and Closeout Report review process, which incorporates the requirements of CERCLA and RCRA; and

- Public meetings, including:
  - The Rocky Flats Citizens Advisory Board (RFCAB),
  - The Rocky Flats Water Working Group,
  - The Rocky Flats Coalition of Local Governments (RFCLoG),
  - The Rocky Flats Cleanup Agreement Stakeholders Focus Group, and
  - The ER/Decontamination & Decommissioning (D&D) Status Meeting.

Monthly updates on the implementation of the ER RSOP will be provided at the ER/D&D Status Meetings or similar status meetings at a different time of day. It is anticipated that these updates will include the following information, as available:

- RSOP Notifications;
- Characterization and remediation schedules;
- Status and results of ongoing IHSS Group characterizations;
- Remediation areas including COCs and extent of remediation;
- Stewardship and As Low As Reasonably Achievable (ALARA) evaluations;
- Status and results of ongoing remediation activities; and
- Results of post-remediation confirmation sampling.

Additionally, the ER staff will continue to provide information at specific stakeholder meetings, as requested.

Communication with stakeholders is also facilitated by use of the Internet. The Site Internet site (www.rfets.gov) has a link to the Environmental Data Dynamic Information Exchange (EDDIE), which includes Site environmental information. The ER section contains current reports and information and will be updated as new information becomes available. The ER section will be updated with the following information specific to actions associated with the ER RSOP:

- IASAP and BZSAP Addenda;
- ER RSOP Notifications;
- Closeout Reports; and
- Annual IA Strategy Updates.

Additionally, the web site contains information on upcoming public meetings, reports for public comment, and other environmental and decommissioning information.

3.0 SITE DESCRIPTION

RFETS is located approximately 16 miles northwest of Denver, Colorado, in northern Jefferson County. The Site occupies approximately 10 square miles. Boundaries and major features are illustrated on Figure 2. Most of the buildings are located within an industrial complex of approximately 350 acres (the IA) surrounded by a BZ of approximately 6,150 acres.

Materials defined as hazardous substances by CERCLA, as well as those defined as hazardous constituents by RCRA or the Colorado Hazardous Waste Act (CHWA), or as toxic substances as defined by the Toxic Substances Control Act (TSCA), may have been released to the environment at various locations across RFETS. Potential release sites covered under this RSOP are listed in Table 2.

Potential releases were identified at 194 IHSSs, PACs, UBC Sites, and tanks in the IA, as illustrated on Figure 3. The IA contains 400 buildings, along with other structures, roads, and utilities, and is where the bulk of RFETS mission activities took place between 1951 and 1989 (DOE et al. 1996). Most of the buildings and associated structures were used for processing activities associated with weapons production. Descriptions of potential release sites are found in Appendix C of the IASAP (DOE 2001b). In the BZ, potential releases were identified at 42 IHSSs and PACs, as illustrated on Figure 4. The BZ contained support functions, disposal areas, and undisturbed buffer areas. Descriptions of historical operations in the BZ are presented in Appendix C of the Draft BZSAP (DOE 2001c).

Descriptions of historical operations and releases in the IA and BZ are also presented in the Historical Release Report (HRR) (DOE 1992) and quarterly and annual updates (DOE 1993 through 2000).

Before RFCA went into effect, the IHSSs were grouped into 16 Operable Units (OUs) as part of the Interagency Agreement (IAG). The OU consolidation prior to RFCA established the BZ and IA OUs and left the original OUs 1, 3, and 7 intact. OUs 5 and 6 remain in place with minor modifications. The 236 IHSSs, PACs, UBC Sites, and associated tanks were further consolidated into 58 IA Groups (Figure 3) and 8 BZ Groups (Figure 4) as part of the 1999 IA Characterization and Remediation Strategy (IA Strategy) (DOE 1999a) and the Closure Project Baseline. Table 2 lists the pre-RFCA OUs, IHSSs, PACs, UBC Sites, and tanks in the IA and BZ OUs. Descriptions of IHSSs, PACs, and UBC Sites, based on previous studies, are included in the Final IASAP (DOE 2001b) and Draft BZSAP (DOE 2001c).

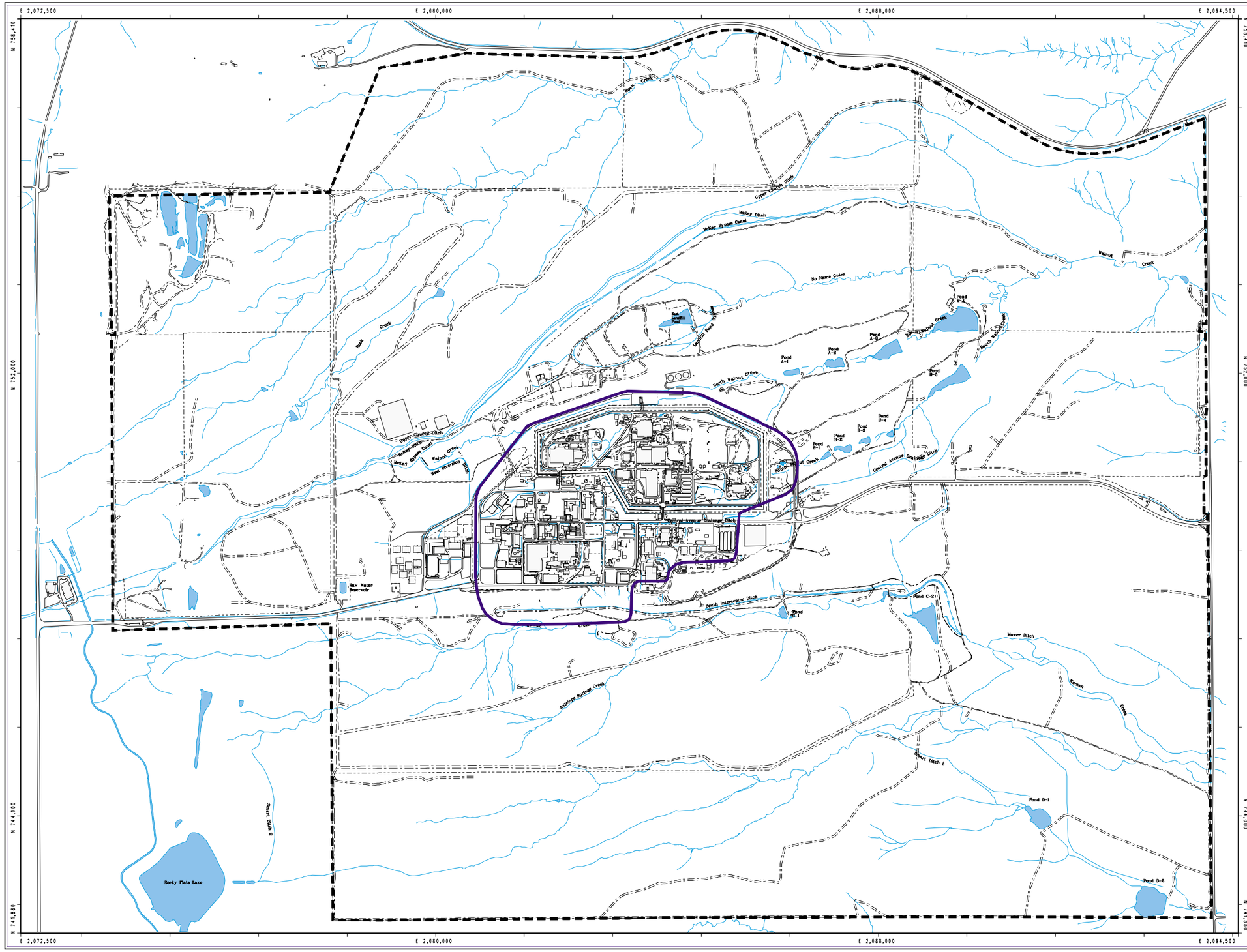


Figure 2

Rocky Flats Environmental Technology Site

EXPLANATION

Industrial Area Boundary

Buffer Zone Boundary

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:

Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/95

Data Source: Industrial Area Boundary data - Approved by Nick Demos (RMRS, 303-966-4605).

Scale = 1 : 21430
1 inch represents approximately 1786 feet

500 0 1000 2000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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

GIS Dept. 303-966-7707

Prepared by: DynCorp THE ART OF TECHNOLOGY

Prepared for: KAISER-HILL COMPANY

MAP ID: 2k-0336/ia_site_fig2.aml

September 05, 2001

NT_Svr w:/projects/fy2k/2k-0336/ia_site_fig2.aml

Table 2
Potential Release Sites

IHSS Group	Old Operable Unit No.	Current Operable Unit	Description	IHSS/PAC/UBC Site	Area (ft^2)	Historical Notes
000-2	OU 9	IA	Original Process Waste Lines (OPWL)	000-121		Underground network pipes/tanks; multiple breaks and leaks
	OU 9	IA	Valve Vault West of Building 707	700-123.2	2,476	Process waste migration along containment pipe and into ditch
	N/A	IA	Building 123 Process Waste Line Break	100-602	14,514	Line, valve vault, bedding material (conduit) between Buildings 123 and 443
	OU 9	IA	Tank 29 – OPWL	000-121		Aboveground waste process tank; possible leaks
	OU 9	IA	Tank 31 – OPWL	000-121		Below-grade, open-top sewage tank
	OU 9	IA	Low-Level Radioactive Waste Leak	700-127	2,500	Multiple line breaks and leaks
	OU 9	IA	Process Waste Line Leaks	700-147.1	16,427	Multiple line breaks and leaks; diverse release paths
	OU 14	IA	Radioactive Site 700 Area	700-162	141,294	Residual hot spots along 8th Street
000-3	N/A	IA	Sanitary Sewer System	000-500		Routine and incidental waste discharges to sinks, sumps, lines
	N/A	IA	Storm Drains	000-505		
	OU 6	IA	Old Outfall – Building 771	700-143	6,167	Contaminated waste water outfall area; one hot spot in nearby culvert
	OU 13	IA	Central Avenue Ditch Caustic Leak	000-190	186,016	Caustic release to Central Ave. Ditch, Walnut Creek, and B-1
000-4	N/A	IA	New Process Waste Lines (NPWL)	000-504		
100-1	N/A	IA	UBC 122 – Medical Facility	UBC 122	9,768	Drum leaks and possible line leaks
	OU 9	IA	Tank 1 – OPWL – Underground Stainless Steel Waste Storage Tank	000-121		Overflows and leaks from underground tank
100-2	N/A	IA	UBC 125 – Standards Laboratory	UBC 125	17,736	Possible spills from calibration lab (mercury)
100-3	N/A	IA	Building 111 Transformer polychlorinated biphenyl (PCB) Leak	100-607	356	Transformer leak
100-4	OU 13	IA	UBC 123 – Health Physics Laboratory	UBC 123	18,885	Disposal out windows and waste line leaks
	N/A	IA	Waste Leaks	100-148	14,143	Unlocated waste spills, OPWL leaks
	N/A	IA	Building 123 Bioassay Waste Spill	100-603	356	OPWL leaks
	N/A	IA	Building 123 Scrubber Solution Spill	100-611	294	Process waste leak
100-5	N/A	IA	Building 121 Security Incinerator	100-609	599	Incinerator; accepted PCB-laden paper
300-1	OU 13	IA	Oil Burn Pit #1	300-128	914	Burn and airborne contamination area
	OU 13	IA	Lithium Metal Site	300-134(N)	7,126	Burn area
	OU 13	IA	Solvent Burning Grounds	300-171	11,412	Burn area
300-2	N/A	IA	UBC 331 – Maintenance	UBC 331	4,986	Possible spills from maintenance activities
	OU 13	IA	Lithium Metal Destruction Site	300-134(S)	23,728	Lithium burn areas (two)
300-3	N/A	IA	UBC 371 – Plutonium Recovery	UBC 371	114,147	Known spills of wastewater and process solutions
300-4	N/A	IA	UBC 374 – Waste Treatment Facility	UBC 374	27,131	Multiple spills and potential leaks from waste lines
300-5	OU 10	IA	Inactive D-836 Hazardous Waste Tank	300-206	627	Condensate water spill from line to tank

IHSS Group	Old Operable Unit No.	Current Operable Unit	Description	IHSS/PAC/UBC Site	Area (ft^2)	Historical Notes
300-6	N/A	IA	Pesticide Shed	300-702	4,380	Herbicide/pesticide spills/leaks in shed and surrounding area
400-1	N/A	IA	UBC 439 – Radiological Survey	UBC 439	5,107	Possible spills from machining operations
400-2	N/A	IA	UBC 440 – Modification Center	UBC 440	40,166	Possible spills from machining operations
400-3	N/A	IA	UBC 444 – Fabrication Facility	UBC 444	123,113	Overflows and leaks of process solutions
	N/A	IA	UBC 447 – Fabrication Facility	UBC 447	19,182	Possible spills and leaks from ongoing processes
	OU 12	IA	West Loading Dock Building 447	400-116.1	2,009	Spills and leaks impacting soil and groundwater beneath dock
	OU 12	IA	Cooling Tower Pond West of Building 444	400-136.1	7,654	Evaporation holding pond
	OU 12	IA	Cooling Tower Pond East of Building 444	400-136.2	7,097	Cooling tower blowdown pond
	OU 10	IA	Buildings 444/453 Drum Storage	400-182	3,465	Leaking drums and oil spills
	OU 10	IA	Inactive Building 444 Acid Dumpster	400-207	1,288	Known spills to containment berm (possible leakage)
	OU 10	IA	Inactive Buildings 444/447 Waste Storage Site	400-208	864	Possible leakage from drum storage
	N/A	IA	Transformer, Roof of Building 447	400-801	1,597	Transformer leakage via downspouts possibly to storm drain
	N/A	IA	Beryllium Fire - Building 444	400-810	15,073	Drainage, holding basin, and airborne contamination from fire
	OU 9	IA	Tank 4 – OPWL Process Waste Pits	000-121		Potential leaks and overflows
	OU 9	IA	Tank 5 – OPWL Process Waste Tanks	000-121		Potential leaks and overflows
	OU 9	IA	Tank 6 – OPWL Process Waste Floor Sump and Foundation Drain Floor	000-121		Potential leaks and overflows
	OU 12	IA	South Loading Dock Building 444	400-116.2	1,113	Windblown, drum leakage, dumping
400-4	N/A	IA	Miscellaneous Dumping, Building 460 Storm Drain	400-803	18,932	Dumping to storm drain, extending along open ditch
	N/A	IA	Road North of Building 460	400-804	1,393	Hot spots covered w/asphalt from falling ingots
400-5	OU 10	IA	Sump #3 Acid Site (Southeast of Building 460)	400-205	1,693	Leakage from container overflows in berm area
	N/A	IA	RCRA Tank Leak in Building 460	400-813	356	Pipe leakage beneath building
	N/A	IA	RCRA Tank Leak in Building 460	400-815	356	Possible leakage from spills to secondary containment
400-6	OU 12	IA	Radioactive Site South Area	400-157.2	438,409	Dumping, surface runoff, air releases, open surface storage
400-7	N/A	IA	UBC 442 – Filter Test Facility	UBC 442	2,583	Leaking barrels, discharges
	OU 13	IA	Radioactive Site North Area	400-157.1	51,169	Leaking drums, drainage to ditches
	OU 10	IA	Building 443 Oil Leak	400-129	6,434	Leaks and spills from underground tanks (six)
	OU 12	IA	Sulfuric Acid Spill Building 443	400-187	20,206	Multiple leaks and sprays from storage tank
400-8	N/A	IA	UBC 441 – Office Building	UBC 441		
	OU 12	IA	Underground Concrete Tank	400-122		Overflows and leaking from tanks
	OU 9	IA	Tank 2 – Concrete Waste Storage Tank	000-121		Potential leaks and overflows

IHSS Group	Old Operable Unit No.	Current Operable Unit	Description	IHSS/PAC/UBC Site	Area (ft^2)	Historical Notes
	OU 9	IA	Tank 3 – Concrete Waste and Steel Waste Storage Tanks	000-121		Potential leaks and overflows
400-10	N/A	IA	Sandblasting Area	400-807	9,583	Open air sandblasting
	OU 12	IA	Fiberglass Area West of Building 664	600-120.2	5,449	Multiple spills around work area (resin and solvents)
	OU 14	IA	Radioactive Site West of Building 664	600-161	53,346	Punctured and leaking drums, hydraulic leaks
500-1	OU 13	IA	Valve Vaults 11, 12, 13	300-186	48,345	Leaks and discharges from transfer pipes and vaults
	OU 16	IA	Scrap Metal Storage Site	500-197	89,320	Residual contamination from removal of process and building scrap
	OU 13	IA	North Site Chemical Storage Site	500-117.1	115,489	Surface storage of contaminated material, uranium chips
500-2	OU 13	IA	Radioactive Site Building 551	500-158	62,166	Wastebox leakage, exterior contaminated drums transferred
500-3	N/A	IA	UBC 559 – Service Analytical Laboratory	UBC 559	34,544	Plutonium waste line leaks and breaks
	N/A	IA	UBC 528 – Temporary Waste Holding Building	UBC 528	432	OPWL leaks/valve vault overflows
	OU 9	IA	Radioactive Site Building 559	500-159	5,363	Broken process waste lines
	OU 9	IA	Tank 7 – OPWL - Active Process Waste Pit	000-121		Potential leaks and overflows
	OU 9	IA	Tank 33 – OPWL - Process Waste Tank	000-121		Potential leaks and overflows
	OU 9	IA	Tank 34 – OPWL - Process Waste Tank	000-121		Potential leaks and overflows
	OU 9	IA	Tank 35 – OPWL - Building 561 Concrete Floor Sump	000-121		Potential leaks and overflows
500-4	OU 13	IA	Middle Site Chemical Storage	500-117.2	91,616	Minor leaks and spills, partial asphalt cover
500-5	N/A	IA	Transformer Leak - 558-1	500-904	356	PCB-oil leaks to concrete pad
500-6	N/A	IA	Asphalt Surface Near Building 559	500-906	356	1-gallon F001 spill from liquid hose transfer
500-7	N/A	IA	Tanker Truck Release of Hazardous Waste from Tank 231B	500-907	859	Liquid and solid sludge release to soil
600-1	N/A	IA	Temporary Waste Storage - Building 663	600-1001	42,803	Leaking, punctured, and spilled drums (concrete pad)
600-2	N/A	IA	Storage Shed South of Building 334	400-802	63,641	Leaking and spilled drums to concrete pad
600-3	OU 12	IA	Fiberglass Area North of Building 664	600-120.1	4,650	Multiple spills around work area
600-4	OU 14	IA	Radioactive Site Building 444 Parking Lot	600-160	143,752	Releases from drums and boxes stored on ground
600-5	N/A	IA	Central Avenue Ditch Cleaning	600-1004	14,885	Soil spreading from ditch to area around tanks
600-6	N/A	IA	Former Pesticide Storage Area	600-1005	356	Pesticide spills to dirt floor
700-1	N/A	IA	Identification of Diesel Fuel in Subsurface Soil	700-1115		Subsurface fuel leak
700-2	N/A	IA	UBC 707 – Plutonium Fabrication and Assembly	UBC 707	107,710	Process line leaks/breaks
	N/A	IA	UBC 731 – Building 707 Process Waste	UBC 731	4,000	Process spills/OPWL leaks and breaks
	OU 9	IA	Tank 11 – OPWL - Building 731	000-121		Potential leaks and overflows
	OU 9	IA	Tank 30 – OPWL - Building 731	000-121		Potential leaks and overflows

IHSS Group	Old Operable Unit No.	Current Operable Unit	Description	IHSS/PAC/UBC Site	Area (ft^2)	Historical Notes
700-3	N/A	IA	UBC 776 – Original Plutonium Foundry	UBC 776	142,889	Airborne/tracked contamination fires and explosions/liquid waste spills
	N/A	IA	UBC 777 – General Plutonium Research and Development	UBC 777		Process spills/OPWL leaks/fire contamination
	N/A	IA	UBC 778 – Plant Laundry Facility	UBC 778	26,609	Laundry water spills/OPWL leaks and breaks
	N/A	IA	UBC 701 – Waste Treatment Research and Development	UBC 701	5,645	Possible spills from Research and Development (R&D)lab
	OU 8	IA	Solvent Spills West of Building 730	700-118.1	246	Carbon tetrachloride overflows and line leaks
	OU 14	IA	Radioactive Site 700 Area No.1	700-131	7,072	Fire and explosion resulting in soil contamination
	OU 8	IA	Radioactive Site West of Building 771/776	700-150.2(S)	27,113	Airborne and tracked contamination from fire, cleanup, and rain
	OU 8	IA	Radioactive Site South of Building 776	700-150.7	18,589	Airborne and tracked contamination from fire, cleanup, and rain
	N/A	IA	French Drain North of Building 776/777	700-1100	1,567	Possible pathway for contamination from explosion and fire
	OU 9	IA	Tank 9 – OPWL – Two 22,500-Gallon Concrete Laundry Tanks	000-121		Potential leaks and overflows
	OU 9	IA	Tank 10 – OPWL – Two 4,500-Gallon Process Waste Tanks	000-121		Potential leaks and overflows
	OU 9	IA	Tank 18 – OPWL – Concrete Laundry Waste Lift Sump	000-121		Potential leaks and overflows
	OU 8	IA	Solvent Spills North of Building 707	700-118.2	633	Tank leaks and rupture
	OU 8	IA	Sewer Line Overflow	700-144(N)	1,710	Pressurized sewer line breaks and overflows
	OU 8	IA	Sewer Line Overflow	700-144(S)	2,330	Pressurized sewer line breaks and overflows
	N/A	IA	Transformer Leak South of Building 776	700-1116	356	Dielectric fluid leak to pad, gravel, and soil
	OU 8	IA	Radioactive Site Northwest of Building 750	700-150.4	394	Leaks and backups of stored decontamination fluid
700-4	N/A	IA	UBC 771 – Plutonium and Americium Recovery Operations	UBC 771	97,553	Fire, sewer line breaks, process waste line leaks
	N/A	IA	UBC 774 – Liquid Process Waste Treatment	UBC 774	15,776	Tank overflows, drain breaks
	OU 8	IA	Radioactive Site West of Buildings 771/776	700-150.2(N)	27,113	Fire, explosion, tank overflows
	OU 8	IA	Radioactive Site 700 North of Building 774 (Area 3) Wash Area	700-163.1	18,613	Contaminated equipment wash area
	OU 8	IA	Radioactive Site 700 Area 3 Americium Slab	700-163.2	2,270	Buried contaminated Americium slab 8'x8'x10"
	OU 9	IA	Abandoned Sump Near Building 774 Unit 55.13 T-40	700-215	960	Mixed waste storage tank
	OU 8	IA	Hydroxide Tank, KOH, NaOH Condensate	700-139(N)(b)	342	Overflows/spills from aboveground KOH/NaOH tanks
	OU 9	IA	30,000-Gallon Tank (68)	700-124.1	1,133	Overflows/leaks from tank
	OU 9	IA	14,000-Gallon Tank (66)	700-124.2		Overflows/leaks from tank
	OU 9	IA	14,000-Gallon Tank (67)	700-124.3		Overflows/leaks from tank
	OU 9	IA	Holding Tank	700-125		Tank overflows
	OU 9	IA	Westernmost Out-of-Service Process Waste Tank	700-126.1	383	Below-grade leaks/overflows
	OU 9	IA	Easternmost Out-of-Service Process Waste Tank	700-126.2	370	Below-grade leaks/overflows

IHSS Group	Old Operable Unit No.	Current Operable Unit	Description	IHSS/PAC/UBC Site	Area (ft^2)	Historical Notes
	OU 9	IA	Tank 8 – OPWL – East and West Process Tanks	000-121		Potential leaks and overflows
	OU 9	IA	Tank 12 – OPWL – Two Abandoned 20,000-Gallon Underground Concrete Tanks	000-121		Potential leaks and overflows
	OU 9	IA	Tank 13 – OPWL – Abandoned Sump - 600 Gallons	000-121		Potential leaks and overflows
	OU 9	IA	Tank 14 – OPWL – 30,000-Gallon Concrete Underground Storage Tank (68)	000-121		Potential leaks and overflows
	OU 9	IA	Tank 15 – OPWL – Two 7,500-Gallon Process Waste Tanks (34W, 34E)	000-121		Potential leaks and overflows
	OU 9	IA	Tank 16 – OPWL – Two 30,000-Gallon Concrete Underground Storage Tanks (66, 67)	000-121		Potential leaks and overflows
	OU 9	IA	Tank 17 – OPWL – Four Concrete Process Waste Tanks (30, 31, 32, 33)	000-121		Potential leaks and overflows
	OU 9	IA	Tank 36 – OPWL – Steel Carbon Tetrachloride Sump	000-121		Potential leaks and overflows
	OU 9	IA	Tank 37 – OPWL – Steel-Lined Concrete Sump	000-121		Potential leaks and overflows
	OU 8	IA	Caustic/Acid Spills Hydrofluoric Tank	700-139.2	918	Spills and leaks infiltrating surrounding soil
	OU 9	IA	Concrete Process 7,500-Gallon Waste Tank (31)	700-146.1	1,507	Frequent tank overflows and leakage
	OU 9	IA	Concrete Process 7,500-Gallon Waste Tank (32)	700-146.2		Frequent tank overflows and leakage
	OU 9	IA	Concrete Process 7,500-Gallon Waste Tank (34W)	700-146.3		Frequent tank overflows and leakage
	OU 9	IA	Concrete Process 7,500-Gallon Waste Tank (34E)	700-146.4		Frequent tank overflows and leakage
	OU 9	IA	Concrete Process 7,500-Gallon Waste Tank (30)	700-146.5		Frequent tank overflows and leakage
	OU 9	IA	Concrete Process 7,500-Gallon Waste Tank (33)	700-146.6		Frequent tank overflows and leakage
	OU 8	IA	Radioactive Site North of Building 771	700-150.1	24,779	Airborne, leaking drums, tracked contamination
	OU 8	IA	Radioactive Site Between Buildings 771 and 774	700-150.3	5,037	Broken process waste line
700-5	N/A	IA	UBC 770 – Waste Storage Facility	UBC 770	3,111	Possible leakage from stored waste containers
700-6	OU 8	IA	Buildings 712/713 Cooling Tower Blowdown	700-137	14,962	Ground placement of tower sludge/blowdown water leaks
	OU 8	IA	Caustic/Acid Spills Hydroxide Tank Area	700-139.1(S)	923	Multiple spills and leaks
700-7	N/A	IA	UBC 779 – Main Plutonium Components Production Facility	UBC 779	43,360	Building over original Solar Pond/water spills and leaks
	OU 8	IA	Building 779 Cooling Tower Blowdown	700-138	14,962	Underground cooling tower water line break
	OU 8	IA	Radioactive Site South of Building 779	700-150.6	4,435	Tracked contamination
	OU 8	IA	Radioactive Site Northeast of Building B779	700-150.8	13,054	Tracked contamination

IHSS Group	Old Operable Unit No.	Current Operable Unit	Description	IHSS/PAC/UBC Site	Area (ft^2)	Historical Notes
	N/A	IA	Transformer Leak - 779-1/779-2	700-1105	712	PCB oil released from transformer
	OU 9	IA	Tank 19 – OPWL - Two 1,000-Gallon Concrete Sumps	000-121		Potential leaks and overflows
	OU 9	IA	Tank 20 – OPWL - Two 8,000-Gallon Concrete Sumps	000-121		Potential leaks and overflows
	OU 9	IA	Tank 38 – OPWL - 1,000-Gallon Steel Tanks	000-121		Potential leaks and overflows
700-8	OU 10	IA	750 Pad – Pondcrete/Saltcrete Storage	700-214	139,658	Pondcrete/saltcrete spills/pad runoff not contained
700-10	N/A	IA	Laundry Tank Overflow – Building 732	700-1101	1,856	Wastewater tank overflow
700-11	N/A	IA	Bowman's Pond	700-1108	4,741	Tanks/process line leaks/footing drain accumulation area
	OU 8	IA	Hydroxide Tank, KOH, NaOH Condensate	700-139.1(N) (a)	2,520	Multiple spills and leaks
700-12	N/A	IA	Process Waste Spill – Portal 1	700-1106	356	Valve vault water spilled onto street
800-1	N/A	IA	UBC 865 – Materials Process Building	UBC 865	41,558	OPWL leaks/spills from coating ops and R&D activities
	N/A	IA	Building 866 Spills	800-1204	2,623	Vent pipe and tank overflows
	N/A	IA	Building 866 Sump Spill	800-1212	364	Leak from sump pump
	OU 9	IA	Tank 23 – OPWL	000-121		Potential leaks and overflows
800-2	N/A	IA	UBC 881 – Laboratory and Office	UBC 881	79,222	Multiple leaks/broken waste lines
	N/A	IA	Building 881, East Dock	800-1205	2,426	Possible unknown contamination/condensate spill
	OU 9	IA	Tank 24 – OPWL – Seven 2,700-Gallon Steel Process Waste Tanks	000-121		Potential leaks and overflows
	OU 9	IA	Tank 32 – OPWL – 131,160-Gallon Underground Concrete Secondary Containment Sump	000-121		Potential leaks and overflows
	OU 9	IA	Tank 39 – OPWL – Four 250-Gallon Steel Process Waste Tanks	000-121		Potential leaks and overflows
800-3	N/A	IA	UBC 883 - Roll and Form Building	UBC 883	49,325	Process waste water leaks and overflows
	N/A	IA	Valve Vault 2	800-1200	4,541	Transfer line leak
	OU 9	IA	Tank 25 – OPWL – 750-Gallon Steel Tanks (18, 19)	000-121		Potential leaks and overflows
	OU 9	IA	Tank 26 – OPWL – 750-Gallon Steel Tanks (24, 25, 26)	000-121		Potential leaks and overflows
	N/A	IA	Radioactive Site South of Building 883	800-1201	1,500	Multiple areas of contamination from Plant operations
800-4	N/A	IA	UBC 886 – Critical Mass Laboratory	UBC 886	13,517	Leaks and spills from criticality experiments
	OU 9	IA	Tank 21 – OPWL – 250-Gallon Concrete Sump	000-121		Potential leaks and overflows
	OU 9	IA	Tank 22 – OPWL – Two 250-Gallon Steel Tanks	000-121		Potential leaks and overflows
	OU 9	IA	Tank 27 – OPWL – 500-Gallon Portable Steel Tank	000-121	31,400	Potential leaks and overflows
	OU 14	IA	Radioactive Site #2 800 Area, Building 886 Spill	800-164.2	31,400	Tank leak
800-5	N/A	IA	UBC 887 – Process and Sanitary Waste Tanks	UBC 887	378	Leaks and breaks in process waste lines

IHSS Group	Old Operable Unit No.	Current Operable Unit	Description	IHSS/PAC/UBC Site	Area (ft^2)	Historical Notes
	OU 10	IA	Building 885 Drum Storage	800-177	1,064	Possible releases from waste storage
800-6	N/A	IA	UBC 889 – Decontamination and Waste Reduction	UBC 889	2,603	Radiological car wash area/OPWL leaks/waste tank breaches
	OU 14	IA	Radioactive Site 800 Area Site #2 Building 889 Storage Pad	800-164.3	28,944	Leaks/spills/rainwater transport from storage area
	OU 9	IA	Tank 28 – Two 1,000-Gallon Concrete Sumps	000-121		Potential leaks and overflows
	OU 9	IA	Tank 40 – Two 400-Gallon Underground Concrete Tanks	000-121		Potential leaks and overflows
900-1	N/A	IA	UBC 991 – Weapons Assembly and R&D	UBC 991	59,849	Potential line leaks/valve vault breaches and overflows
	OU 8	IA	Radioactive Site Building 991	900-173	5,970	Small spills and equipment wash area
	OU 8	IA	Radioactive Site 991 Steam Cleaning Area	900-184	4,125	Equipment cleaning area
	N/A	IA	Building 991 Enclosed Area	900-1301	3,939	Possible leaks from waste containers/material storage
900-2	OU 2	BZ	Oil Burn Pit No. 2	900-153	6,403	Oil contaminated with uranium was burned in two parallel trenches
	OU 2	BZ	Pallet Burn Site	900-154	3,152	Wooden pallet burn area
900-3	OU 10	IA	904 Pad, Pondcrete Storage	900-213	127,334	Spillage and rainwater runoff of stored pondcrete/saltcrete
900-4&5	OU 10	IA	S&W Building 980 Contractor Storage Facility	900-175	5,819	Leaks and spills from drum storage
	N/A	IA	Gasoline Spill Outside Building 980	900-1308	356	Gas overflow during filling
900-11	OU 2	BZ	903 Pad	900-112	146,727	Leaks and spills from drum storage
	OU 2	BZ	Hazardous Disposal Area	900-140	65,498	Reactive metal destruction and disposal Site
	OU 2	BZ	East Firing Range	SE-1602	465,173	Dispersal of lead and depleted uranium from routine weapons firing
900-12	OU 2	BZ	Trench T-5	900-111.2	19,235	Disposal of sanitary waste sludge
	OU 2	BZ	Trench T-6	900-111.3	4,089	Disposal of sanitary waste sludge
	OU 2	BZ	Trench T-8	900-111.5	7,297	Disposal of sanitary waste sludge
	OU 2	BZ	Trench T-9	900-111.6	14,705	Disposal of sanitary waste sludge, scrap metal, and junk
	OU 2	BZ	Trench T-10	900-111.7	4,271	Disposal of sanitary waste sludge
	OU 2	BZ	Trench T-11	900-111.8	5,776	Disposal of sanitary waste sludge and asphalt planking
NE/NW	OU 10	BZ	Property Utilization and Disposal (PU&D) Yard – Drum Storage	174a	4,342	Leaks and spills from RCRA drum storage
	N/A	BZ	OU 2 Treatment Facility	NE-1407	356	Leaks and spills from process operations
	N/A	BZ	Trench T-12 Located at OU 2 East Trenches	NE-1412	7,449	Disposal of sanitary waste sludge and flattened drums
	N/A	BZ	Trench T-13 Located at OU 2 East Trenches	NE-1413	5,090	Disposal of sanitary waste sludge and flattened drums
NE-1	OU 6	OU 6	Pond A-1	142.1	39,294	Received wastewater effluent from the IA spill control
	OU 5	OU 6	Pond C-2	142.11	168,524	Received discharge from the South Interceptor Ditch (SID)
	OU 6	OU 6	Pond A-2	142.2	61,373	Received wastewater effluent from the IA spill control

IHSS Group	Old Operable Unit No.	Current Operable Unit	Description	IHSS/PAC/UBC Site	Area (ft^2)	Historical Notes
	OU 6	OU 6	Pond A-3	142.3	122,909	Received wastewater effluent from the IA
	OU 6	OU 6	Pond A-4	142.4	254,102	Received wastewater effluent from the IA
	OU 6	OU 6	Pond B-1	142.5	11,396	Flow-through retention pond, received treated sanitary effluent and process waste
	OU 6	OU 6	Pond B-2	142.6	33,761	Flow-through retention pond, received treated sanitary effluent and process waste
	OU 6	OU 6	Pond B-3	142.7	18,422	Flow-through retention pond, received treated sanitary wastewater effluent discharge
	OU 6	OU 6	Pond B-4	142.8	11,731	Flow-through retention pond, received treated sanitary effluent and process waste
	OU 6	OU 6	Pond B-5	142.9	129,515	Flow-through retention pond, received treated sanitary effluent and process waste
	OU 5	OU 5	Pond C-1	142.1	39,294	Retention and monitoring pond, received sanitary sewage discharge and runoff from the 903 Pad Area
NE-2	OU 2	BZ	Trench T-7	111.4	15,565	Disposal of sanitary waste sludge
SW-1	OU 5	OU 5	Ash Pit 1	133.1	13,960	Disposal of combustible waste ash and noncombustible trash
	OU 5	OU 5	Ash Pit 2	133.2	26,624	Disposal of combustible waste ash and noncombustible trash
	OU 5	OU 5	Ash Pit 3	133.3	13,023	Disposal of combustible waste ash and noncombustible trash
	OU 5	OU 5	Ash Pit 4	133.4	10,749	Disposal of combustible waste ash and noncombustible trash
	N/A	BZ	Recently identified ash pit (also referred to as TDEM-1)	SW-1701	11,066	Disposal of combustible waste ash, depleted uranium and metallic debris
	N/A	BZ	Recently identified ash pit (also referred to as TDEM-2)	SW-1702	5,588	Disposal of combustible waste ash, depleted uranium and metallic debris
	OU 2	BZ	Ryan's Pit (Trench 2)	109	261	Disposal of VOCs and drum carcasses
	OU 2	BZ	Trench T-3	110	7,823	Disposal of sanitary waste sludge and debris

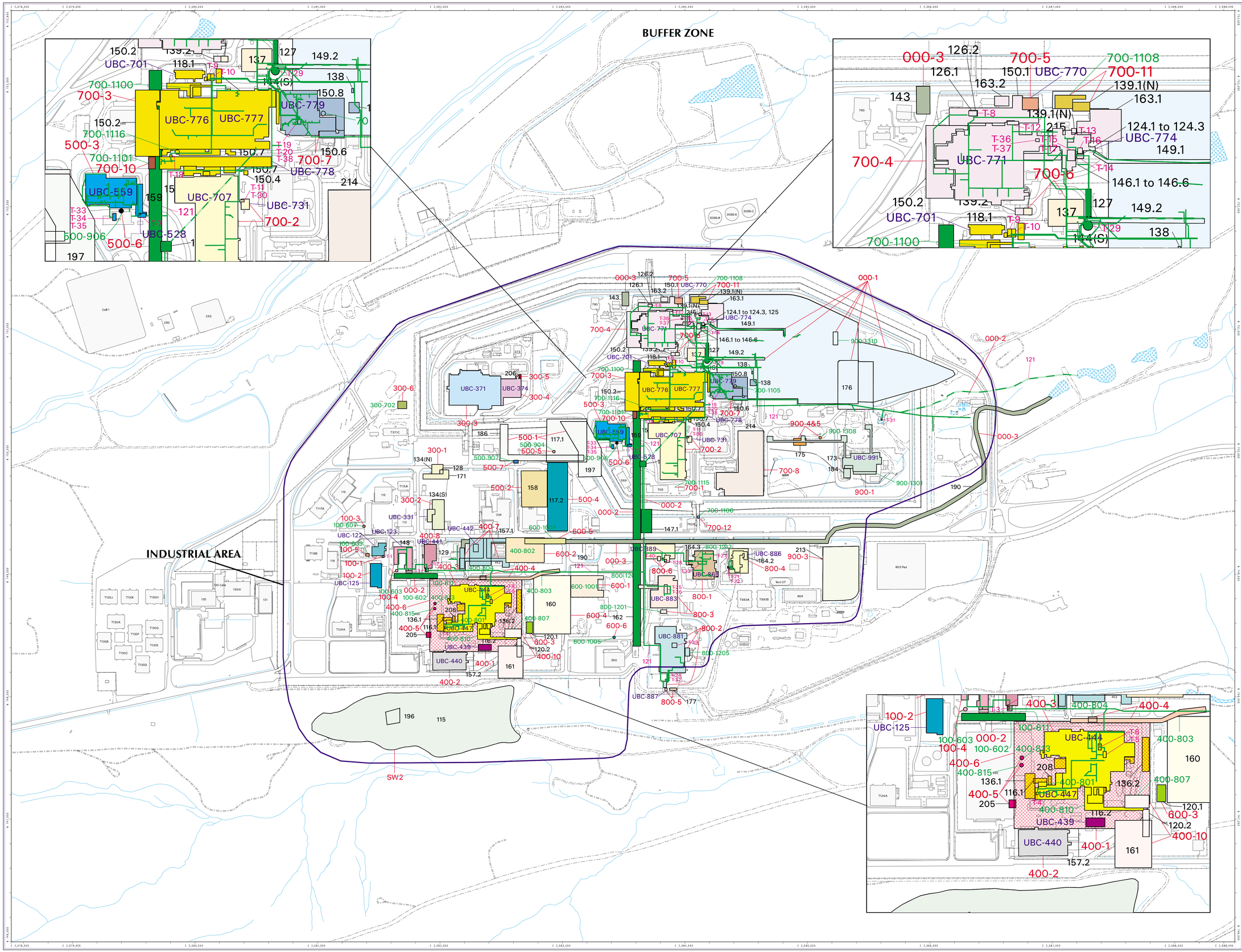


Figure 3
Industrial Area Groups

EXPLANATION

IHSS Groupings

- 000-1
- 000-2
- 000-3
- 100-1
- 100-2
- 100-3
- 100-4
- 100-5
- 300-1
- 300-2
- 300-3
- 300-4
- 300-5
- 300-6
- 400-1
- 400-2
- 400-3
- 400-4
- 400-5
- 400-6
- 400-7
- 400-8
- 400-10
- 500-1
- 500-2
- 500-3
- 500-4
- 500-5
- 500-6
- 500-7
- 600-1
- 600-2
- 600-3
- 600-4
- 600-5
- 600-6
- 700-1
- 700-2
- 700-3
- 700-4
- 700-5
- 700-6
- 700-7
- 700-8
- 700-10
- 700-11
- 700-12
- 800-1
- 800-2
- 800-3
- 800-4
- 800-5
- 800-6
- 900-1
- 900-3
- 900-4&5
- SW-2

Standard Map Features

- Buildings and other structures
- Solar Evaporation Ponds (SEPs)
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads
- Industrial Area Operable Unit Boundary
- Original Process Waste Lines
- Location of Original Process Waste Lines that may have been removed

DATA SOURCE BASE FEATURES:

PACs
Historical Release Report (HRR)
2nd Annual Update
Sept. 30, 1997
Individual Hazardous Substance Sites (IHSS)
DOE, 1992, HRR Report and Subsequent Updates.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/95

Scale = 1 : 3600
1 inch represents 300 feet

100 0 200 400ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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

GIS Dept. 303-966-7707

Prepared by: DynCorp — THE ART OF TECHNOLOGY

Prepared for: KAISER•HILL COMPANY

MAP ID: 01-0698

September 05, 2001

Original map contents are preserved. Logo and date have changed.

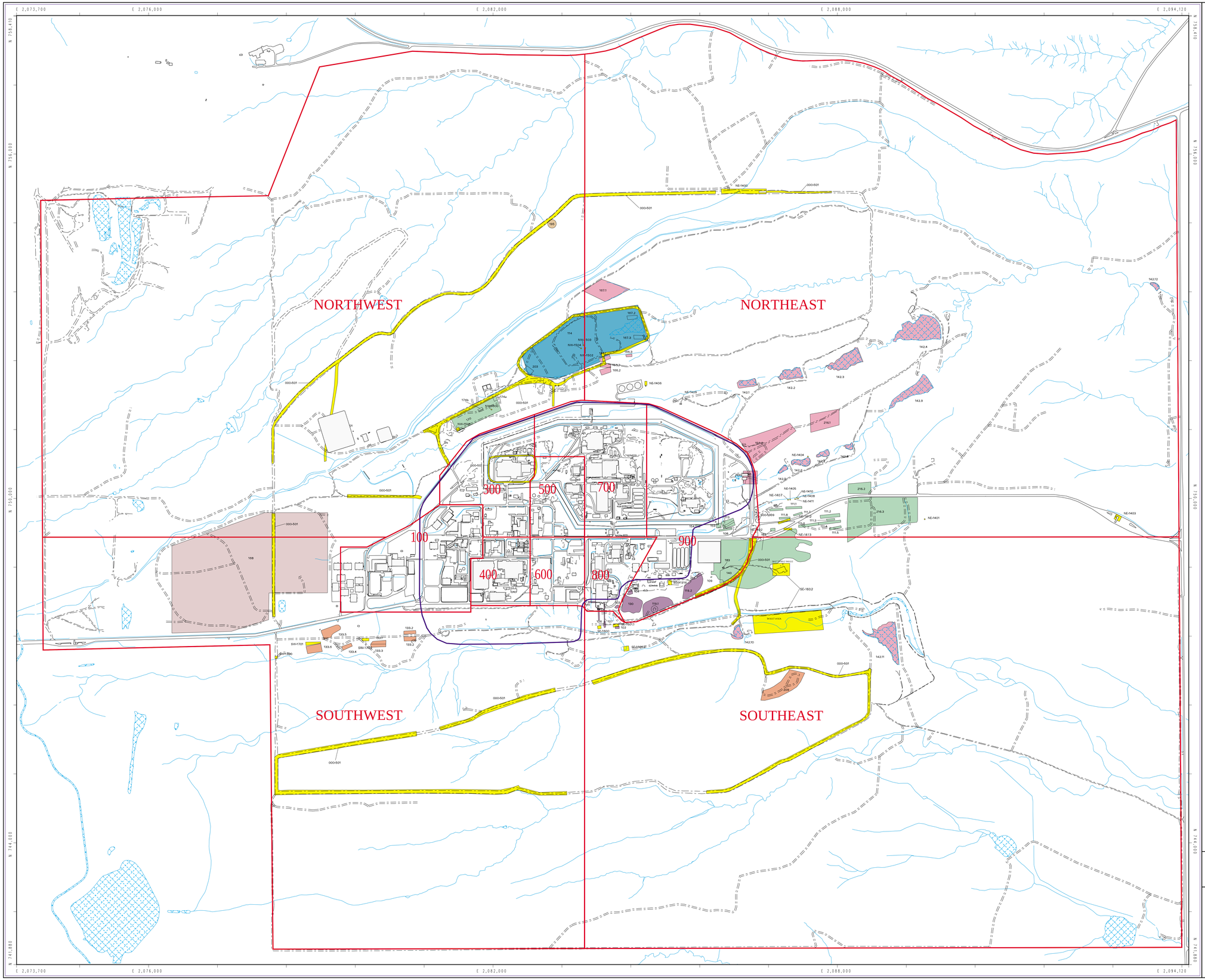


Figure 4

Buffer Zone IHSS & PACs

EXPLANATION

- BZOU
- OU1
- OU5
- OU6
- OU7
- OU11
- OU16
- PAC
- HRR Zone Boundary
- Industrial Area Boundary

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/95

Scale = 1 : 8030
1 inch represents approximately 669 feet

500 0 1000 2000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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

GIS Dept. 303-966-7707

Prepared by:
DynCorp
THE ART OF TECHNOLOGY

Prepared for:
KAISER•HILL COMPANY

MAP ID: 01-0267

September 05, 2001

3.1 PREVIOUS STUDIES AND REMEDIAL ACTIONS

Numerous studies conducted at RFETS include RFI/RIs, risk assessments, Interim Measure/Interim Remedial Actions (IM/IRAs), and Corrective Measure Studies/Feasibility Studies (CMS/FSs). Previous studies in the IA include RFI/RI studies initiated at all previous IA OUs, Phase I and Phase II RFI/RIs, an IM/IRA at OU 4 (SEP), and a preremedial investigation at Bowman's Pond. Previous studies in the BZ include RFI/RIs at OU 1 (881 Hillside), OU 2 (903 Pad, Mound, and East Trenches), OU 5 (Woman Creek), OU 6 (Walnut Creek), OU 7 (Present Landfill), and OU 11 (West Spray Field). Remedial actions were conducted at Trenches T-1, T-2, T-3, and T-4, the Mound Site, and Ryan's Pit in the BZ, and polychlorinated biphenyl (PCB) sites in the IA.

3.2 GEOLOGY

At RFETS, relatively flat-lying Quaternary surficial deposits overlie Cretaceous bedrock. The surficial deposits consist primarily of the Rocky Flats Alluvium and artificial fill materials (EG&G 1992). The alluvium ranges from approximately 100 feet (ft) thick at the western edge of the Site to approximately 1 ft thick at the eastern edge of the Site, and consists of unconsolidated, poorly sorted coarse gravels, coarse sands, and gravelly clays with discontinuous lenses of clay, silt, and sand. The Rocky Flats Alluvium is truncated by erosion immediately east of the IA.

The alluvium unconformably overlies weathered claystone bedrock consisting of the Upper Cretaceous Arapahoe and Laramie Formations. The Arapahoe Formation ranges from 0 to approximately 50 ft thick and consists of siltstones and claystones with sandstone lenses. In some areas, such as near the SEP, well-sorted and coarse-grained sandstone is present. This sandstone provides a preferential migration pathway; however, it is interrupted by erosion and does not provide an offsite pathway for groundwater and contaminant migration. The Laramie Formation unconformably underlies the Arapahoe Formation. Beneath the Site, the Laramie Formation is 600 to 800 ft thick and consists primarily of claystone with siltstone; fine-grained sandstone and coal lenses are also present (EG&G 1995a).

3.3 SURFACE WATER HYDROLOGY

Three intermittent streams drain RFETS: Rock Creek, Walnut Creek, and Woman Creek. The northwestern corner of RFETS is drained by Rock Creek, which flows northeast through the BZ to its offsite confluence with Coal Creek. North and South Walnut Creeks and an unnamed tributary drain the northern part of the Site. The confluence of North and South Walnut Creeks is east of Ponds A-4 and B-5. The South Interceptor Ditch (SID), located between the IA and Woman Creek, collects runoff from the southern part of RFETS and ultimately diverts the water to Pond C-2. Water from the A-, B-, and C-series ponds is monitored and discharged periodically. Woman Creek is diverted over the SID, flows around Pond C-2, and then flows offsite into the Woman Creek Reservoir.

3.4 HYDROGEOLOGY

Two hydrostratigraphic units are present at RFETS: the upper hydrostratigraphic unit (UHSU) and the lower hydrostratigraphic unit (LHSU). The UHSU consists of the unconfined saturated Rocky Flats Alluvium and weathered Arapahoe and Laramie Formation bedrock. This hydrostratigraphic unit contains most of the groundwater impacted by Site activities. The LHSU consists of the unweathered Arapahoe and Laramie Formations. Claystones and silty claystones in this unit act as an aquitard, inhibiting downward groundwater movement. The geometric mean of measured hydraulic conductivity values in the Rocky Flats Alluvium is approximately 10^{-4} centimeters per second (cm/sec). LHSU conductivities are generally lower than those of the overlying UHSU because of the higher percentage of fine-grained material (EG&G 1995b).

Groundwater within the UHSU primarily flows west to east along the bedrock contact with the underlying Arapahoe and Laramie Formation claystones. Groundwater elevations are highest in the spring and early summer when precipitation is high and evapotranspiration is low. Groundwater elevations decline during the remainder of the year, and some areas of the UHSU are seasonally dry. Groundwater from the UHSU discharges at springs and seeps on the hillsides at the contact between the alluvium and bedrock, and where sandstone lenses subcrop in drainages, and does not migrate offsite (EG&G 1995b).

To the west, where the alluvium is thickest, depth to the water table is 50 to 70 ft below ground surface (bgs). Depth to water generally decreases from west to east as the surficial material thins. Depth to water ranges from less than 2 ft to 22 ft (EG&G 1995b). Engineered structures cause variations in water levels and saturated thickness. The impact of building footing drains, utility corridors, and other structures has not been evaluated; however, these structures are believed to impact groundwater flow and are being evaluated as part of the Site-Wide Water Balance (SWWB).

The majority of remediation activities will be conducted in Rocky Flats Alluvium. However, basements of some buildings extend into the weathered Arapahoe or Laramie Formations. Because of the deep basements, UHSU groundwater may be intercepted beneath some buildings.

3.5 FUTURE LAND USE

Future Site land use assumptions are consistent with Figure 1 from RFCA Attachment 5. RFCA ALs for these land use scenarios will be applied.

4.0 INTERFACES

Because this ER RSOP covers projects across the Site, implementation requires interaction with Site organizations performing many functions. Key interfaces are described below and illustrated on Figure 5.

4.1 DECOMMISSIONING

The decommissioning staff is responsible for dismantling Site structures and infrastructure. ER staff will work closely with decommissioning staff so remediation projects can be scheduled and resources can be managed effectively. Additionally, information from decommissioning activities will be used during remediation planning and implementation.

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

ER will work with decommissioning staff to achieve an integrated process to minimize risk to workers and the environment, minimize generation of remediation waste, streamline technical processes, and reduce project costs. Project interface points and division of responsibilities include the following:

- The ER characterization and remediation schedule is integrated with decommissioning schedules. In general, ER characterization will start during facility deactivation or decommissioning.

- Decommissioning staff will remove any structural material to 3 ft below existing grade including facility slabs, foundations, and at least the top 3 ft of the footings/pilings.

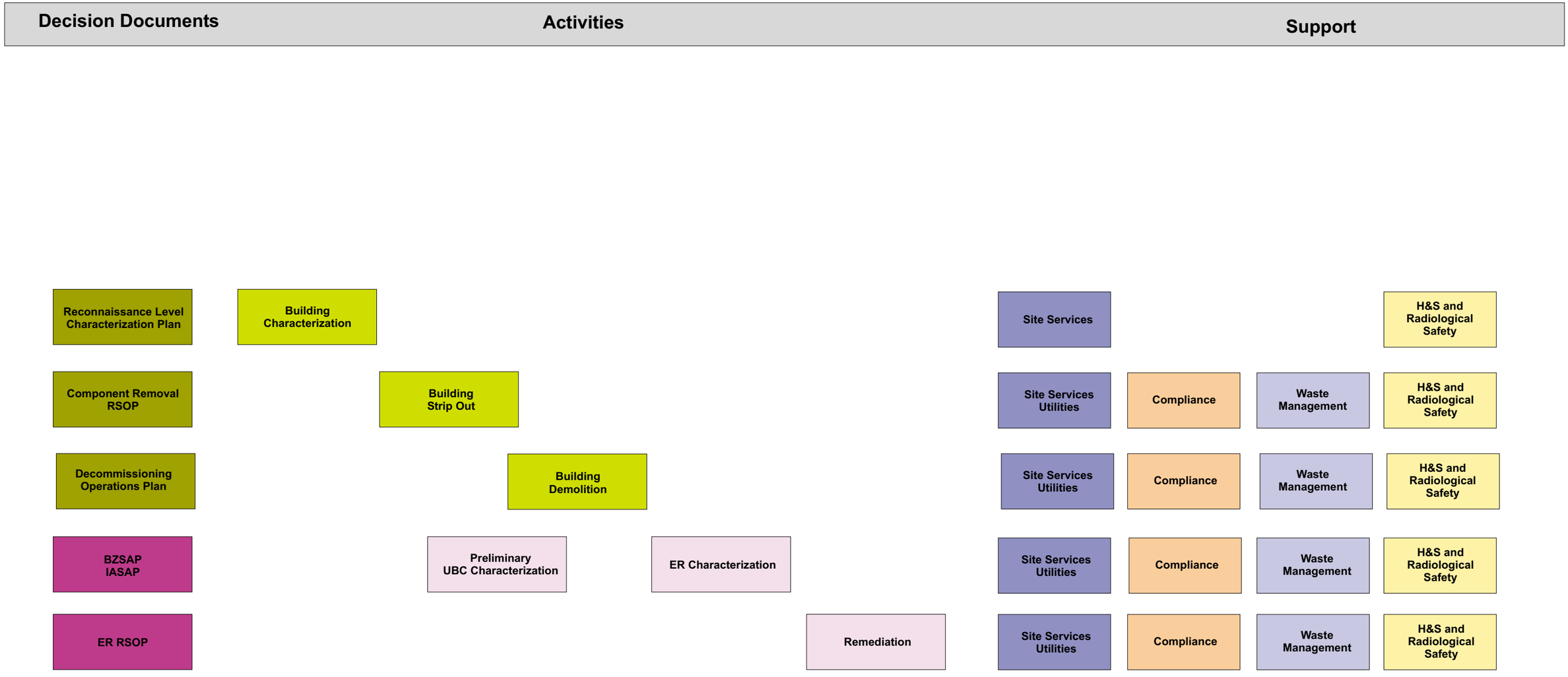
- Decommissioning staff will remove any structures below 3 ft of the existing grade when the structure prevents access to underlying soil that requires remediation or when the structure cannot be released for unrestricted use. The removal will include the surface foundation. Any remaining footings/pilings will be assessed and may be removed during ER activities.

- Decommissioning staff will flush and remove sanitary sewer lines, tanks, and equipment associated with facilities to the isolation valve of the main system line. Clean water will be used for flushing.

- If ER staff encounters additional UBC after decommissioning staff removes contaminated structures below 3 ft of proposed final grade, ER staff will remove the additional structure as necessary to complete the remediation.

- In the event that decommissioning of a facility with a high potential for UBC occurs well before scheduled soil remediation actions, ER staff may specify that facility slabs be left in place to provide continued containment of potentially contaminated soil. This decision will

Figure 5
Key Project Interfaces



be made on a case-by-case basis, documented in writing with concurrence from both groups, and included in the project AR. The requirements for leaving a slab in place will be addressed by ER staff.

- If slab removal is delayed, the Site's landlord staff will provide surveillance and maintenance of the facility slab during the interim. The handoff from decommissioning to the landlord organization will be documented in writing between decommissioning, ER, and the landlord organizations.

- Tunnels and other underground structures will be dispositioned on a case-by-case basis. In general, the dispositioning will be conducted during decommissioning. The decision on the disposition of these structures will be identified in project management plans and RFCA decision documents.

- Foundation drains will be removed, grouted, or otherwise disrupted by ER staff to eliminate potential contaminant migration pathways. If foundation drains are disturbed during decommissioning, they will be removed.

- ER staff will assess and be responsible for determining the actions for remediating contaminated soil and associated process waste lines beneath floor slabs.

- If decommissioning occurs in an IHSS area, a silt fence or other sediment control mechanism will be used, where needed, so potential contamination does not migrate outside of the IHSS area. ER staff will address sediments that collect at the sediment control point during remediation of the associated IHSS.

- Decommissioning staff will remove all electrical and water utilities within the facility footprint. Underground utilities will be left in a stable condition outside the facility footprint, and a map will be maintained annotating the locations and sources of these utilities. The maps will be maintained in the AR and project files and provided to ER staff.

- Decommissioning staff will remove process waste lines, tanks, and any other lines associated with the process waste transfer system within or as part of the facility footprint. Decommissioning will cap off the process waste lines at the facility perimeter or closest junction, as appropriate. A map annotating the locations and sources of the process lines will be maintained in the AR and project files and provided to ER staff.

- Decommissioning staff will remove valve vaults. ER staff will characterize soil surrounding valve vaults and remediate as necessary.

- ER staff will work with the building engineers and planners to identify potential spills and leaks, process waste lines, and other areas of potential contamination beneath the buildings.

- The Building 374 treatment facility is not expected to accept waste after the end of fiscal year (FY)01. A replacement system will be installed and be operational in FY02.

4.2 COMPLIANCE

The RFETS compliance organizations are responsible for guiding and supporting Site regulatory strategy and compliance. ER staff will work with compliance staff to ensure remediation is compliant with RFCA and identified Applicable or Relevant and Appropriate Requirements (ARARs). Remediation of RCRA units will be coordinated with compliance staff to ensure data generated during ER remediation activities are available for the closure of RCRA units.

4.2.1 RCRA Compliance

Compliance staff is responsible for ensuring Site activities are in accordance with RCRA requirements. Part of this responsibility includes overseeing the closure of RCRA-regulated units. Because ER staff will be responsible or partly responsible for the closure of some RCRA units, interaction and data transfer between ER and compliance organizations is critical. Project interface points and division of responsibilities include the following:

- ER staff will consult with compliance staff on the location and status of RCRA-regulated units.
- ER staff will close RCRA-regulated ER units in accordance with Section 6.5.3 of this RSOP.
- ER staff will document the RCRA closure activities, for those units that ER closes, in the ER data management system and Closeout Report.
- ER staff will inform compliance staff when a unit has been closed.
- Compliance staff will update the Master List of RCRA Units.

4.2.2 Environmental Monitoring

The IMP (DOE 2000a) provides a template for routine data collection for groundwater, soil, surface water, air, and ecology in the IA and BZ and around decommissioning and remediation projects. Interaction and data transfer between the compliance and ER organizations is ongoing. Project interface points and division of responsibilities include the following:

- ER staff will consult with compliance staff on the location of surface water, groundwater plumes, and ecological resources during project planning to develop protection requirements.
- ER staff will inform compliance staff when and where remediation actions are planned. This information will be used in planning project-specific surface water, groundwater, and air monitoring activities. The compliance staff will write SAPs to direct project-specific monitoring in accordance with the IMP.
- ER staff will notify compliance staff when surface water, groundwater, or ecological resources are encountered at a project site.

4.3 WASTE MANAGEMENT

The RFETS waste management organization is responsible for Site waste management activities. ER staff will work closely with waste management staff on waste characterization and transportation issues. Of critical importance is the ability to move ER remediation waste from the remediated area. Additionally, ER staff will work with waste management staff to remove packaged waste currently located in waste storage facilities within IHSS and PAC boundaries. Project interface points and division of responsibilities include the following:

- ER staff will inform waste management staff of upcoming projects, potential waste types, and volumes prior to the start of remediation projects.
- The waste management organization will assign a Waste Requirements Representative (WRR) who will be responsible for providing waste management guidance and assistance to the project.
- The WRR will issue a Waste Generating Instruction (WGI) for all waste streams that identifies waste characteristics, U.S. Department of Transportation (DOT) packaging and label requirements, waste packing instructions, characterization requirements for treatment and disposal, and document requirements.
- ER staff will be responsible for waste characterization, segregation, and packaging.
- The WRR will verify that packaged waste meets WGI requirements and has been entered into the Waste and Environmental Management System (WEMS) before the waste is transferred to the waste management organization.
- Waste management staff will be responsible for storage, transportation, and disposal of ER remediation waste.

4.4 SITE SERVICES

A key Site function is provided by the site services organization that is responsible for all Site systems. ER staff relies on the site services organization for a number of support functions. Project interface points and division of responsibilities include the following:

- ER staff will consult with site services staff before excavation to determine whether utilities are present in the excavation area.
- Site services staff will continue to provide fire, emergency, road, and maintenance support services through closure.
- Site services staff will cap or seal and abandon in place underground water distribution systems deeper than 3 ft below grade.
- Site services staff will close the water utility system. If the system is closed before ER remediation is complete, ER staff will be required to provide water for dust suppression, decontamination, and other uses.

- Site services staff will remove all manholes.
- Site services staff will close the electrical power system. Power poles will be cut off at grade. After the power system is shut down, ER staff will be required to provide generators for power requirements.
- Site services staff will close the Sewage Treatment Plant (STP) and associated sanitary sewer lines. The STP and associated sewer lines will be flushed in accordance with the RSOP for Facility Disposition (DOE 2000c). ER staff will characterize soil surrounding the sewer lines, remediate contaminated soil as necessary, flush contaminated pipe, and foam or grout pipelines deeper than 3 ft below grade.
- Storm drains will be maintained through the end of FY05 (approximately). Some components of the storm drain system may be maintained or modified as part of long-term stewardship needs after Site closure. ER staff will characterize soil around the remaining storm drains and remediate as necessary. Contaminated storm sewers will be removed. Storm sewers deeper than 3 ft below grade will be foamed or grouted and abandoned in place.

5.0 ACCELERATED ACTION DECISIONS

Accelerated action decisions will be made based on remedial action objectives (RAOs), evaluation of characterization and existing analytical data in accordance with Draft BZSAP (DOE 2001c) and IASAP (DOE 2001b) DQOs, and ALARA and stewardship considerations. The ER RSOP accelerated action decision framework is shown on Figure 6. These decision criteria are discussed below and illustrated in figures throughout this section. Because ARARs are considered during accelerated actions and are used, in part, to determine RAOs, they are included with RAOs in Section 5.1.

5.1 LONG-TERM REMEDIAL ACTION OBJECTIVES

RAOs are contaminant- and medium-specific goals designed to protect human health and the environment and are used to guide the accelerated actions. The overall long-term RAOs for RFETS soil are as follows:

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

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

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

5.1.1 Surface Soil

Most surface soil at IHSSs and PACs that may require remediation is not characterized. The anticipated contaminant types are expected to be the same as those in previously characterized areas based on process knowledge and waste stream characterization. RAOs are developed to address categories of anticipated COCs (radionuclides, organics, and metals). The overall RAO for surface soil is to prevent human exposure to contaminated surface soil exceeding RFCA Tier I ALs. Additionally, the RAOs are intended to protect surface water quality and ecological resources. Based on COCs and potential exposure pathways for surface soil, surface soil RAOs include the following:

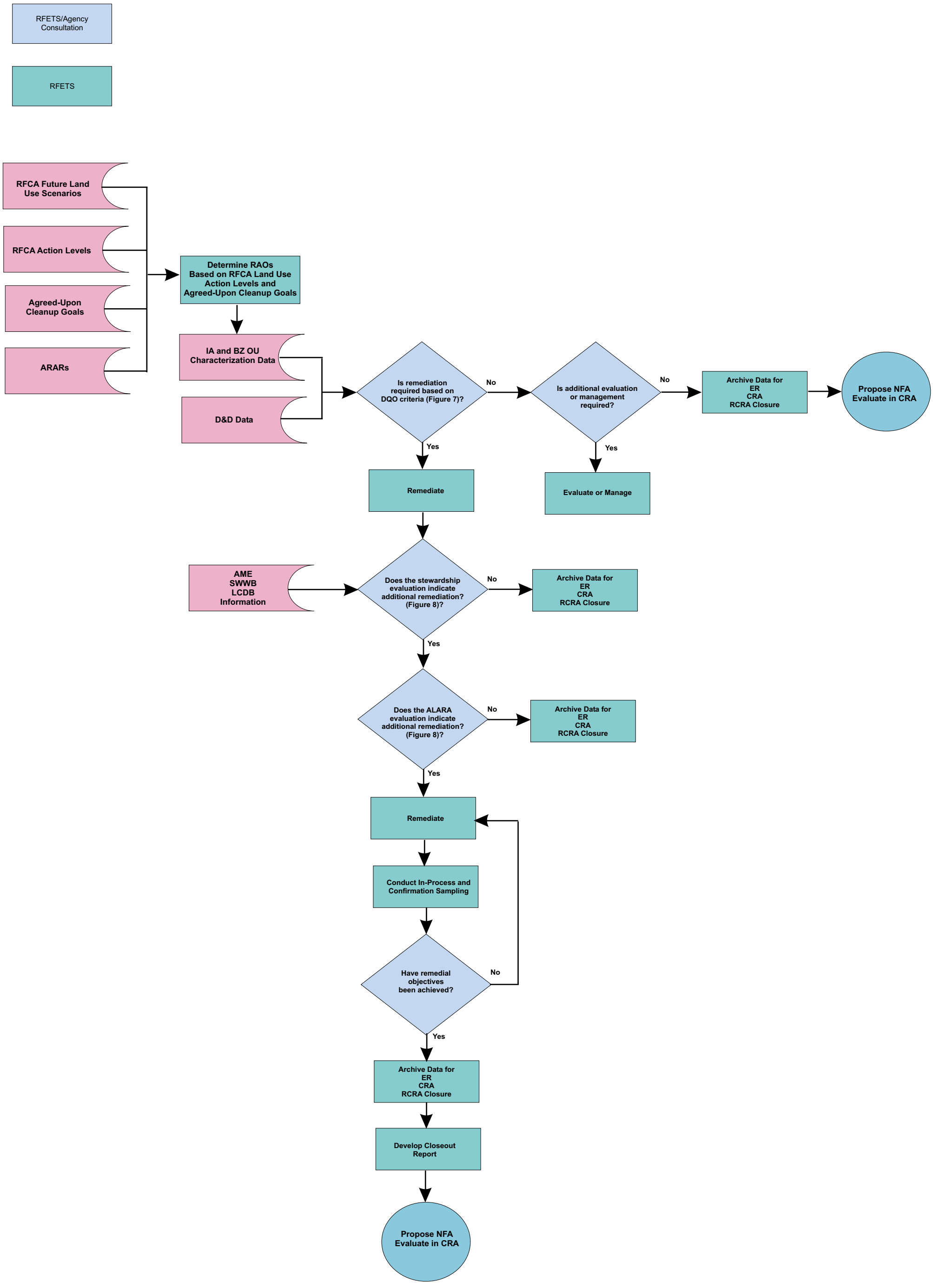
1. Prevent human exposure (direct contact, ingestion, and inhalation) to contaminated surface soil that would result in a cancer risk greater than 10^{-4} (RFCA Tier I ALs);

2. Prevent human exposure (direct contact, ingestion, or inhalation) to contaminated surface soil having a hazard index (HI) greater than or equal to one for noncarcinogens;

3. Prevent human exposure (direct contact, ingestion, inhalation, and external irradiation) to contaminated surface soil that would result in an annual radiation dose exceeding RFCA ALs;

4. Protect surface water quality; and

Figure 6
Decision Framework for Soil Accelerated Actions



5. Protect ecological resources during remediation while not adversely impacting other ecological resources.

The final action for the Site, which will be described in the final CAD/ROD, will provide for long-term protection of human health and the environment, address remaining threats posed by the Site, and protect surface water resources.

Remediation objectives will be ensured by demonstrating that the 95% upper confidence limit (UCL) of the mean concentrations of residual COCs across an area of concern (AOC) (as defined in the IASAP [DOE 2001b] and Draft BZSAP [DOE 2001c]) is below the RFCA Tier I AL.

5.1.2 Subsurface Soil

Most subsurface soil in IHSSs, PACs, and UBC Sites that may require remediation is not yet characterized. The anticipated contaminant types are expected to be the same as those in characterized areas based on process knowledge and waste stream characterization. RAOs are developed to address categories of anticipated COCs (radionuclides, organics, and metals). Subsurface soil will be remediated to agreed-upon cleanup levels. The RAOs for subsurface soil are to remediate subsurface soil to the extent necessary to protect surface water resources (from groundwater transport of contaminants) and protect ecological resources. Based on the overall goal, COCs, and potential exposure pathways, subsurface soil RAOs are:

1. Prevent adverse effects to surface water quality resulting from the subsurface soil-to-groundwater-to-surface water contaminant migration pathway;

2. Remediate soil containing COCs above agreed-upon cleanup levels from 6 inches bgs to the top of the saturated zone or top of bedrock, as appropriate, to address the extent of contamination;

3. Provide a remedy that minimizes the need for long-term maintenance; and

4. Protect ecological resources during remediation while not adversely impacting other ecological resources.

The final action for the Site, which will be described in the final CAD/ROD, will provide for long-term protection of human health and the environment, address remaining threats posed by the Site, and protect surface water resources.

5.1.3 Applicable or Relevant and Appropriate Requirements

RFETS accelerated actions must attain, to the maximum extent practicable, federal and state ARARs listed in Table 3.

Table 3
Applicable or Relevant and Appropriate Requirements

Requirement	Citation	Compliance Strategy	Excavate	Stabilize or Treat
Colorado Air Quality Control Commission (CAQCC) Regulations	5 Code of Colorado Regulations (CCR) 1001		X	X
• Emission Control Regulations for Particulates, Smoke, Carbon Monoxide, and Sulfur Oxides	5 CCR 1001-3			
- Opacity	Section II.A.1	The Site will not allow the emission into the atmosphere of any air pollutant that is in excess of 20 percent opacity from covered sources. Certified visible emissions evaluators will be available to ensure compliance.		
- Fugitive Particulate Emissions - Construction Activities - Storage and Handling of Materials - Haul Roads - Haul Trucks	Section III.D Section III.D.2(b) Section III.D.2(c) Section III.D.2(e) Section III.D.2(f)	Use a combination of dust control measures (Section 7.0) that may include covering loads, speed reduction, water sprays, road cleaning, covering or stabilization of spoil piles, and ceasing work at certain wind speeds.	X	X
• Air Pollutant Emission Notice (APEN)	5 CCR 1001-5, Part A	APENs will be submitted as appropriate in accordance with RFCA. Fuel consumption limits for fuel-fired equipment will be followed.	X	X
• Construction Permits	5 CCR 1001-5, Part B	Construction permits are not required, however requirements such as fuel consumption limits for fuel-fired equipment will be followed.	X	X
• Emissions of VOCs - Transfers of VOCs	5 CCR 1001-9 Regulation Number 3	Use submerged fill or bottom filling equipment when transferring VOCs to any tank, container, or vehicle compartment with a capacity exceeding 56 gallons.	X	X

Requirement	Citation	Compliance Strategy	Excavate	Stabilize or Treat
• Disposal of VOCs - Construction Permit Requirements	5 CCR 1001-9 Regulation Number 3 Section V	VOCs will not be disposed by evaporation or spillage unless reasonably achievable control technologies (RACTs) are utilized.	X	X
National Emission Standards for Hazardous Air Pollutants (NESHAP) • National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities	40 Code of Federal Regulations (CFR) 61, subpart H			
- Standard	61.92	The Site Radioactive Ambient Air Monitoring Program (RAAMP) sampling network is used to verify compliance with the 10 millirem per year (mrem/yr) standard.	X	X
- Emission Monitoring and Test Procedures	61.93	Radionuclide emission measurements will be made at all release points that have a potential to discharge radionuclides into the air that could cause an effective dose equivalent (EDE) to the most impacted member of the public in excess of 1 percent of the standard (0.1 mrem/yr).	X	X
- Compliance and Reporting	61.96	Site personnel perform radionuclide air emission assessments on all new and modified sources. Appropriate notifications are submitted for sources with calculated controlled emissions that exceed 0.1 mrem/yr EDE.	X	X
Federal Water Pollution Control Act (FWPCA), Clean Water Act (CWA), Colorado Basic Standards and Methodologies for Surface Water	5 CCR 1002-31	Surface water quality will be monitored in accordance with RFCA Attachment 5 requirements.	X	X
National Pollutant Discharge Elimination System (NPDES) Regulations • Best Management Practices (BMP) Program	40 CFR 125 .104	Compliance with current Site Storm Water Management Plan will constitute field compliance with FWPCA.	X	X
Endangered Species Act (ESA)	50 CFR 402	Identify and minimize early in the planning stage of an action, any potential conflicts	X	

Requirement	Citation	Compliance Strategy	Excavate	Stabilize or Treat
		between the action and federally listed species.		
Migratory Bird Treaty	50 CFR 10	Prevent or minimize contact with listed birds and nests. Consult with the responsible RFETS ecologist.	X	
Solid Waste Disposal Act (RCRA) Solid Waste Disposal Sites and Facilities • Definitions	6 CCR 1007-2 Section 1.2	Soil generated during remediation will be characterized. Contaminated soil will then be placed in containers for offsite disposition. If contaminated soil is not immediately shipped to a waste disposal facility, waste will be managed onsite in accordance with substantive requirements.	X	
Identification and Listing of Hazardous Waste	6 CCR 1007-3, Part 261	All remediation waste will be characterized to determine a hazardous waste classification.	X	X
Generator Standards • Hazardous Waste Determinations • Hazardous Waste Accumulation Areas	6 CCR 1007-3 Part 262 262.11 262.34(a)(i)(i)(ii) (iv, excluding A&B) (a)(3); (a) (4); (c)(1)	Waste characteristics will be determined. Waste will be staged onsite in appropriate storage facilities.	X	
Contingency Plan and Emergency Procedures • Purpose and Implementation • Emergency Coordinator Emergency Procedures	6 CCR 1007-3 Part 264, Subpart D .51 (b) .55 .56 (a-I)	Emergencies such as fire, explosion, or release of hazardous waste will be mitigated immediately. A designated employee will be responsible for coordinating emergency response actions.	X	X
Manifest System, Record Keeping, and Reporting • Operating Record • Record Keeping	6 CCR 1007-3, Part 264, Subpart E 264.73 264.74	Use of WEMS and compliance with RFETS disposal procedures will constitute compliance.	X	X
Use and Management of Containers • Condition of Containers • Compatibility of Waste in Containers • Management of Containers • Inspections	6 CCR 1007-3 Part 264, Subpart I .171 .172 .173 .174	Containers will be maintained in good condition and kept closed except when adding or removing waste. Waste will be compatible with containers.	X	X

Requirement	Citation	Compliance Strategy	Excavate	Stabilize or Treat
Miscellaneous Units • Environmental Performance Standards • Monitoring, Analysis, Inspection, Response, Reporting, and Corrective Action • Post-Closure Care	6 CCR 1007-3 Part 264, Subpart X [40 CFR Part 264, Subpart X] .601 .602 .603	The thermal desorption unit will be designed, constructed, operated, and maintained in a manner that protects groundwater, surface water, wetlands, soil, and air.		X
Air Emission Standards for Process Vents • Standards: Process Vents • Standards: Closed-Vent Systems and Control Devices • Test Methods and Procedures	6 CCR 1007-3 Part 264, Subpart AA .1032 .1033 .1034	Air emission standards will be incorporated into the design of process vents associated with thermal desorption operations to achieve compliance with requirements for hazardous wastes with organic concentrations equal to or greater than 10 parts per million (ppm) (by weight).		X
Corrective Action for Solid Waste Management Units • Temporary Units	6 CCR 1007-3, Part 264.553 (a-c) [40 CFR Part 264, Subpart S]	Hazardous or mixed waste may be stored in a temporary unit. This status is appropriate because of the short duration of operation of the unit, limited potential for release from the unit, and type of unit being established.	X	X
• Staging Piles	.554(d) (1) (I) and (ii) .554(d) (I)-(iv)	The volume of Tier I soil will be wrapped in material that will isolate it from surrounding environmental media or in some other manner that meets the requirements of 264.554(d)(1).		
Thermal Treatment	6 CCR 1007-3 Part 265, Subpart P	Operating parameters will be incorporated in system design as appropriate for thermal desorption technology.	X	X
Land Disposal Restrictions (LDRs) • Dilution Prohibited as a Substitute for Treatment • LDR Determination (Determination if Hazardous Waste Meets the LDR	6 CCR 1007-3 Part 268 [40 CFR Part 268] .3 .7	Hazardous remediation waste treated in the thermal desorption unit will meet the substantive requirements outlined in the regulation.		X

Requirement	Citation	Compliance Strategy	Excavate	Stabilize or Treat
Treatment Standards) • Special Rules for Wastes that Exhibit a Characteristic • Universal Treatment Standards for VOCs	 .9 (a-c) .48			
Toxic Substance Control Act (TSCA) Disposal Requirements • Applicability • Disposal Requirements • PCB Remediation Waste • PCB Bulk Product Waste • Disposal of R&D and Chemical Analyses Wastes	40 CFR 761 761.50 761.60 761.61 761.62 761.64	All PCB waste stored or disposed will be controlled to meet applicable requirements.	X	
Chronic Beryllium Disease Prevention Final Rule • Definitions • Waste Disposal • Warning Labels • Release Criteria	10 CFR 850 .3 .32 .38(b-c)	Debris suspected of being contaminated with beryllium >0.2 microgram per 100 square centimeters (μg/100 $cm^{2)}$) will be controlled and disposed so as to meet applicable requirements.	X	
Radiation Control	6 CCR 1007-1			
Emergency Plan – Required if material quantity exceeds Schedule E of Part 3 (e.g., 2 curies of alpha emitters) and evaluation shows maximum dose to offsite person from release exceeds 1 rem (5 rem to thyroid).	RH 3.9.11	DOE maintains its Emergency Plan in accordance with DOE Order 151.1, *Comprehensive Emergency Management System.*	X	X
Decommissioning Plan Contents – Must include a description of methods used to ensure protection of workers and the environment against radiation hazards during decommissioning.	RH 3.16.4.3.3	Procedures to meet 10 CFR 835, *Occupational Radiation Protection* and the Site's Integrated Work Control Program (IWCP) process will be described for proposed actions.	X	X
Decommissioning Plan Contents – Must include a description of the planned final radiation survey.	RH 3.16.4.3.4	Planned implementation of the Decommissioning Characterization Protocols or any final sampling and analysis plan for environmental media will be described.	X	X

Requirement	Citation	Compliance Strategy	Excavate	Stabilize or Treat
Decommissioning Plan Contents – Must include a description of the intended final condition of the site, buildings, and/or outdoor areas upon decommissioning.	RH 3.16.4.3.6	The intended condition upon completion of an accelerated action will be described in the Notification.	X	X
Decommissioning Plan Contents – If proposing to use the criteria in RH 4.61.3 or RH 4.61.4 (restricted access), the plan must include analysis demonstrating that reductions in residual radioactivity necessary to comply with the provisions of RH 4.61.2 (unrestricted access) would result in net public or environmental harm or were not being made because residual levels of contamination associated with restricted conditions are ALARA, taking into account consideration of any detriments expected to potentially result from decontamination and waste disposal.	RH 3.16.4.3.7.1	The analysis will be part of any accelerated action or final action regulatory decision document for environmental media cleanup projects proposing restricted access.	X	X
Decommissioning Plan Contents – If proposing to use the criteria in RH4.61.3 or RH 4.61.4 (restricted access), the plan must include an analysis demonstrating that if institutional controls were no longer in effect, the dose criteria of RH 4.61.3.3 (described below) will be met.	RH 3.16.4.3.7.3		X	X

Requirement	Citation	Compliance Strategy	Excavate	Stabilize or Treat
Decommissioning Plan will be approved by CDPHE if information therein meets RH 3.16, and RH 4.61, decommissioning is completed as soon as practicable, and the health and safety of the public is adequately protected.	RH 3.16.4.6	This section also specifies requirements for a long-term care warranty under RH 3.9.5.10 that may be required if using the criteria in RH 4.61.3 or RH 4.61.4 (restricted access). The RFCA Parties agree that further analysis is required to determine whether long-term care warranty requirements are relevant and appropriate to Rocky Flats. Planned implementation of Site-approved procedures to meet DOE Order 5400.5, R*adiation Protection of the Public and the Environment*, and the Site's IWCP process, which includes Lead Regulatory Agency (LRA) involvement, will be described for proposed actions. The Closure Project Baseline is focused on achieving decommissioning as soon as practicable.	X	X
Site radiation survey to establish residual contamination levels and/or confirm absence of contamination. As appropriate, survey building/outdoor areas that contain residual radioactivity.	RH 3.16.6.2	Requirements for radiation surveys are met through the Reconnaissance Level Characterization Survey Plans and Predemolition Survey Plans for facility decommissioning and through SAPs and the IMP for ER.	X	X
Submittal of final survey report, units and other information – specifies, as appropriate, that gamma levels be reported at 1 meter from surface in microrem/hr, removable and fixed contamination in disintegrations per minute per 100 square centimeters (dpm/100 cm^2); and radioactive concentrations in picocuries per liter (pCi/L) or per gram; identify instruments used and certify proper calibration/testing.	RH 3.16.6.3	Same as RH 3.16.6.2 above	X	X

Requirement	Citation	Compliance Strategy	Excavate	Stabilize or Treat
Radiation Protection Program – To the extent practicable, procedures and controls used shall be based on sound radiation protection principles to achieve public doses that are ALARA.	RH 4.5.2	Planned implementation of Site-approved procedures to meet 10 CFR 835, *Occupational Radiation Protection*, DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, and the Site's IWCP process, which includes LRA involvement, will be described for proposed actions.	X	X
Radiation Protection Program – Imposes constraint on air emissions of radioactive material to the environment. "Individual member of the public likely to receive the highest dose" will not be expected to receive a total effective dose equivalent (TEDE) greater than 10 mrem/yr from air emissions. Requires exceedance reporting and corrective action to ensure against recurrence.	RH 4.5.4	Listed only for completeness of this table. NESHAP already identified as ARAR. Radionuclide NESHAP required monitoring established at Site perimeter is used to determine potential for exposure to individual member of the public.	X	X
Dose limits for individual members of the public – TEDE from licensed operations less than 100 mrem/yr above background, exclusive of medical exposure and exposure from disposal by sanitary sewer. Dose rate in unrestricted areas less than 2 mrem/hr.	RH 4.14.1	Site-approved procedures to meet DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, are based on the same dose rate limits.	X	X
Dose Limits for Individual Members of Public – Surveys of radiation levels in unrestricted areas and radioactive materials in effluents released to unrestricted areas shall be made to demonstrate compliance with the dose limits for individual members of the public in RH 4.14.	RH 4.15.1	Surveys are conducted pursuant to Site-approved procedures to meet DOE Order 5400.5, *Radiation Protection of the Public and the Environment*. Radionuclide NESHAP required monitoring established at Site perimeter is used to determine potential for exposure to individual member of the public. Surface water is monitored in accordance with the IMP and RFCA Attachment 5.	X	X

Requirement	Citation	Compliance Strategy	Excavate	Stabilize or Treat
Dose Limits for Individual Members of Public – Provides the means to demonstrate compliance with RH 4.14: by measurement or calculation that dose does not exceed the annual limit or by demonstrating that annual average radioactive material concentration released in gaseous and liquid effluents at boundary of the unrestricted area does not exceed Appendix B, Table II, "Effluent Concentrations."	RH 4.15.2.1 and .2	Site-approved procedures to meet DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, are based on the same dose rate limits. Radionuclide NESHAP required monitoring established at Site perimeter is used to determine potential for exposure to individual member of the public. Surface water is monitored in accordance with the IMP and RFCA Attachment 5.	X	X
Surveys shall be made as necessary to evaluate radiation levels, concentrations of radioactive material, and potential radiological hazards that could be present.	RH 4.17.1	Planned implementation of Site-approved procedures to meet 10 CFR 835, *Occupational Radiation Protection*, DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, and the Site's IWCP process, which includes LRA involvement, will be described for proposed actions. Requirements for radiation surveys are met through the Reconnaissance Level Characterization Survey Plans and Predemolition Survey Plans for facility decommissioning and through SAPs and the IMP for ER.	X	X
Instruments and equipment used for qualitative radiation measurements must be calibrated at intervals not to exceed 12 months, unless otherwise noted by regulation.	RH 4.17.2		X	X

Requirement	Citation	Compliance Strategy	Excavate	Stabilize or Treat
Waste Disposal – Shall dispose only by transfer to authorized recipient, by release in effluents within the limits of subpart RH 4.14 (discussed above), or as authorized pursuant to (pertinent to RFETS) RH 4.34, *Method for Obtaining Approval of Proposed Disposal Procedures*, or RH 4.35, *Disposal by Release into Sanitary Sewerage*.	RH 4.33	Transfer to authorized recipient is met through compliance with the "offsite rule," 40 CFR 300.440. Proposals for onsite disposal of radioactive waste (if any) will be part of any accelerated action, or any final action regulatory decision document for environmental media cleanup projects proposing specific disposal methods. RH Part 11, *Special Land Ownership Requirements* which addresses requirements if government ownership of RFETS is transferred to private ownership, and RH Part 14, *Licensing Requirements for Land Disposal of Low Level Radioactive Waste*, will be reviewed for relevant and appropriate requirements for cleanup projects proposing specific disposal methods.	X	X
Radiological Criteria (for Decommissioning) – Determination of dose and residual activity levels which are ALARA, must take into account consideration of any detriments expected to potentially result from decontamination and waste disposal.	RH 4.61.1.3	The analysis will be part of any accelerated action for environmental media cleanup projects and will be provided in the Notification unless it is included in the RSOP itself and any final action regulatory decision document. See the Radionuclide Soil Action Level (RSAL) Regulatory Analysis for the RFCA Parties understandings regarding implementation of the "Decommissioning Rule."	X	X

Requirement	Citation	Compliance Strategy	Excavate	Stabilize or Treat
Criteria for Unrestricted Use – Residual radioactivity above background has been reduced to levels that are ALARA and results in TEDE to average member of the critical group that does not exceed 25 mrem/yr, including groundwater sources of drinking water.	RH 4.61.2	The analysis will be part of any accelerated action for environmental media cleanup projects and any final action regulatory decision document. See the RSAL Regulatory Analysis for the RFCA Parties understandings regarding implementation of the "Decommissioning Rule."	X	X
Criteria for Restricted Use – Must demonstrate that further residual radioactivity reductions to meet Unrestricted Use: 1) Would result in net public or environmental harm, OR 2) Are not being made because residual levels are ALARA.	RH 4.61.3.1	See the RSAL Regulatory Analysis for the RFCA Parties understandings regarding implementation of the "Decommissioning Rule."	X	X
Criteria for Restricted Use – 1) Provisions made for durable, legally enforceable institutional controls that provide reasonable assurance that TEDE to average member of the critical group will not exceed 25 mrem/yr, AND 2) If institutional controls were no longer in effect, TEDE above background is ALARA and would not exceed either100 mrem/yr. OR 500 mrem/yr, if demonstrated that further reductions are not technically achievable, would be prohibitively expensive, or would result in net public or environmental harm.	RH 4.61.3.2 and .3	See the RSAL Regulatory Analysis for the RFCA Parties understandings regarding implementation of the "Decommissioning Rule."	X	X
Alternate (Decommissioning) Criteria 1) Analysis provides assurance that public health and safety would continue to be protected and unlikely that TEDE would be more than 100 mrem/yr. 2) Employment of restrictions on site use that minimize exposures at the site. Doses are reduced to ALARA.	RH 4.61.4.1.1 through .3	See the RSAL Regulatory Analysis for the RFCA Parties understandings regarding implementation of the "Decommissioning Rule."	X	X

5.1.4 Data Quality Objectives

The ER RSOP decisions are based on the Preliminary Data Quality Objectives for the Industrial Area Sampling and Analysis Plan (DOE 2000d). DQOs for accelerated action decisions contain data aggregation and AL comparison rules as illustrated on Figure 7. Data aggregation and AL comparison methods are detailed in the IASAP (DOE 2001b) and the Draft BZSAP (DOE 2001c). Action will be taken based on these DQOs in accordance with the following:

- When the 95% UCL of the mean COC concentration across an AOC is above RFCA Tier I ALs for surface soil or agreed-upon cleanup levels for subsurface soil, or the sum of the ratios of the 95% UCLs of the mean concentration for COCs across an AOC to their respective RFCA Tier I ALs is greater than 1 for surface soil, or agreed-upon cleanup levels for subsurface soil.

- When analytical results indicate contaminant concentrations between Tier I, or agreed-upon cleanup levels, and Tier II, the AOC will be evaluated to determine whether additional remediation or management is warranted to protect surface water resources. Additional Site studies, including the Actinide Migration Evaluation (AME), SWWB, Land Configuration Design Basis (LCDB), and IMP, may provide information for this evaluation.

- When analytical results indicate a hot spot is present at 3 times the RFCA Tier I AL for surface soil or agreed-upon cleanup levels for subsurface soil, in accordance with the elevated measurement comparison in the IASAP (DOE 2001b) and BZSAP (DOE 2001c).

A detailed description of the data aggregation, analysis, and hot spot determination is presented in the IASAP (DOE 2001b) and Draft BZSAP (DOE 2001c).

5.2 LONG-TERM STEWARDSHIP

Accelerated action planning and implementation include consideration of long-term stewardship goals. The stewardship evaluation, conducted during the accelerated action planning process, takes into account potential post-closure actions so that accelerated actions are consistent with the RFCA Vision for long-term stewardship. The results of the stewardship evaluation, which will include whether additional remediation is warranted, will be documented in the RSOP Notification. The results of the stewardship evaluation (Figure 8) will be used during the accelerated action implementation in conjunction with the ALARA process.

Many of the stewardship controls will be applied on a Sitewide basis and will not be affected by individual actions discussed in this RSOP. DOE will consider additional remediation beyond ALs in those cases where remediation would eliminate the need for specific institutional controls.

Figure 7
Data Quality Objectives

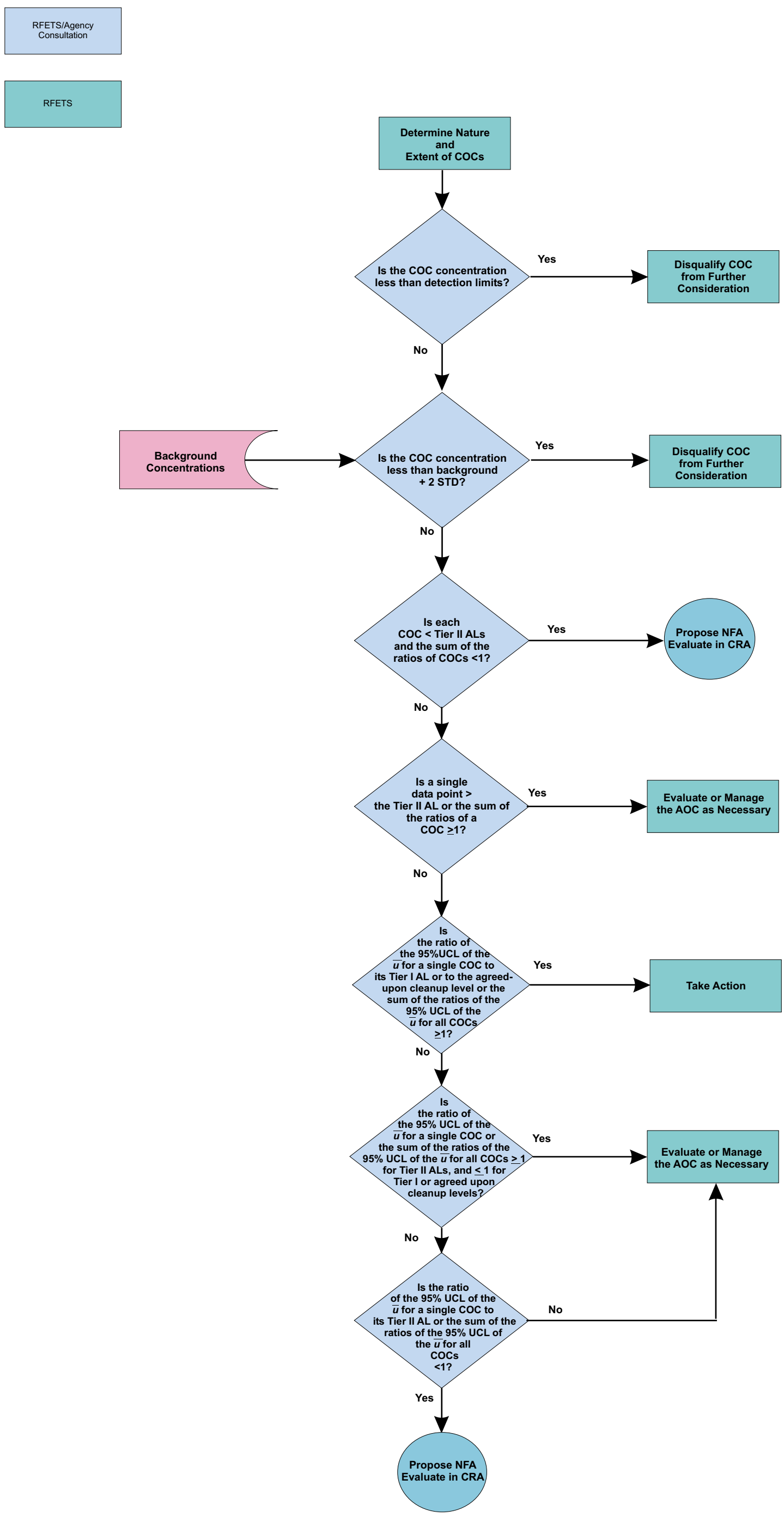
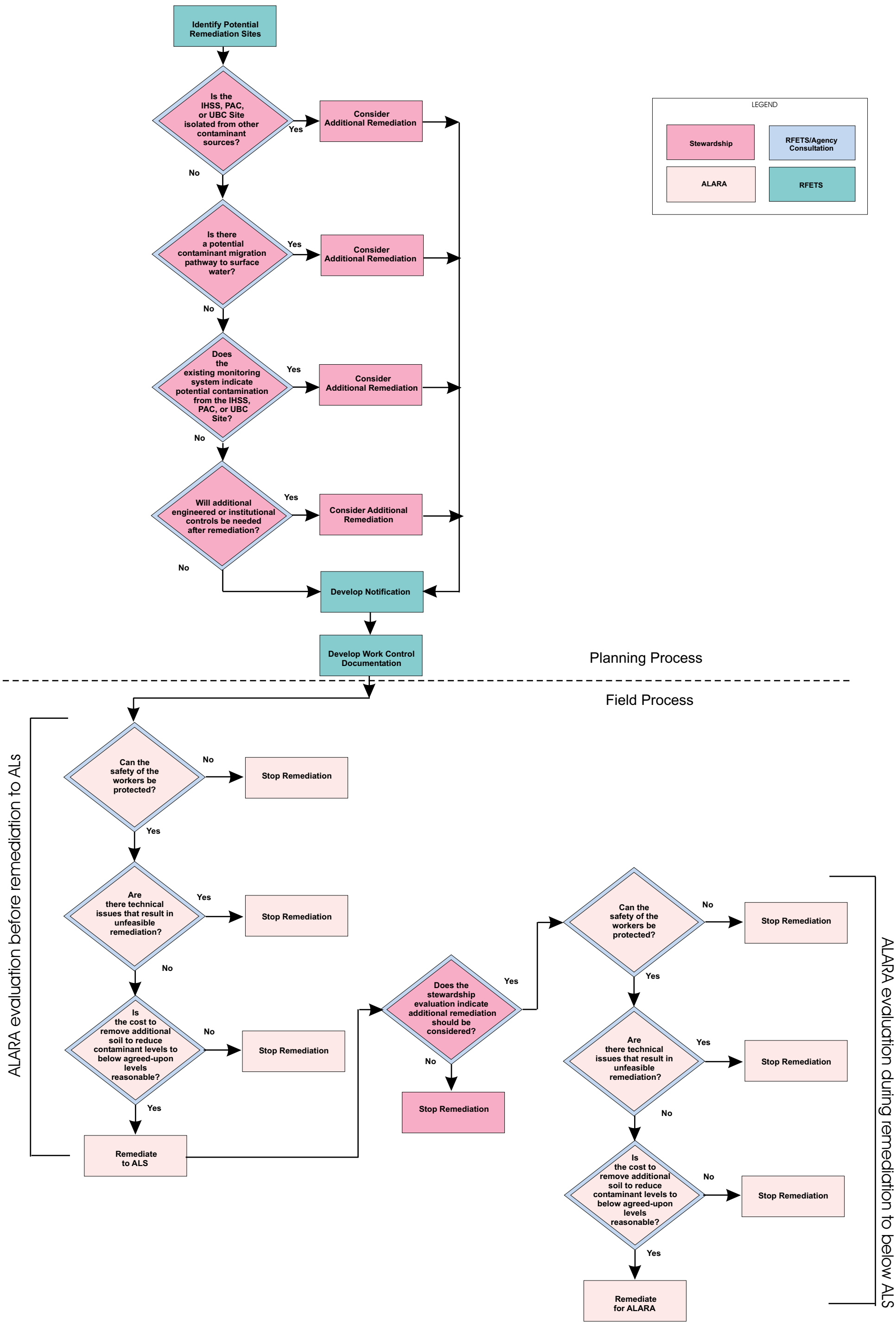


Figure 8
Stewardship and ALARA Process Overview



5.2.1 Accelerated Actions

Because the ER RSOP addresses accelerated actions, the primary contribution of remediation under the ER RSOP to long-term stewardship is risk reduction through source removal. Additionally, when removal of the contaminants is the action, long-term stewardship considerations are unlikely to lead to any modification of the type of action to be undertaken. The ER RSOP also includes work controls and procedures to protect human health and the environment during accelerated actions. Long-term adverse impacts from the actual remediation activities are not expected.

In accordance with RFCA, excavation to RFCA ALs is considered protective of human health and the environment. Remediation under the ER RSOP will be conducted to the agreed-upon cleanup levels specified through the RFCA process. However, additional long-term stewardship considerations may impact cleanup decisions.

Evaluation of long-term stewardship criteria is incorporated into the planning process. The stewardship evaluation will be conducted during the planning process, because all of the stewardship evaluation criteria, except the amount of residual contamination in soil, will be known at that time. The stewardship evaluation will be conducted by ER staff in consultation with the regulatory agencies and will be included in the ER RSOP Notification. During field implementation of the ER RSOP, the project manager will evaluate in-process remediation data, in consultation with the regulatory agencies, to determine whether additional remediation is required to meet the goals determined in the stewardship evaluation. If additional remediation is reasonable and consistent with ALARA goals (Section 5.3), remediation will continue. When remediation goals are achieved, confirmation samples will be collected and the remediation area will be surveyed. Remediation data, including levels and location of residual contamination, if any, will be documented in the Closeout Report and archived for use in the RFI/RI, CRA, and CAD/ROD.

The long-term stewardship evaluation includes the following:

- Proximity to other contaminant sources;
- Surface water protection;
- Monitoring requirements; and
- Recommendations for institutional controls or additional engineered controls.

Figure 8 illustrates an overview of the long-term stewardship evaluation and its relationship to ALARA and remediation activities. This stewardship evaluation will consider the factors shown on Figure 8 and described in detail in the following sections.

Proximity to Other Contaminant Sources

Surrounding and adjacent IHSS Groups may influence post-remediation impacts from IHSS Group remediations. These impacts are best considered in whole rather than individually so that institutional controls and monitoring requirements can be consolidated. When an IHSS Group is isolated from other contaminant sources, additional remediation will be considered. This could result in a reduction of potential future institutional controls over large areas.

Surface Water Protection

Remediation to agreed-upon cleanup levels at some IHSS Groups will be evaluated to ensure protection of surface water. Surface water protection considerations include the following:

- Subsurface soil ALs were developed to be protective of surface water quality standards and radionuclide subsurface soil ALs are equal to surface soil ALs. Both radionuclide and non-radionuclide ALs are protective of surface water.

- There are very few IHSSs where a pathway from surface soil to surface water exists. AME data indicate particulate transport is the dominant migration pathway from surface soil to surface water, and additionally states "Actinide source areas that have the potential to impact surface water quality due to erosion and sediment transport are the following:

  – The 903 Pad and Lip Area (903 Pad Area);

  – An area south and southwest of the old firing range and access road to the north of the SID;

  – The Woman Creek watershed between Pond C-1 and the Mower Diversion; and

  – The areas near the A- and B-series Ponds, South Walnut Creek, and the north-facing hillslopes adjacent to South Walnut and Walnut Creeks" (DOE 2000e).

  As shown on Figures 3 and 4, the majority of IHSSs, PACs, and UBC Sites covered under this RSOP are not located in these areas. Remediation of the 903 Lip Area is covered under a separate IM/IRA.

- Areas where surface soil is remediated to agreed-upon cleanup levels will be backfilled according to Section 6.11, stabilized, and revegetated. This will prevent erosion of soil with residual contamination into surface water.

- The final land configuration will provide additional cover where required.

Where a pathway to surface water exists, the following questions will be addressed:

- Do characterization data indicate there are contaminants in surface soil?

- Do monitoring results from points of evaluation (POEs) or points of compliance (POCs) (Figure 9) indicate there are surface water impacts from the area under consideration?

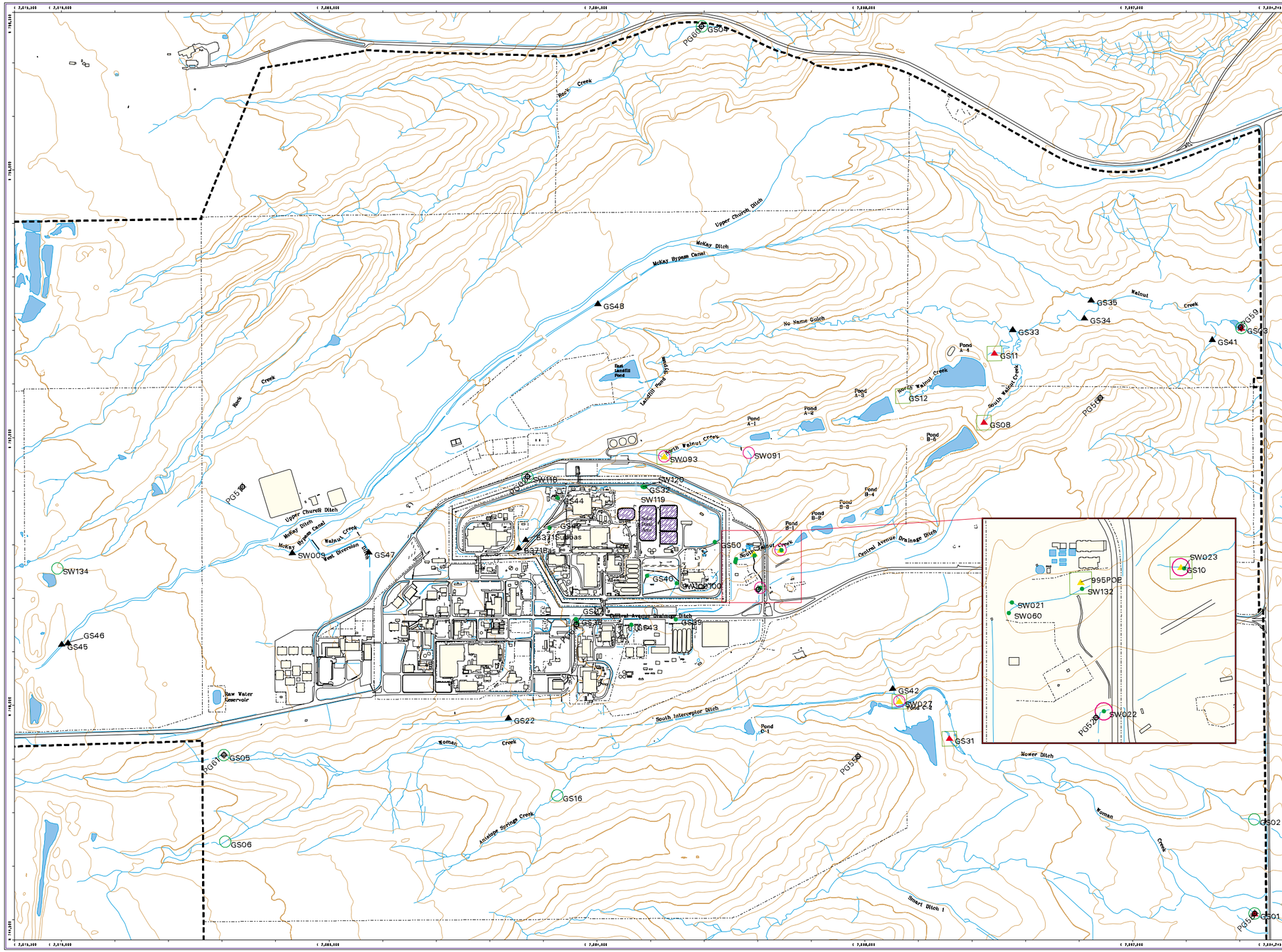


Figure 9
Surface Water Monitoring Locations for Fiscal Year 2001

EXPLANATION

Precipitation Gage

Monitoring Location Objective*

- Buffer Zone Hydrologic
- New Source Detection
- Point of Compliance
- Point of Evaluation
- Source Location
- Ad Hoc
- Performance
- IDLH**

Standard Map Features

- Buildings and other structures
- Solar Evaporation Ponds (SEPs)
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Topographic Contour (20-Foot)
- Rocky Flats boundary
- Paved roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/95
Topographic contours were derived from digital elevation model (DEM) data by Morrison Knudson (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~ 10 meter resolution. DEM post-processing performed by MK, Winter 1997.

NOTES:
* The monitoring objective(s) performed at each location are detailed in the Surface Water Section of the Site Integrated Monitoring Plan.

** IDLH (Immediate Danger to Life & Health) refers to the monitoring objective for safe operation of the Site detention ponds.

N

Scale = 1 : 17870
1 inch represents approximately 1489 feet

250 0 500 1000FT

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy

Rocky Flats Environmental Technology Site

GIS Dept. 303-966-7707

Prepared by: DynCorp THE ART OF TECHNOLOGY

Prepared for: KAISER-HILL COMPANY

MAP ID: 01-0023 September 05, 2001

Original map contents are preserved. Logo and date have changed.

NT_Svr w:/projects/fy2001/01-0023/auto-sw-loc-fig9-b.aml

- Is the IHSS Group in an area with high erosion potential, based on the 100-Year Average Erosion Map shown on Figure 10 (DOE 2000e)?

If additional remediation and/or management are indicated, the consultative process will be used to determine the following:

- Remediation targets (area and COCs), if necessary;
- Management actions, if necessary, which may include stabilization, monitoring, or best management practices (BMPs).

Monitoring

Current surface water and groundwater monitoring networks are shown on Figures 9 and 11, respectively. The current monitoring system may be modified by addition of surface water or groundwater performance monitoring stations in accordance with the IMP. The evaluation of monitoring requirements will be based on the following:

- Do monitoring results from POEs or POCs (Figures 9 and 11) indicate there are groundwater or surface water impacts from the area under consideration?
- Can the impact be traced to a specific IHSS Group?
- Are additional monitoring stations needed?
- Can existing monitoring locations be deleted if additional remediation is conducted?

If the impacts can be traced to a specific IHSS Group, additional remediation or monitoring may be indicated. If additional remediation or monitoring is indicated, the consultative process will be used to determine additional remediation targets or the type and placement of additional monitoring stations.

Performance monitoring stations will be used, if necessary, to provide additional monitoring around areas during remediation. If groundwater or surface water impacts are detected during remediation, performance monitoring will continue for a period of one year. Additional monitoring may be required at sites that are not remediated to agreed-upon ALs or at areas that have the potential to adversely impact surface water. The evaluation criteria for determining whether additional monitoring is required are as stated above.

Additional remediation may eliminate the need for existing monitoring stations. The consultative process will be used to determine when monitoring stations can be eliminated.

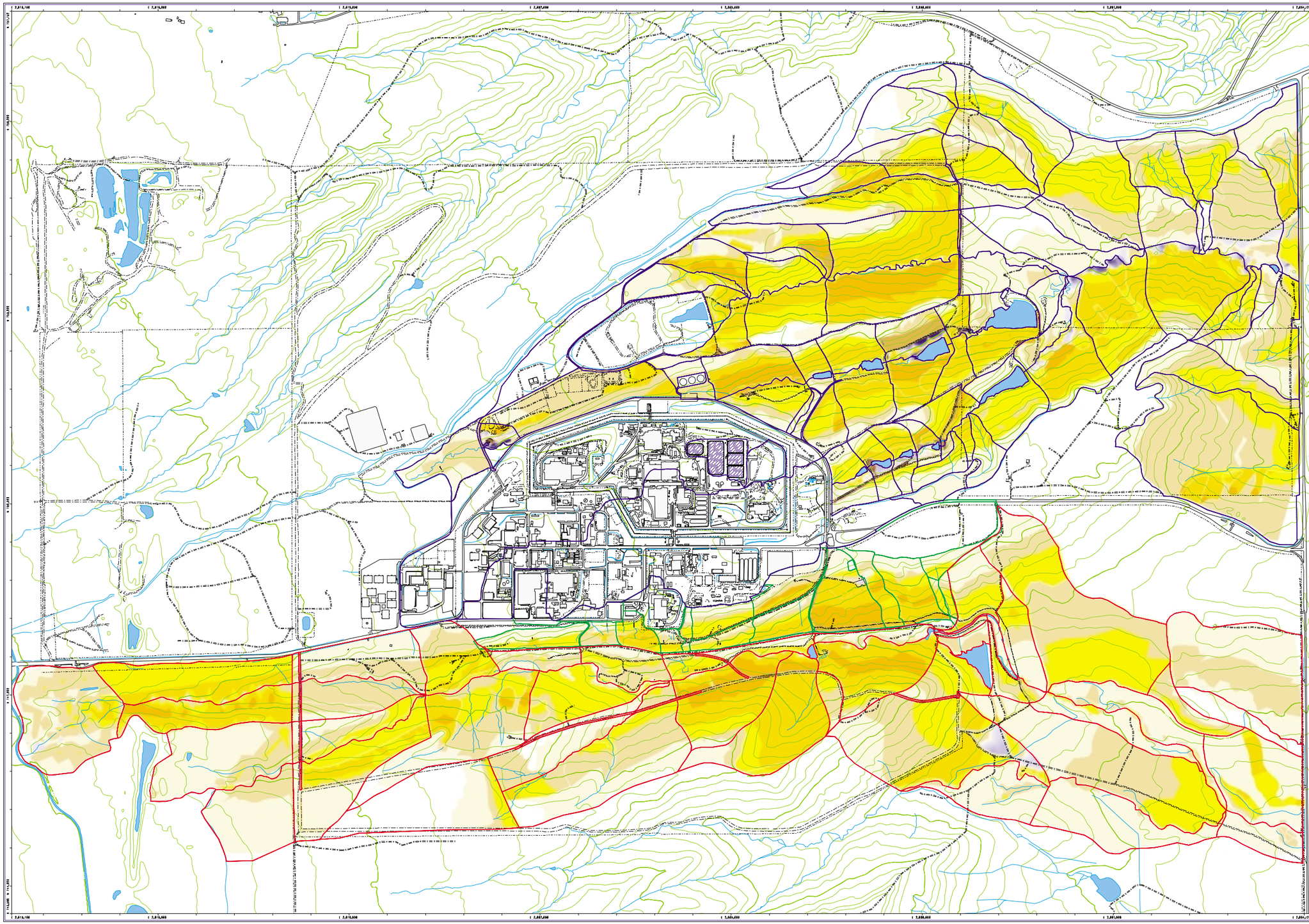


Figure 10

100-Year Average Erosion Map

EXPLANATION

- > 0.400 Kg/m2 (0.737 Lbs/yd2) Deposition
- 0.200 Kg/m2 (0.369 Lbs/yd2) Deposition
- 0.020 Kg/m2 (0.037 Lbs/yd2) Deposition
- No Deposition or Detachment
- 0.010 Kg/m2 (0.018 Lbs/yd2) Detachment
- 0.025 Kg/m2 (0.046 Lbs/yd2) Detachment
- 0.050 Kg/m2 (0.092 Lbs/yd2) Detachment
- 0.100 Kg/m2 (0.184 Lbs/yd2) Detachment
- 0.150 Kg/m2 (0.276 Lbs/yd2) Detachment
- 0.200 Kg/m2 (0.369 Lbs/yd2) Detachment
- 0.250 Kg/m2 (0.461 Lbs/yd2) Detachment
- 0.300 Kg/m2 (0.553 Lbs/yd2) Detachment
- 0.350 Kg/m2 (0.645 Lbs/yd2) Detachment
- Road Detachment

Hillslopes

- South Interceptor Ditch (SID)
- Woman Creek
- Walnut Creek

Standard Map Features

- Buildings and other structures
- Solar Evaporation Ponds (SEPs)
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Topographic Contour (20-Foot)
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial flyover data captured by: EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/95
Topographic contours were derived from digital elevation model (DEM) data by: Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~10 meter resolution. DEM post-processing performed by MK, Winter 1997.
Data Source:
Erosion data - Approved by
Win Chromec (RMRS, 303-966-4535).

Scale = 1 : 18270
1 inch represents approximately 1523 feet

0 250 500 1000 ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy

Rocky Flats Environmental Technology Site

GIS Dept. 303-966-7707

Prepared by:

DynCorp
THE ART OF TECHNOLOGY

Prepared for:

KAISER-HILL COMPANY

MAP ID: 2k-0276/sid_wom_wal_ersn_100av_b-fig10.aml

September 05, 2001

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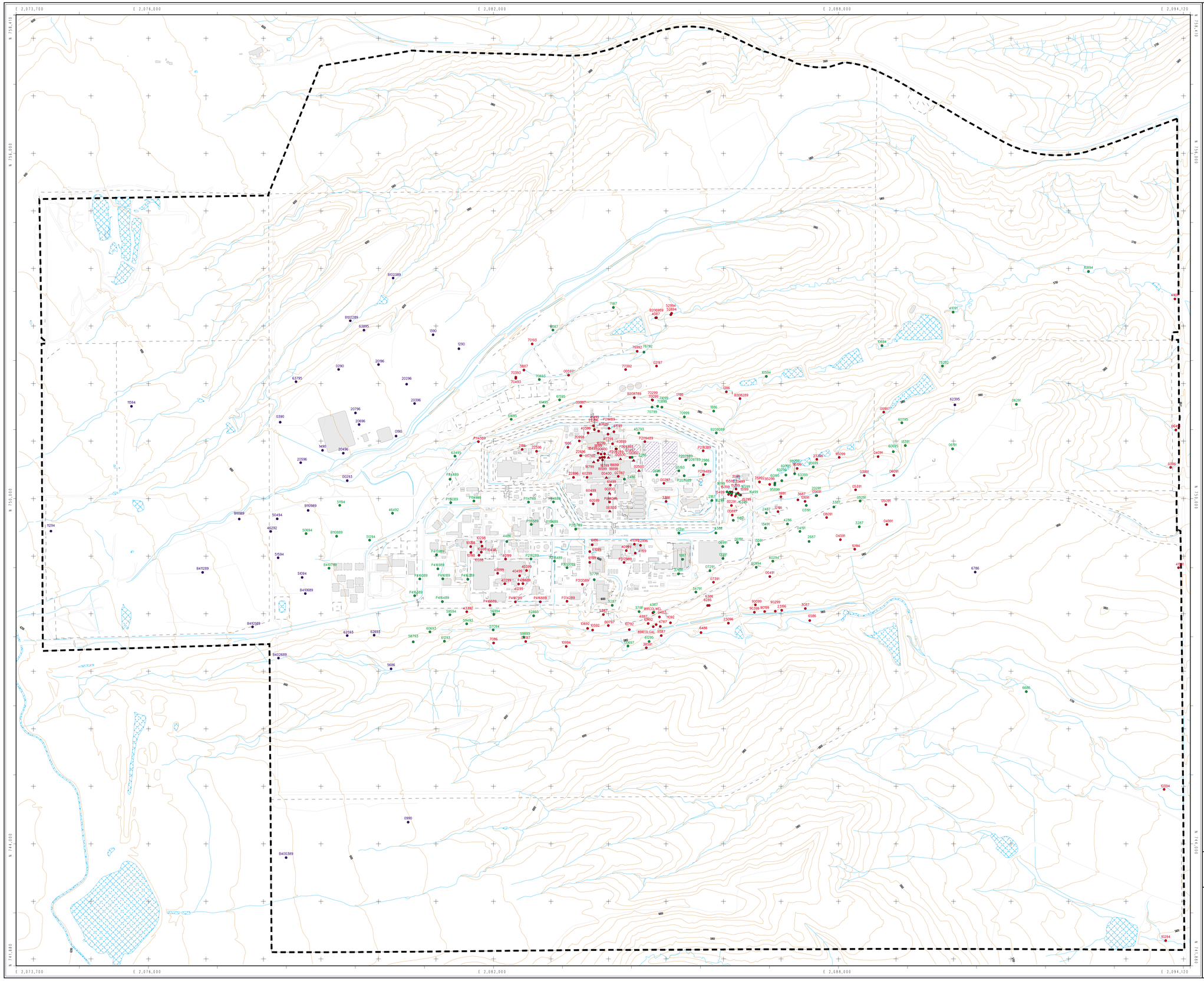

Figure 11

Groundwater Monitoring Locations

IMP Well Type

- Water Quality/Flow Monitoring
- Industrial Area Flow Monitoring
- Background Flow Monitoring
- 2000 Wells (color denotes IMP well type)

Standard Map Features

- Buildings
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Contours (20' Intervals)
- Roads
- Rocky Flats Boundary

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/95

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Scale = 1 : 7200
1 inch represents 600 feet

500 0 1000 2000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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

GIS Dept. 303-966-7707

Prepared by: DynCorp THE ART OF TECHNOLOGY

Prepared for: KAISER•HILL COMPANY

MAP ID: 01-0833

September 05, 2001

Institutional Controls

Besides continued restricted Site access, institutional controls will be used for near-term management and long-term stewardship. It is anticipated that long-term controls will likely consist of the following:

- Federal ownership (either DOE or the U.S. Fish and Wildlife Service);
- Land use restrictions by deed and/or covenant;
- Permanent restrictions on groundwater and onsite surface water use;
- Permanent fencing and signage;
- Additional fencing and signage within Site boundaries for areas that are capped and areas where excavation or other activities are restricted; and
- Maps and descriptions of residual contamination.

Near-term institutional controls that will be considered include the following:

- Fences and signs alerting workers of areas with residual contamination; and
- Fences, signs, and locks to protect monitoring systems.

Other Site work control processes will be used to control access to these sites.

Engineered Controls

Engineered controls will be used for near-term management and long-term stewardship. It is anticipated that engineered controls may consist of the following:

- Caps or covers;
- Erosion controls (grading, terracing, etc.);
- Diversion ditches; and
- Groundwater barriers.

The need for engineered controls will be based on the following:

- Residual contamination;
- Proximity to surface water resources; and
- Erosion potential.

Engineered controls will be described in a separate RFCA decision document. Decision documents could include Proposed Action Memorandums (PAMs), IM/IRAs, or a CAD/ROD.

Many of the previously discussed controls will be applied on a Sitewide basis and will not be affected by individual actions discussed in this RSOP. DOE will consider additional remediation beyond ALs in those cases where remediation would eliminate the need for specific institutional controls, such as fencing.

Ongoing Site Management Activities

Activities that will be conducted on an ongoing basis through the end of Site closure will be described in the RFETS Stewardship Plan (in preparation). Ongoing activities include preventing access to the Site and preserving natural resources. Additionally, routine activities conducted during accelerated actions covered under this RSOP contribute to stewardship by reducing risk and minimizing potential long-term effects to the environment. These activities are briefly described below.

RFETS Stewardship Plan

The RFETS Stewardship Plan will describe current closure stewardship and post-closure stewardship activities. DOE is developing the Stewardship Plan in consultation with the Stewardship Working Group. The Stewardship Plan will include the stewardship policy, current stewardship activities and requirements (e.g., records management, land management, engineering controls, and institutional controls) as well as the post-closure stewardship policy, activities, and requirements.

Ongoing Site Access Control

RFETS currently has access restrictions that are required for security and safety reasons. These access restrictions are expected to be in place consistent with keeping RFETS a controlled area in accordance with 10 Code of Federal Regulations (CFR) 835, *Occupational Radiation Protection*. Access controls restrict admission to the Site through gate access restrictions and perimeter patrols in accordance with the *RFETS Security Manual.*

Resource Management

Ecological resource management that includes vegetation and habitat management is an ongoing stewardship activity at RFETS. These activities are conducted in accordance with the Site's *Ecological Resource Management Plan, 2001 Annual Vegetation Management Plan,* and the *Site-Wide Wetland Comprehensive Plan*.

Source Removals

Surface and subsurface soil and associated debris contaminated above agreed-upon ALs will be excavated (Section 6.5). This source removal will reduce risk in the immediate area and contribute to sitewide risk reduction. The Closeout Report will contain maps of all sampling locations and results above background plus two standard deviations for inorganics and radionuclides, method detection limits for organics, Tier II AL values, and Tier I AL values.

Analytical data will also be included. The Closeout Report will document that remediation goals have been achieved and the extent of residual contamination.

Plugging of Pipelines

Pipelines left in place will be plugged to eliminate potential contaminant migration pathways (Sections 6.5). Pipeline ends will be surveyed, plotted on maps, and documented in the Closeout Report. This will ensure remaining pipeline maps are available for evaluation during other Site studies and for stewardship planning.

Work Controls

Work controls (Sections 6.1, 6.2, and 9.0) are used routinely at RFETS to mitigate or control releases to the environment during remediation projects. Work controls, along with BMPs, will be used to prevent impacts to surface water and air from erosion or releases at remediation sites. The use of work controls and BMPs contributes to stewardship goals by reducing long-term risk onsite and in the environment.

Confirmation Sampling

Confirmation sampling (Section 6.10) will be conducted at remediated areas in accordance with the IASAP (DOE 2001b) and Draft BZSAP (DOE 2001c). Confirmation sampling and analysis will contribute to long-term stewardship by documenting the extent of residual contamination, if any, in the remediated area. These data will be included in the Closeout Report (Section 6.13) and the AR and will be available for long-term stewardship planning.

Stabilization and Revegetation of Remediated Areas

Areas that have been remediated will be stabilized and revegetated to reduce erosion, protect surface water resources, and prevent air dispersion of residual contamination (Section 6.11). While this stabilization and revegetation is temporary, it contributes to stewardship by reducing impacts to surface water, air, and biota. The final Site topography and vegetative cover will be documented in the final Land Configuration Design.

Documentation

Information and data about accelerated actions will be documented in the Closeout Report (Section 6.13). This information will include characterization data, confirmation sampling data, maps of residual contamination areas, and stewardship recommendations. Groundwater and surface water monitoring results are documented in quarterly IMP reports. The Closeout Report and IMP reports become part of the AR.

Performance Monitoring

Performance monitoring (Section 7.0) will be used, as required, to monitor air, surface water, groundwater, or biota in the vicinity of remediation areas. Performance monitoring is used to isolate the impacts of individual projects where they are likely to impact surface water. Performance monitoring contributes to long-term stewardship by (1) alerting project personnel to potential problems, and (2) providing information on AOCs that may be used in stewardship

planning. Data collected during performance monitoring will be documented in the RFETS Quarterly Environmental Monitoring Report and archived in the Site SWD.

Ongoing Compliance Monitoring

Compliance monitoring contributes to long-term stewardship by (1) alerting project personnel to areas that may require remediation, and (2) providing information on surface water, groundwater, air, and biota quality that may be used in planning. Data collected during compliance monitoring will be documented in the RFETS Quarterly Environmental Monitoring Report.

5.2.2 Post-Closure Activities

Post-closure activities will consist of long-term monitoring and care of the Site. Post-closure activities will be addressed when the final action for the Site has been determined. Long-term activities will be described in the RFETS Stewardship Plan (in preparation) and the final CAD/ROD.

Some elements of long-term stewardship can be discussed conceptually; however, elements of this discussion will likely change when the following actions have been completed:

- All remediation decisions have been made;
- Sitewide studies that will impact future decisions are completed; and
- The CRA has been conducted.

Remediation Decisions

Remediation decisions will affect post-closure stewardship actions. This ER RSOP contains remediation decisions (Section 5.0) related to the excavation of contaminated soil at IHSSs, PACs, and UBC Sites. Additional remediation decisions that will be made in the future include the following:

- Groundwater plume remediation;
- 903 Lip Area;
- Original Landfill; and
- Final Site remediation.

Sitewide Studies

Several of the sitewide studies currently in progress will have a significant affect on stewardship activities. These studies and their contribution to long-term post-closure stewardship goals are described below.

Actinide Migration Evaluation

AME staff evaluates the behavior and mobility of actinides in surface water, groundwater, and soil environments. Results of AME studies may be used when planning stewardship activities. AME studies and their relevance to stewardship planning include the following:

- Report on Soil Erosion and Surface Water Sediment Transport Modeling for the Actinide Migration Evaluations at the Rocky Flats Environmental Technology Site (DOE 2000e). Results of this study include average erosion rates for Site watersheds, erosion mechanisms, actinide source areas that have the potential to impact surface water quality, and model simulations for Pu-239/240 and Am-241 concentrations in Site streams. The results of this study may be used to evaluate potential impacts to surface water from soil erosion sitewide and at IHSSs, PACs, and UBC Sites that have surface soil radionuclide activities between RFCA Tier I and Tier II ALs. Additionally, erosion-modeling results may be used in implementing erosion controls at remediation sites.

- Final Report on Phase Speciation of Pu and Am for Actinide Migration Studies (DOE 2000f). Results of this study indicate Pu and Am solubility is limited in natural water. Both Pu and Am can be transported by sorption onto and migration with colloidal particles. Particulate transport is the dominant mechanism for Pu migration at RFETS. The results of this study may be used to evaluate potential impacts to surface water at IHSSs, PACs, and UBC Sites.

- Air Transport and Deposition of Actinides at the Rocky Flats Environmental Technology Site (DOE 1999b). This study focused on emission of actinides into the air from contaminated soil or debris (resuspension), transport of airborne actinides (dispersion), and removal of actinide-contaminated particles from the air to soil or water (deposition). The results of this study will be used when planning dust and other air-borne contaminant controls at remediation sites.

- Geochemical Modeling of Solar Ponds Plume Groundwater at the Rocky Flats Environmental Technology Site. Results from this ongoing study indicate the SEP U plume is attenuated, perhaps due to sorption and reaction with aquifer material. The results of this study may be used to evaluate potential impacts to surface water at IHSSs, PACs, and UBC Sites.

- FY01 studies are focusing on the relationship between actinides and colloid stability in the environment. Results of these studies may be used, when available, to plan and implement erosion controls at remediation sites.

Site-Wide Water Balance

The purpose of the SWWB is to develop information to support a hydrologic design basis for RFETS closure activities. ER remediation, sitewide closure activities, and the final end-state configuration have the potential to significantly alter groundwater, surface water, and near-surface flow at the Site. Many RFETS closure decisions are dependent on SWWB information. The objectives of the SWWB are to provide RFETS with a management tool for the following:

- Evaluate how the sitewide water hydrology changes from present to final Site configuration;
- Predict surface water impacts from groundwater for present and final Site configuration;
- Provide data for the final IA configuration (cover design and land recontouring) to protect surface water quality;
- Provide information for the CRA and CAD/ROD; and
- Provide information for stewardship planning.

Land Configuration Design Basis

The goal of the LCDB project is to develop the data necessary to design the final land surface configuration for RFETS. The LCDB will evaluate bounding conditions that may exist at the end of active remediation. Three scenarios, including detention and wetlands, water retention, and erosion control and source isolation are considered. The results of this study will result in design criteria for post-remediation actions.

Potential Long-Term Stewardship Actions

Although not part of this RSOP, it is anticipated that several long-term stewardship actions will occur including:

- The Site will have ongoing institutional controls including land use restrictions;
- Long-term monitoring of surface water and groundwater will be ongoing; and
- Long-term maintenance of some parts of the Site will be ongoing.

Institutional Controls

Institutional controls at RFETS will likely consist of the following:

- Federal ownership (either DOE or U.S. Fish and Wildlife Service);
- Permanent land use restrictions by deed and or covenant;
- Permanent restrictions on groundwater and surface water use;
- Permanent fencing and signage;
- Additional fencing and signage within Site boundaries for areas that are capped and areas where excavation or other activities are restricted; and
- Maps and descriptions of residual contamination.

Monitoring

In accordance with RFCA, surface water and groundwater monitoring systems will remain in place for as long as necessary to protect public health, the environment, and safety.
Current surface water and groundwater monitoring activities are described in the IMP (DOE 2000a). It is anticipated that the long-term stewardship monitoring network will be based on the following:

- Current monitoring network results;
- Remediation results;
- Additional onsite monitoring stations installed to monitor specific remediations;
- Results of ongoing studies;
- Results of the CRA; and
- The final action as described in the CAD/ROD.

Long-Term Maintenance

Long-term maintenance of caps, groundwater remediation systems, and other remedial options may be necessary. Long-term maintenance will continue for as long as necessary to protect public health, the environment, and safety.

5.3 ALARA

RFETS-specific requirements include implementation of DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, ALARA objectives. The definition of ALARA in DOE Order 5400.5 is,

> "ALARA is a phrase (acronym) used to describe an approach to radiation protection to control or manage exposures (both individual and collective to the work force and the general public) and releases of radioactive material to the environment as low as social, technical, economic, practical, and public policy considerations permit. As used in this Order, ALARA is not a dose limit, but rather it is a process that has as its objective the attainment of dose levels as far below the applicable limits of the Order as practicable."

These objectives are consistent with the ALARA objectives specified in the Radiation Control ARARs, Table 3, Section 5.1 of this RSOP. DOE believes that source removal to current RFCA ALs is protective because the RFCA ALs are based on potential human health impacts. Additionally, the work planning and work control processes already identified in this RSOP pursuant to RFCA requirements are fully consistent with well-accepted ALARA processes. Table 4 lists where in the ER RSOP or other decision documents the ARARs are addressed.

Table 4
ARAR Requirements

ARAR Requirement	Section	Decision Document
Methods to Ensure Protection of Workers	RH 3.16.4.3.3	ER RSOP Sections 6.2, 8.0, and 9.0
Description of Final Radiation Survey	RH 3.16.4.3.4	IASAP and BZSAP
Intended Final Condition	RH 3.16.4.3.6	ER RSOP Notification
ALARA Analysis	RH 3.16.4.3.7.1 RH 3.16.4.3.7.3	ER RSOP Section 5.3
Institutional Controls	RH 3.16.4.3.7.3 RH 3.16.4.6	CAD/ROD
Radiation Surveys	RH 3.16.2	IASAP and BZSAP
Submittal of Survey Report	RH 3.16.6.3	Closeout Report
Radiation Protection Program	RH 4.5.2	Incorporated through ER RSOP Sections 6.2, 8.0, and 9.0
Radiation Protection Program – Air	RH 4.5.4	ER RSOP Section 7.0
Radiation Protection Program – Dose limits	RH 4.14.1 RH 4.15.1 RH 4.15.2.1 RH 4.15.2.1	Incorporated through ER RSOP Sections 6.2, 8.0, and 9.0
Radiation Protection Program – Surveys	RH 4.17.1 RH 4.17.2	IASAP and BZSAP and incorporated through ER RSOP Sections 6.2, 8.0, and 9.0
Waste Disposal	RH 4.33	ER RSOP Section 10.0
Radiological Criteria	RH 4.61.1.3	ER RSOP Section 5.3
Criteria for Unrestricted Use	RH 4.61.2	RFCA
Criteria for Restricted Use	RH 4.61.3.1 RH 4.61.3.2 RH 4.61.3.3	RFCA

ARAR Requirement	Section	Decision Document
Alternate Criteria	RH 4.61.4.1.1 through .3	RFCA

The RFCA parties are consulting regarding the process by which the common ALARA objectives are evaluated in relation to the cleanup actions covered by this RSOP. This consultation will include consideration of public comments regarding the ALARA approach.

5.3.1 ALARA Evaluation

Remediation of soil through excavation is a conservative measure, and excavation to RFCA ALs is protective of human health and the environment. RFCA ALs were developed to be protective of human health and are based on a 10^{-4} cancer risk (RFCA Tier I ALs) and a 10^{-6} cancer risk (RFCA Tier II ALs) consistent with EPA guidance. Because the ER RSOP covers accelerated actions, an ALARA evaluation will be used to determine whether additional remediation is indicated at IHSS Group remediations. The ALARA evaluation process and its relationship to stewardship and remediation are shown on Figure 8.

The ALARA evaluation will be conducted twice, once before remediation to ALs and once during remediation if required. Both evaluations will be conducted in consultation with the regulatory agencies. The ER RSOP ALARA evaluation will consider health and safety (H&S), technical feasibility, and cost. Potential impacts to surface water are discussed in the Stewardship section (Section 5.2). This ALARA evaluation is not intended as an ALARA analysis of final remedial actions or actions outside the scope of the ER RSOP.

The ER project manager and H&S manager will conduct the ALARA evaluation in consultation with the regulatory agencies. During field implementation of the ER RSOP, the project manager and H&S manager will evaluate in-process remediation data, H&S data, and physical conditions, in consultation with the regulatory agencies, to determine whether additional remediation is required to achieve ALARA. If additional remediation is reasonable, remediation will continue. When remediation goals are achieved, confirmation samples will be collected and the remediation area will be surveyed. Remediation data including levels and location of residual contamination, if any, will be documented in the Closeout Report and archived for use in the RFI/RI, CRA, and CAD/ROD.

These ALARA evaluation considerations are described in detail in the following sections.

Health and Safety Evaluation

The H&S of workers is a prime concern during remediation especially during excavation. Although work controls will be used to control hazards to workers, there may be instances when continued excavation will endanger the H&S of the workers. If safety limits are exceeded during excavation to achieve ALARA, remediation will stop and the remediation will be considered ALARA. The decision to stop work because of H&S concerns will be made by the project H&S

manager and will be in accordance with current Site work controls. The H&S evaluation will include the following considerations:

- Will the excavation be deeper than 4 ft?
- Can a trench box (or multiple trench boxes) be used to protect H&S to a depth of 8 ft?
- Will the excavation be deeper than 8 ft?

Technical Feasibility Evaluation

Technical feasibility will be evaluated by considering the following criteria:

- Is the area beneath a deep basement that was not removed by decommissioning?
- Does remediation to ALARA require remediation of very large areas (over 1 acre)?

Cost Evaluation

For the purpose of the ER RSOP ALARA analysis, the cost considerations to achieve ALARA will include the following criteria:

- Type of waste;
- Excavation and debris removal;
- Waste sampling;
- Waste packaging;
- Waste transportation and disposal;
- Backfill purchase and transportation; and
- Backfilling, compaction, and revegetation.

5.4 SOIL DISPOSITION

Remediated soil will be dispositioned through the following activities:

- Offsite disposal;
- Onsite thermal desorption with offsite disposal;
- Onsite thermal desorption with onsite backfilling; or
- Offsite thermal desorption.

Figure 12 illustrates the decision flow for soil disposition. Excavation, treatment, and disposal of remediated soil are described in Sections 6.0 (Project Approach) and 10.0 (Waste Management).

5.5 SUMMARY

Decisions will be made throughout the planning and implementation phases of accelerated actions in consultation with the regulatory agencies. These decisions, their associated actions, and when they occur in the accelerated action process are summarized on Figure 13.

Accelerated action decisions will be made within the context of RFCA and regulatory requirements. RFCA and regulatory requirements guide data evaluation, the stewardship and ALARA evaluations, preparation of the Notification, and development of work control documents. These will be used to direct field implementation of accelerated actions.

Key decisions made during implementation are the following:

- Is remediation required?
- Does the ALARA evaluation indicate additional remediation?
- Does the stewardship evaluation indicate additional remediation?
- Have remediation objectives been achieved?

Soil remediation waste will be appropriately disposed. Institutional and/or engineering controls will be implemented, if required, after fieldwork is complete.

Accelerated action decisions and results will be documented through the closeout process. Data will be conveyed to the regulatory agencies and public through the Closeout Report and will be archived through RADMS in the Site environmental database - SWD, and the AR.

Figure 12
Soil Disposition

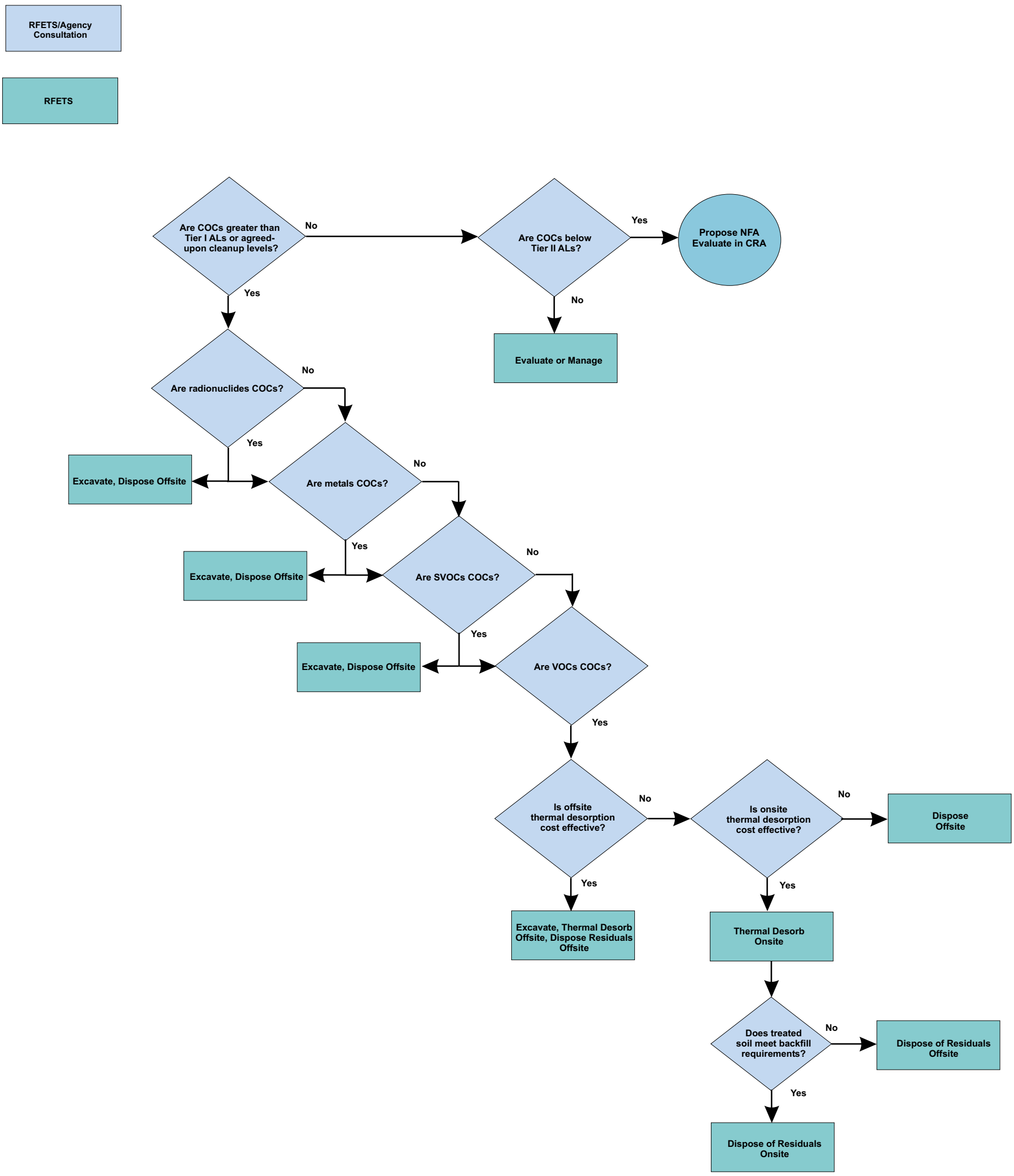
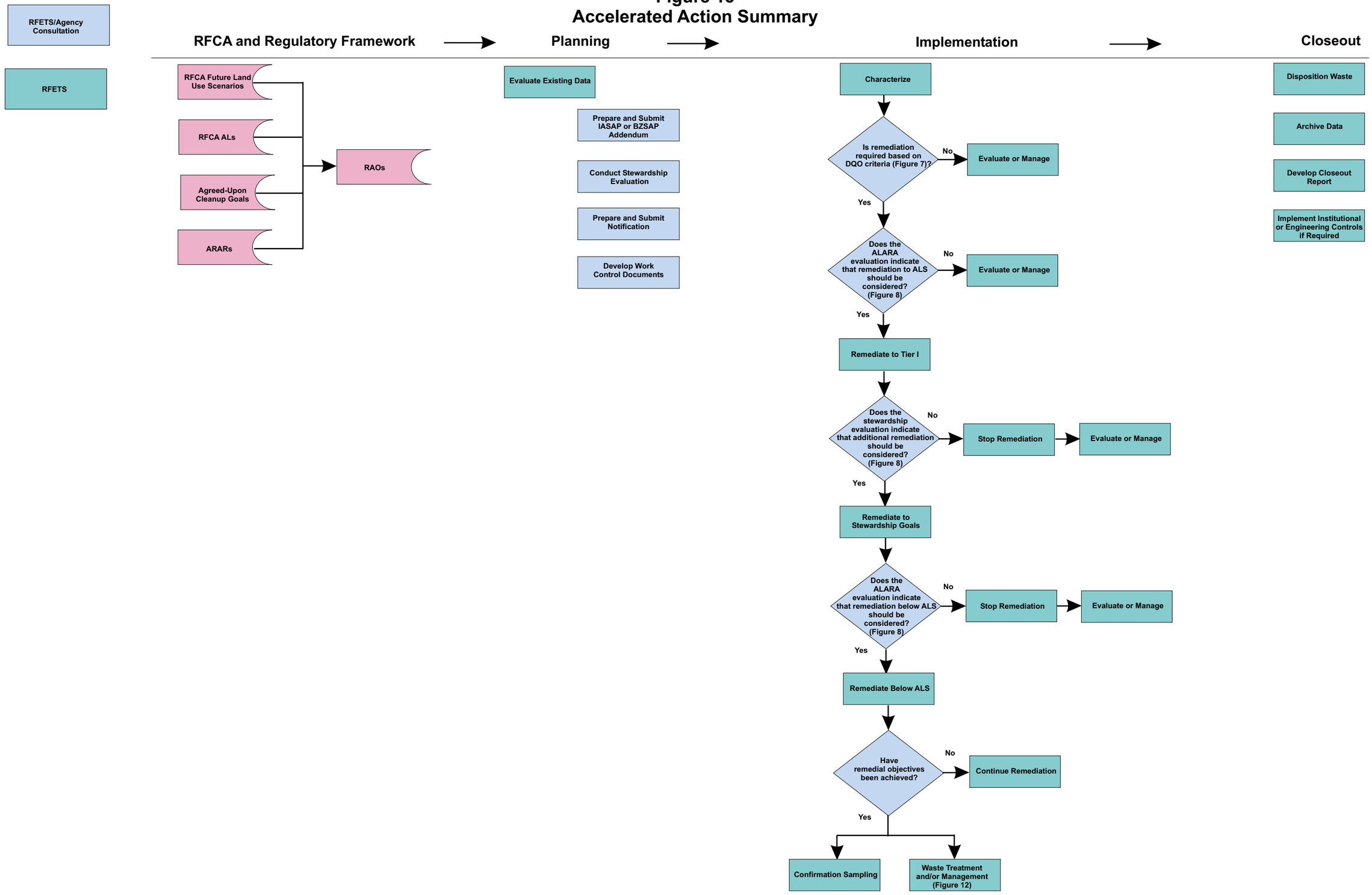
Figure 13
Accelerated Action Summary