ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

771 Closure Project Decommissioning Operations Plan Modification 5

June 19, 2003

Reviewed for Classification/UCNI

By: S. Cunningham

Date: June 19, 2003

RECORD OF MODIFICATIONS

DOP Modification #	Effective Date	Description
1	6/7/00	Field modification to clarify the endstate
2	6/14/00	Field modification to separate Set 38 into four separate sets
3	3/2/01	Major modification incorporating under building contamination remediation and demolition activities
4	9/6/01	Minor modification to clarify Section 5.3.2 since tap and drain activities are complete
5	TBD	Major modification to update the DOP with respect to the Modifications to RFCA Attachments, approved June 2003, and current status of the project. Due to the Modifications to RFCA Attachments, approved June 2003, the proposed action memorandum for under building remediation has been removed. The environmental restoration activities associated with the project will be addressed through site-wide documents.

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ACRONYMS AND ABBREVIATIONS

AHA	activity hazard analyses
AR	Administrative Record (File)
ARARs	applicable or relevant and appropriate requirements
AST	aboveground storage tank
BIO	Basis for Interim Operation
CCR	Code of Colorado Regulations
CDD	Closure Description Document
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CHWA	Colorado Hazardous Waste Act
CHWR	Colorado Hazardous Waste Regulations
CPB	Closure Project Baseline
DDCP	Decontamination and Decommissioning Characterization Protocol
DOE	U.S. Department of Energy, Rocky Flats Field Office
DOP	Decommissioning Operations Plan
DOT	U.S. Department of Transportation
dpm	disintegrations per minute
DPP	Decommissioning Program Plan
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
ES&H	environmental safety and health
FDPM	Facility Disposition Program Manual
HASP	Health and Safety Plan
HEPA	high efficiency particulate air
HVAC	heating, ventilation and air conditioning
IA	Industrial Area
IASAP	Industrial Area Sampling and Analysis Plan
IDEC	indirect/direct evaporative cooling
IDC	Item Description Code
IGD	RFCA Implementation Guidance Document
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
ISM	Integrated Safety Management
ISMS	Integrated Safety Management System
IV	independent verification
IVC	Independent Verification Contractor
IWCP	Integrated Work Control Program
JHA	job hazards analysis
LLW	low-level waste
LLMW	low-level mixed waste
LRA	lead regulatory agency
MOU	Memorandum of Understanding

N/A	not applicable
nCi	nanocurie
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NTS	Nevada Test Site
OSHA	Occupational Safety and Health Administration
PA	Protected Area
PAC	potential area of concern
PCBs	polychlorinated biphenyls
PCOC	potential contaminant of concern
PDS	pre-demolition survey
PDSP	Pre-Demolition Survey Plan
PEB	pre-evolution briefing
PMP	Project Management Plan
POD	Plan of the Day
POW	Plan of the Week
PPE	personal protective equipment
psi	pounds per square inch
RACT	reasonably available control technologies
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFCAB	Rocky Flats Citizens Advisory Board
RFCLOG	Rocky Flats Coalition of Local Governments
RFETS	Rocky Flats Environmental Technology Site
RISS	Remediation, Industrial Decommissioning, and Site Services
RLC	reconnaissance level characterization
RLCR	Reconnaissance Level Characterization Report
RSOP	RFCA Standard Operating Protocol
RTR	real-time radiography
SCO	surface-contaminated object
Site	Rocky Flats Environmental Technology Site
SNM	special nuclear material
STP	Site Treatment Plan
TP	termination point
TRM	transuranic mixed waste
TRU	transuranic waste
TSD	treatment, storage, disposal (facility)
TU	temporary unit
UBC	under-building contamination
UCNI	Uncontrolled Classified Nuclear Information
UST	underground storage tank
VOC	volatile organic compound
WAC	waste acceptance criteria
WGI	waste generation instruction
WIPP	Waste Isolation Pilot Plant

EXECUTIVE SUMMARY

This Decommissioning Operations Plan (DOP) for the 771 Closure Project applies to buildings with significant contamination or hazards (Type 3 facilities) and buildings without significant contamination or hazards, but in need of decontamination (Type 2 buildings). The identification of Type 1 facilities and their disposition path are included for information only. This document is the result of a major modification approved in September 2001 of the DOP for the 771 Closure Project approved January 1999. This DOP follows the format of the other DOPs and contains additional detail on work activities. This additional detail reflects the advanced state of the 771 Closure Project decommissioning activities and planning. This DOP includes the following additional information and changes from the original DOP (revision 0):

- Additional physical and historical information about Building 771 (see Section 3.1).
- The Type 2 facilities (throughout the document, but particularly in Sections 3.1, 4.3, 4.4, and 4.7).
- Reference to the RFCA Standard Operating Protocols (RSOPs). This DOP satisfies the notification requirements of the RSOPs (throughout the document, but particularly in Sections 4.4 and 4.7).
- Demolition activities (see Section 4.7).
- A streamlined Resource Conservation and Recovery Act (RCRA) closure process, which reduces paperwork (see Section 6.0).
- An exception to the ***RSOP for Recycling Concrete***, which will eliminate the need to stockpile and size reduce the concrete (see Section 5.5).
- Decontamination criteria for Building 771 and 774 concrete structure that will remain in the subsurface after demolition (see Sections 1.1.1, 4.4.2, and 4.7.1).

In general, the 771 Closure Project dispositioning will be conducted in the following sequence: deactivation activities will be completed; component removal, size reduction, and decontamination will be conducted; the under building contamination will be remediated, as necessary; the pre-demolition survey will be conducted; and the building will be demolished. The outbuildings surrounding Buildings 771 and 774 will be conducted in the same manner.

Three alternatives were considered for the near-term management of the 771 Closure Project: decommissioning, no action with safe shutdown maintenance, and facility reuse. The alternatives included the evaluation of potential impacts on the human environment. Alternative 1 is selected because decommissioning and the associated hazard reduction support the Rocky Flats Vision of safe, accelerated, cost-effective closure. This alternative also ensures long-term protection of public health and the environment. Short-term impacts on the environment (i.e., impacts occurring during the interval of the action) will be controlled physically and administratively. Currently, the facilities within the 771 Closure Project are scheduled to be deactivated and decommissioned, and the under-building contamination remediated, as necessary, by August 2004. Environmental impacts resulting from the 771 Closure Project will contribute incrementally to potential Site-wide cumulative impacts associated with the Rocky Flat Environmental Technology Site (RFETS or Site) Closure Project. Given the existing industrial setting of the 771 Closure Project, environmental impact issues associated with the project are relatively limited.

The decision to decommission and demolish the 771 cluster buildings is the approved action being conducted pursuant to the DOP. An analysis of risks to workers to decontaminate to free release criteria the Buildings 771 and 774 concrete structure that will remain in the subsurface resulted in a determination that decontamination criteria based upon the June 2003, modifications to RFCA Attachment 5 Radionuclide Soil Action Levels should be applied for this DOP.

For planning purposes, the 771 Closure Project was divided into small manageable groupings of similar equipment and rooms. Thirty-three Dismantlement Sets and 13 Decommissioning Areas were defined for

decommissioning activities for the 771 Closure Project; most of the sets and some of the areas have been dispositioned.

Consistent with the objectives of RFCA, the 771 Closure Project team will select decommissioning techniques based on a variety of factors, including potential environmental, safety and health (ES&H) hazards, secondary waste generation, and cost-effectiveness. Performance specifications for the techniques will include meeting the applicable release criteria; minimizing the generation of hazardous, radioactive and secondary wastes; minimizing ES&H impacts; and complying with the applicable or relevant and appropriate requirements (ARARs), and waste acceptance criteria for treatment, storage and disposal facilities.

The 771 Closure Project team will perform decommissioning activities upon completion of appropriate reviews in compliance with Site programs and procedures, including the Site Integrated Work Control Program (IWCP), which incorporates the RFETS Integrated Safety Management System (ISMS), Readiness Determination Program, Integrated Environmental Management Program, and Quality Assurance Program. Site requirements will be applied based on a graded approach (i.e., more rigorous requirements will be applied to facilities with greater hazards). In addition, personnel and environmental monitoring systems will be used, including Site-wide and project-specific air, surface water, and groundwater monitoring systems as described in the RFETS Integrated Environmental Management Program Manual and Site Integrated Monitoring Plan.

Throughout the course of the 771 Closure Project, personnel of the U.S. Department of Energy, Rocky Flats Field Office (DOE), the contractor and subcontractors, and the regulatory agencies will use the RFCA consultative process to establish and maintain effective working relationships with each other and with the general public. Decommissioning activities will be documented in the 771 Closure Project Files, RCRA Operating Record, where appropriate, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Administrative Record (AR). Upon completion of decommissioning activities and final characterization, a Decommissioning Closeout Report will be prepared and submitted to the Lead Regulatory Agency (LRA) for approval.

1 INTRODUCTION

In 1996, the DOE, the Environmental Protection Agency (EPA), and the CDPHE executed the RFCA.[1] RFCA is the Federal Facility Compliance Agreement and Consent Order negotiated pursuant to the CERCLA[2] and Colorado Hazardous Waste Act (CHWA).[3] RFCA provides the regulatory framework for achieving the goals expressed in the Rocky Flats Vision.[4]

The overriding vision for RFETS is to achieve accelerated cleanup and Site closure in a manner that is safe to workers and the public, and protective of the environment. DOE intends to disposition all special nuclear material (SNM) and wastes, demolish facilities, and remediate contaminated areas to the extent that future land uses are enabled and downstream water supplies are protected.

The 771 Closure Project is comprised of Buildings 771, 774, 714, 714A, 715, 716, 717, 770, 771B, 771C, 771-DT, and a number of outside storage tanks, storage areas, and trailers, all of which are located within the Protected Area (PA) of the Site. Completing the 771 Closure Project is necessary to meet the goals of the RFCA and the Rocky Flats Closure Project Baseline (CPB).

In general, the 771 Closure Project dispositioning will be conducted in the following sequence: deactivation activities will be completed; component removal, size reduction, and decontamination will be conducted; the under building contamination will be remediated (as necessary); the pre-demolition survey will be conducted; and the building will be demolished. The outbuildings surrounding Buildings 771 and 774 will be conducted in the same manner.

The decommissioning scope in this DOP applies to buildings with significant contamination or hazards (i.e., Type 3 buildings) and buildings without significant contamination or hazards, but in need of decontamination (i.e., Type 2 buildings). Buildings within the Cluster that are free of contamination (i.e., Type 1 buildings) will be decommissioned using Site procedures upon notification to the LRA (CDPHE). Building 771 is a Type 3 facility; Buildings 714, 728, 770, 774, 775, and 771C are Type 2 facilities; and the remaining buildings/trailers located within the 771 Closure Project are classified as Type 1 buildings. Eleven tanks have been classified as Type 2 facilities; these tanks are 176, 182, 183, 184, 185, 194, 195, 292, 293, 774A and 774B. Therefore, the scope of this DOP is limited to Buildings 771, 714, 728, 770, 774, 775, 771C and the eleven Type 2 tanks. Table 1 details all of the facilities associated with the 771 Closure Project, the typing, and if the facility disposition decision is addressed by this DOP.

Table 1. 771 Closure Project Facilities

Facility	Type	DOP scope
771, plutonium recovery facility, includes 771A, 771 stack, 771/776 tunnel, and 771/774 tunnel	3	Within the scope of the DOP
774, liquid treatment plant	2	Within the scope of the DOP
714, hydrofluoric storage	2	Within the scope of the DOP
714A, hydrofluoric storage	1	Included in the DOP for information purposes
715, emergency generator #1	1	Included in the DOP for information purposes

[1] Final Rocky Flats Cleanup Agreement (RFCA), Federal Facility Agreement and Consent Order (CERCLA VIII-96-21, RCRA 3008[h] VIII-96-01, State of Colorado Docket 96-07-19-01), July 19, 1996.

[2] Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9620 *et seq*.

[3] Colorado Hazardous Waste Act (CHWA), CRS 25-15-101 *et seq*.

[4] The Rocky Flats Vision is contained in Appendix 9 of RFCA.

Table 1. 771 Closure Project Facilities

Facility	Type	DOP scope
716, emergency generator #2	1	Included in the DOP for information purposes
717, magnehelic gauge building/sampling shed	1	Included in the DOP for information purposes
728, process waste pit	2	Within the scope of the DOP
770, office and supply building	2	Within the scope of the DOP
S770, carpenter storage facility	1	Included in the DOP for information purposes
K771N, food building	1	Included in the DOP for information purposes
T771A, office trailer	1	Included in the DOP for information purposes
T771B, office trailer	1	Included in the DOP for information purposes
T771C, showers/locker trailer	1	Included in the DOP for information purposes
T771F, office trailer	1	Included in the DOP for information purposes
T771G, showers/locker trailer	1	Included in the DOP for information purposes
T771J, office trailer	1	Included in the DOP for information purposes
T771K, office trailer	1	Included in the DOP for information purposes
T771L, restroom trailer	1	Included in the DOP for information purposes
T771Q, office trailer	1	Included in the DOP for information purposes
T771R, office trailer	1	Included in the DOP for information purposes
T771T, office trailer	1	Included in the DOP for information purposes
T771M, Modular network operations center	1	Included in the DOP for information purposes
771B, carpenter shop	1	Included in the DOP for information purposes
771C, nuclear waste packaging and drum counting, includes tanks 309E and 309W	2	Within the scope of the DOP
771-DT, decontamination trailer	1	Included in the DOP for information purposes
772, new breathing air facility	1	Included in the DOP for information purposes
772A, acid storage	1	Included in the DOP for information purposes
773, old 771 guard post	1	Included in the DOP for information purposes
T773S, Skid mounted guard post	1	Included in the DOP for information purposes
775, sanitary lift station	2	Within the scope of the DOP
T21A, aboveground diesel storage tank	1	Included in the DOP for information purposes

This DOP, first approved in 1999, incorporates the major modifications listed in the *Record of Modifications* at the beginning of the document. This DOP follows the format of the other DOPs and contains additional detail on work activities. This additional detail reflects the advanced state of the 771 Closure Project decommissioning activities and planning. This DOP includes the following additional information and changes from the original DOP:

- Additional physical and historical information about Building 771 (see Section 3.1).
- The Type 2 facilities (throughout the document, but particularly in Sections 3.1, 4.3, 4.4, and 4.7).
- Reference to the RSOPs. This DOP satisfies the notification requirements of the RSOPs (throughout the document, but particularly in Sections 4.4 and 4.7).
- Demolition activities (see Section 4.7).

- A streamlined RCRA closure process, which reduces paperwork (see Section 6.0).
- An exception to the ***RSOP for Recycling Concrete***, which will eliminate the need to stockpile and size reduce the concrete (see Section 5.5).

The decision to decommission and demolish the 771 cluster buildings is the approved action being conducted pursuant to the DOP. An analysis of risks to workers to decontaminate to free release criteria the Building 771 and 774 concrete structure that will remain in the subsurface resulted in a determination that decontamination criteria based upon the June 2003, modifications to RFCA Attachment 5 Radionuclide Soil Action Levels should be applied. The concrete structure that will remain after demolition that is within 6 feet of the final expected surface grade will meet surface contamination free release criteria, while concrete below that depth will be decontaminated or removed if it exceeds 7nCi/g, averaged over the thickness of concrete.

1.1 Alternatives Analysis and Selection

To determine the most efficient path to accelerated cleanup and Site closure, the RFETS Facilities Use Committee evaluated three alternatives for the near- and long-term management of RFETS facilities:

- Alternative 1 - Decommissioning (i.e., component removal, size reduction, decontamination, and demolition),
- Alternative 2 - No action with safe shutdown maintenance (i.e., mothballing), and
- Alternative 3 - Facility reuse.

Table 2 summarizes the results of this analysis, and only relates to building demolition decision. As discussed in the Facility Assessment for the Industrial Area (IA) Reuse Study, Alternative 3 is not beneficial, because Site cleanup and closure would be deferred but not eliminated. Similarly, Alternative 2 fails to accomplish the Rocky Flats Vision, resulting in an increase in the life-cycle costs associated with Site cleanup and closure.

The alternatives were evaluated for potential impacts on the human environment. Alternative 1 is the selected alternative because decommissioning supports the Rocky Flats Vision of safe, accelerated, cost-effective closure. This alternative also maintains long-term protection of public health and the environment. By removing RFETS facilities and associated contamination, risks currently posed by the 771 Closure Project will be reduced and/or eliminated.

1.1.1 Demolition Process Alternatives Analysis

The original alternatives analysis led to decision to decommission and demolish all buildings in the cluster, this additional alternatives analysis is focused on and related to the Building 771/774 decontamination criteria for the concrete that will remain below the expected surface contour. The Building 771/774 decontamination criteria is being re-evaluated because there is more experience with the decontamination techniques and worker risks posed by these activities, and more information on the contamination profile in Buildings 771/774. This alternatives analysis is only related to Building 771/774, not the entire 771 Closure Project facilities. Two alternatives were considered for the demolition process associated with Building 771 and 774:

- Alternative 1 Decontamination and component removal to unrestricted release criteria followed by demolition of the facility to 3 feet below final proposed grade and backfill and regrading of the project area.
- Alternative 2 Decontamination and component removal consistent with the technical basis of the RFCA modifications for soil remediation followed by demolition of the facility to 3 feet below final proposed grade and backfill and regrading of the project area.

Table 2. Alternatives Analysis Summary

Alternative	Description	Effectiveness	Feasibility	Relative Cost
1-Decommissioning	*Decommissioning* activities will follow specific plans approved by DOE and the LRA. Activities include decontamination, as deemed necessary; equipment dismantlement; size reduction; and demolition of building structures.	Decommissioning is effective in achieving the long-term goals of RFCA. The mortgage costs are eliminated, and the risks and hazards are significantly reduced.	Technology currently exists to achieve the objectives of this alternative. Integration with other Site activities can be accomplished.	Immediate decommissioning results in the lowest life-cycle costs. Once decommissioning is achieved, minimal landlord costs are incurred.
2 – No Action	*No Action* will maintain the 771 Closure Project in its current configuration. No additional equipment would be removed unless the present safe shutdown status of the Cluster is compromised.	*No Action* delays closure activities that must be performed to meet the goals of RFCA. Deferring closure could make funding available to other Site closure activities. However, *No Action* could increase risk to workers and the environment if the integrity of the facility is jeopardized.	*No Action* would disrupt the long-term plans for RFETS.	*No Action* results in higher costs than immediate decommissioning, because landlord costs continue to be incurred until decommissioning begins.
3 – Reuse	*Reuse* of the 771 Closure Project would maintain the facilities in their current configuration. The Site Utilization Review Board would assign a new mission for the facilities, in support of the present Site cleanup mission. Depending on the nature of this mission, removal of equipment may be necessary. No changes would be made before definition of the new mission.	*Reuse* of the 771 Closure Project was evaluated by the RFETS Facility Use Committee, which determined there was no further mission for the Cluster. Use of the Cluster for an alternative off-Site use was evaluated in accordance with the RFCA Preamble (Objective #7), and DOE Order 430.1A. No further use was identified.	Because no new mission has been identified for the Cluster, implementation of this alternative is not administratively feasible.	This alternative results in the greatest life-cycle costs, because the reuse mission would more than likely require expenditures for modifications to the buildings in addition to existing landlord/ surveillance costs. Furthermore, decommissioning costs (adjusted for future value) would still be required.

1.1.1.1 Alternative 1: Decontamination to Unrestricted Release

Under this alternative, the facility would be decontaminated using various techniques including hydrolasing and removal of contaminated concrete. Once the facility had been brought to the unrestricted release criteria, a final survey would be performed to verify the status of the facility. With CDPHE approval of the final survey, the demolition would be initiated and all portions of the structure within 3 feet of the final proposed grade would be removed. The area would be backfilled and the surrounding area would be graded and vegetation would be established. This alternative was proposed and approved through modification 3 of this DOP.

1.1.1.1.1 Effectiveness

Effectiveness considers whether the alternative provides protection of public health and the environment. In the short term, there is the potential for increased adverse impact to water quality, fugitive dust emissions, and transportation of demolition debris. However, potential impacts to water and air are temporary and controllable with mitigation measures.

There would be a potentially adverse impact to worker health and safety because workers would be exposed to industrial hazards associated with decontamination of the concrete and removal of concrete in areas that cannot be decontaminated. Alternative 1 requires 26,727 additional person-hours for hydrolasing[5] and 11,412 person-hours for concrete removal[6] in comparison with Alternative 2. Based on the site and Building 771 average injury rate, Alternative 1 has the potential to incur 5 to 10[7] additional injuries during hydrolasing and 2 to 4[7] additional injuries during concrete removal. The hazards associated with these activities require extensive controls including personal protective equipment, specialized equipment, and work within confined areas. Hazards[8] associated with these activities include:

- Pressurized connections, bodily injury from blade point and flying objects, eye hazards, noise
- Potential for radiological and chemical exposure and contamination, including wound contamination
- Potential spread of contamination and airborne contamination
- Bodily injury from falling objects and equipment, cutting skin/bone, and burns from steam

During demolition, there may be the potential of an increased adverse impact to the public at the Site boundary. There may also be an increased adverse impact to ecological receptors during demolition because additional areas of the Site would be disturbed. In the long term, this alternative would be effective for overall protection of public health and the environment. ARARs would be achieved.

1.1.1.1.2 Implementability

Implementability addresses the technical and administrative feasibility of implementing an alternative and the availability of the services and materials required.

Technical Feasibility

This alternative is technically feasible because there are proven decontamination and removal techniques that would bring the facility to unrestricted release. Specialized equipment may be required to facilitate the removal of concrete within the confined area of the facility. Currently, an experienced workforce, with specific decontamination and removal experience at RFETS, is in place and has demonstrated through

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[5] Hydrolasing employs a high-pressure (i.e., several thousand pounds per square inch) water jet to remove contaminated debris from large and/or inaccessible areas.

[6] Concrete removal involves manually cutting out a section of concrete and rigging the concrete into a waste container.

[7] A range of injuries is given because the Site and Project injury rates do not include many hours of actual hydrolasing and concrete removal activities, which have more industrial hazards than the work activities used for the estimated injuries.

[8] The hazards and decontamination definitions are taken from the RFCA Standard Operating Protocol for Facility Component Removal, Size Reduction, & Decontamination Activities, Revision 3, May 27, 2003.

previous performance that it can implement routine decontamination and removal using safe and compliant techniques. However, large concrete sections may need to be removed from the facility that may require special techniques and might not be implemented quickly.

No Endangered Species Act or wetlands concerns are anticipated for this alternative. Permits are not required to implement this alternative.

Availability of Services and Materials
Standard construction equipment and trained personnel are readily available to implement this alternative, except that some of the concrete removal may be difficult to work with standard equipment (e.g., confined area within the facility). Offsite laboratory testing services exist during the action in the short term; however, the future availability of these facilities cannot be predicted. Post-removal site control would not be required.

Administrative Feasibility
This alternative is administratively feasible because there is no need for coordination with other offices or agencies for permits, easements of right-of ways, or zoning variances. Under this alternative, existing Site management and access controls would be maintained until closure is complete. There would be no need for long-term Site management, access controls or institutional controls. Costs for short-term care, monitoring, controls, and so forth will continue until closure is complete, but would decrease over time.

This alternative is acceptable to the State and local communities; as it was vetted during the formal public comment process during the major modification.

1.1.1.1.3 Costs

Evaluation of costs should consider the capital costs to engineer, procure, and construct the required equipment and facilities, and the operating and maintenance costs associated with the alternative. In accordance with the IGD, cost estimates can be "order-of-magnitude" with sufficient accuracy to allow comparison and ranking of the alternatives.

Capital Cost
Alternative 1 would cost approximately 38 million dollars[9] to implement. This cost is based on the current decommissioning contract.

Operation and Maintenance
Long-term operation and maintenance costs are expected to be low because the area will be graded and vegetation established in order to provide a stable configuration. Stewardship costs associated with this alternative will be approximately the same as those in Alternative 2.

Present Worth Cost

This analysis was not completed; it is assumed that the alternative would be implemented fairly soon; therefore, today's dollars are a fair estimate.

1.1.1.2 Alternative 2: Decontamination consistent with Modifications to RFCA Attachments, approved June 2003,

This alternative applies the risk-based approach to contamination that is expected to remain in the concrete in a manner similar to that for subsurface soil as incorporated into the June 2003, approved modifications to RFCA Attachment 5. Under this alternative, the facility would be decontaminated using various techniques including hydrolasing and removal of contaminated concrete. The facility would be broken into two "zones." The first zone would be from 0 to 6 feet below the ground surface, and this zone would be decontaminated or concrete removed to bring the concrete to unrestricted release. The

[9] This cost is the complete decommissioning contract cost.

second zone would be 6 feet below the ground surface, and this zone would be decontaminated or concrete removed in order to bring the concrete to less than 7 nCi/g.

Once the facility preparation was complete as indicated above, a final survey would be performed to verify the status of the facility. With CDPHE approval of the final survey, the demolition would be initiated and all portions of the structure within 3 feet of the final proposed grade would be removed. The area would be backfilled, the surrounding area would be graded, and vegetation would be established.

The differences in the actions taken in Alternative 1 and Alternative 2 are the degree to which the concrete of decontaminated and removed, and the form of final survey that is performed.

1.1.1.2.1 Effectiveness

Effectiveness considers whether the alternative provides protection of public health and the environment. In the short term, there is the potential for increased adverse impact to water quality, fugitive dust emissions, and transportation of demolition debris. However, potential impacts to water and air are temporary and controllable with mitigation measures.

There would be a potentially adverse impact to worker health and safety because workers would be exposed to industrial hazards associated with decontamination of the concrete and removal of concrete in areas that cannot be decontaminated. Alternative 2 requires 26,727 less person-hours for hydrolasing and 11,412 less person-hours for concrete removal in comparison with Alternative 1. Based on the site and Building 771 average injury rate, Alternative 2 has the potential to reduce the total injuries by 5 to 10[10] during hydrolasing and 2 to 4[10] during concrete removal.

During demolition, there may be the potential of an increased adverse impact to the public at the Site boundary. There may also be an increased adverse impact to ecological receptors during demolition because additional areas of the Site would be disturbed. In the long term, this alternative would be effective for overall protection of public health and the environment. ARARs would be achieved.

1.1.1.2.2 Implementability

Implementability addresses the technical and administrative feasibility of implementing an alternative and the availability of the services and materials required.

Technical Feasibility

This alternative is technically feasible because there are proven decontamination and removal techniques that would bring the facility to the acceptable contamination levels. Specialized equipment may be required to facilitate the removal of concrete within the confined area of the facility. Currently, an experienced workforce, with specific decontamination and removal experience at RFETS, is in place and has demonstrated through previous performance that it can implement routine decontamination and removal using safe and compliant techniques. However, large concrete sections may need to be removed from the facility that may require special techniques and might not be implemented quickly.

No Endangered Species Act or wetlands concerns are anticipated for this alternative. Permits are not required to implement this alternative.

Availability of Services and Materials

Standard construction equipment and trained personnel are readily available to implement this alternative, except that some of the concrete removal may be difficult to work with standard equipment (e.g., confined are within the facility). Offsite laboratory testing services exist during the action in the short term; however, the future availability of these facilities cannot be predicted. Post-removal site control would not be required.

[10] A range of injuries is given because the Site and Project injury rates do not include many hours of actual hydrolasing and concrete removal activities, which have more industrial hazards than the work activities used for the estimated injuries.

Administrative Feasibility
This alternative is administratively feasible because there is no need for coordination with other offices or agencies for permits, easements of right-of ways, or zoning variances. Under this alternative, existing Site management and access controls would be maintained until closure is complete. There would be no need for long-term Site management, access controls or institutional controls. Costs for short-term care, monitoring, controls, and so forth will continue until closure is complete, but would decrease over time.

This alternative is believed to be acceptable to the State and local communities.

1.1.1.2.3 Costs

Evaluation of costs should consider the capital costs to engineer, procure, and construct the required equipment and facilities, and the operating and maintenance costs associated with the alternative. In accordance with the IGD, cost estimates can be "order-of-magnitude" with sufficient accuracy to allow comparison and ranking of the alternatives.

Capital Cost
Alternative 2 would cost approximately 34.5 million dollars to implement. This cost is based on the current decommissioning contract with the hydrolasing and concrete removal activities adjusted for this approach. Since the decommissioning contract has already been implemented and the contract is fixed priced, the overall contract savings would probably be minimal.

Operation and Maintenance
Long-term operation and maintenance costs are expected to be low because the area will be graded and vegetation established in order to provide a stable configuration. Stewardship costs associated with this alternative will be approximately the same as those in Alternative 1.

Present Worth Cost
This analysis was not completed; it is assumed that the alternative would be implemented fairly soon; therefore, today's dollars are a fair estimate.

1.1.1.3 Comparative Analysis of Alternatives

As indicated by the IGD, only alternatives passing the initial screening based on effectiveness, implementability, and cost are compared against each other. Table 3 presents a comparative analysis of alternatives made on a semi-quantitative ranking system based on effectiveness, implementability, and cost. Each category has been scored low (L), medium (M), or high (H). A low score means that the criteria cannot be achieved; a medium score means that the criteria can be achieved most of the time; and a high score means that the criteria will always be achieved or is not required under the alternative.

Alternative 2 was selected because it is consistent with Modifications to RFCA Attachments, approved June 2003, the alternative significantly reduces the potential risk to workers and is protective of public health and the environment.

Table 3. Comparative Analysis of Alternatives[11]

Screening Criteria	Alternative 1 Decontamination to Unrestricted Release	Alternative 2 Decontamination consistent with Modifications to RFCA Attachments, approved June 2003,
Effectiveness		
Protectiveness		
Public health	**H**	**H**
Workers	**M**	**H**
Environment	**H**	**H**
Attains ARARs	**H**	**H**
Implementability		
Technical Feasibility		
Construction and operation	**H**	**H**
Demonstrated performance	**H**	**H**
Adaptable to environmental conditions	**H**	**H**
Need for permits	**H**	**H**
Availability of Services and Materials		
Equipment	**H**	**H**
Personnel and services	**H**	**H**
Outside laboratory testing	**H**	**H**
Offsite treatment and disposal	**H**	**H**
Post-removal site control	**H**	**H**
Administrative Feasibility		
Permits required	**H**	**H**
Easements of right-of-ways required	**H**	**H**
Impact on adjoining property	**H**	**H**
Ability to impose institutional controls	**H**	**H**
Acceptable to State and local communities	**H**	**M**
Costs		
Capital cost	**M**	**M**
Operation and maintenance	**H**	**H**
Present worth cost	**NA**	**NA**

[11] Each category has been scored low (L), medium (M), or high (H). A low score means that the criteria cannot be achieved; a medium score means that the criteria can be achieved most of the time; and a high score means that the criteria will always be achieved or is not required under the alternative.

1.2 Decommissioning Under the Rocky Flats Cleanup Agreement

The RFETS Decommissioning Program Plan (DPP)[12] presents the regulatory approach to decommissioning and compliance with RFCA. The Facility Disposition Program Manual (FDPM)[13] establishes the RFETS internal requirements for planning and executing decommissioning activities, including preparation of a Project Management Plan (PMP)[14]. The PMP documents planning activities for each project.

As described in the DPP, buildings are typed based on levels of contamination. Buildings classified as Type 1 are free of contamination; Type 2 buildings do not have significant contamination or hazards, but need some level of decontamination; and Type 3 buildings have significant contamination and/or hazards. Different RFCA decision documents may be used to decommission each building type. The DPP serves as the RFCA decision document for Type 1 buildings; therefore, decommissioning activities are conducted in accordance with RFETS procedures upon notification of the LRA. Type 2 buildings require a separate RFCA decision document in the form of a Proposed Action Memorandum (PAM), Interim Measure/Interim Remedial Action (IM/IRA), or RSOP, or they may be included with Type 3 buildings in an approved DOP.

The decommissioning process begins with internal and external scoping meetings, at which the individual closure project points of contact from the Site and the LRA discuss the scope of the decommissioning project, including goals, schedule, budget, risks, controls, and overall project approach.[15] Reconnaissance level characterization (RLC) identifies radiological, chemical, and physical hazards. The Reconnaissance Level Characterization Report (RLCR) summarizes the results of the RLC. The RLCR provides the basis for determining building types.

Additional characterization may be conducted during decommissioning as facility components are removed and building surfaces are exposed. This type of characterization is referred to as in-process characterization. Data from in-process characterization is used to identify additional hazards; refine approaches to facility component removal, size reduction, decontamination, and demolition; revise waste volume estimates; and modify ES&H controls, as necessary. In-process characterization is also conducted to determine the type and extent of decontamination, and to verify that decontamination has achieved the applicable decontamination goals and waste acceptance criteria (WAC) of contractor-approved treatment and disposal facilities. In addition, a final verification survey (referred to as a pre-demolition survey) is conducted before demolition to ensure that buildings have been sufficiently decontaminated to meet applicable performance specifications. Facility characterization activities are performed in accordance with the RFETS Decontamination and Decommissioning Characterization Protocol (DDCP)[16], which defines the characterization process, and provides guidance for establishing appropriate data quality objectives and assessing data quality.

Figure 1 summarizes the relationships between RFETS Closure Project documents and drivers, individual closure project characterization packages, decision documents, and reports, including the use of various RSOPs. This figure shows the sequence of the major closure activities, including preparation of essential documents and interfaces between the elements of Site closure (i.e., decommissioning, and ER).

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12 RFETS Decommissioning Program Plan (DPP), Revision 1 (June 21, 1999).

13 RFETS Facility Disposition Program Manual (FDPM), MAN-076-FDPM, Revision 1 (September 24, 1999).

14 The Project Management Plan (PMP) will replace the Project Execution Plan (PEP) in the next revision to the FDPM.

15 The consultative process is described in Part 7 of RFCA (¶¶51-61) and in Section 1.1.1 of the DPP.

16 Rocky Flats Environmental Technology Site Decontamination and Decommissioning Characterization Protocol, MAN-077-DDCP (latest revision).

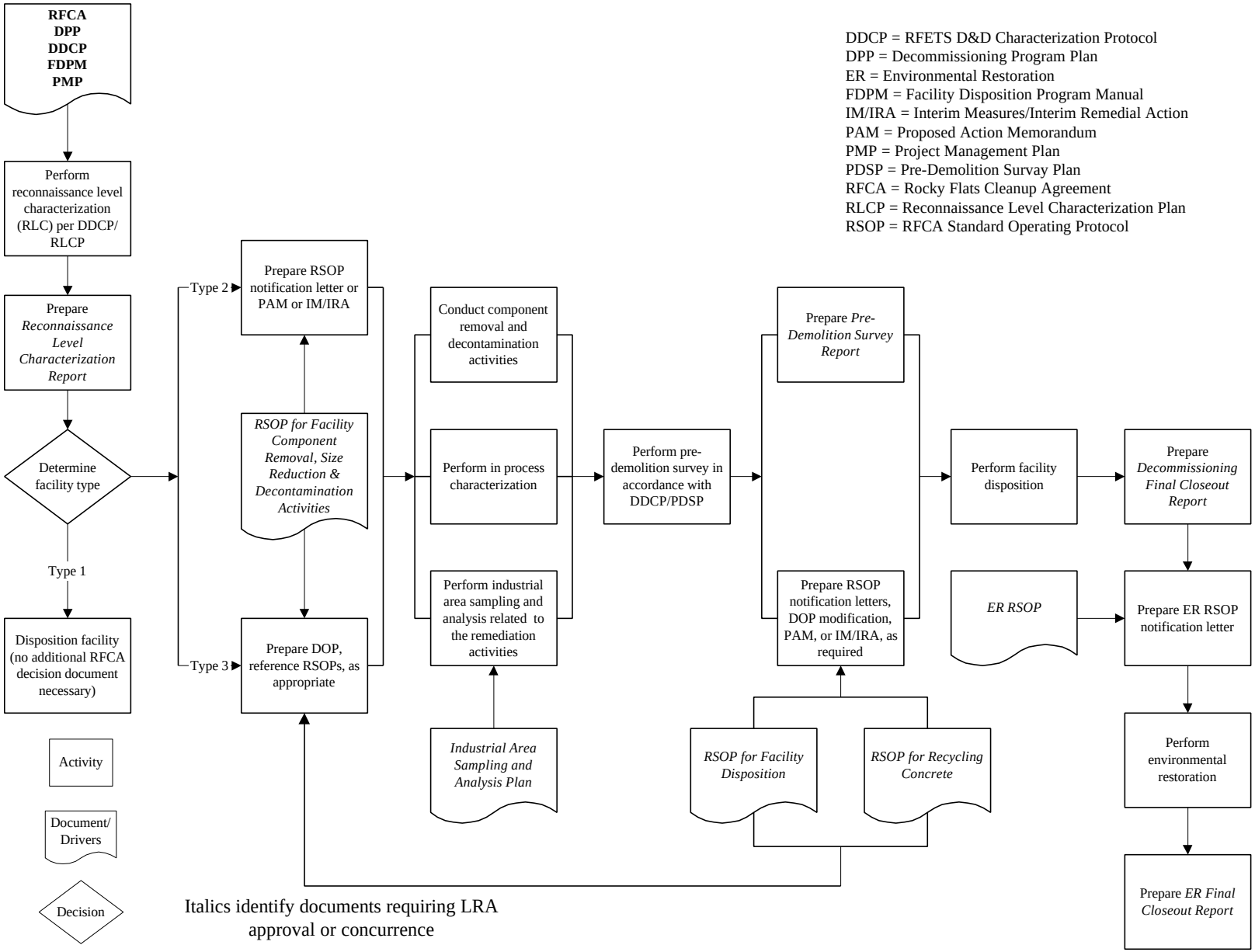

Figure 1. Major Closure Activities & Associated Documents

While the regulatory processes and documentation for decommissioning and ER are separate, these two major elements of facility closure interface at various points in the closure process and will sometimes occur concurrently in a building or building cluster. The Industrial Area (IA) Characterization and Remediation Strategy[17] describes the interfaces within the IA. The interfaces apply to buildings identified as having under-building contamination (UBC) and/or contamination of surface and subsurface soils surrounding the building or building cluster. ER has characterized UBC and surrounding soils, as appropriate. The Environmental Restoration IA Sampling and Analysis Plan describes characterization activities.

1.3 Scope and Purpose

The purpose of this DOP is to describe the decommissioning process for the Type 2 and 3 buildings within the 771 Closure Project. Building 771 is a Type 3 building, as discussed in the DPP. There are six Type 2 Buildings 714, 728, 770, 774, 775, and 771C, and eleven Type 2 tanks. The remaining facilities in the 771 Closure Project are Type 1 facilities and are not included within the scope of this DOP. The current RLCR will be modified to address facility typing. The current RLCR did not address facility typing and was based on historical information. Sampling activities are currently being conducted and will be included in the RLCR revision.

[17] Rocky Flats Environmental Technology Site Industrial Area (IA) Characterization and Remediation Strategy (in preparation).

2 PROJECT ORGANIZATION

This section provides a brief description of the 771 Closure Project organization structure, functions, and interfaces as they pertain to facility management and decommissioning. This information identifies reporting relationships and responsibilities. The organizational structure is not an enforceable part of the DOP. DOE or its contractor may alter the structure without prior notification to or approval of the LRA, and without modifying the DOP. Significant organization changes (e.g., management-level changes) will be shared with the LRA as part of the RFCA consultative process.

2.1 Project Team Organization Structure

The 771 Closure Project will function under an integrated scope, schedule, and cost control system that identifies roles, responsibilities, and interfaces. Figure 2 as described below, depicts the project organization.

- **771 Closure Project Management** – Accountable for the safe planning and execution, and the successful completion of the 771 Closure Project in accordance with applicable standards and requirements.
- **Environment, Safety, Health & Quality** – Provides program, policy, and regulatory guidance; performs inspections; manages radiological operations; coordinates assessments; collects, tracks, and trends Closure Project ESH&Q metrics; and provides engineering services and planning support to the Closure Project team.
- **Administrative Services** – Provides support in the area of human relations and labor relations; assists the Closure Project Manager in resource allocation planning; manages the 771 Closure Project training program; administers the employee compensation program; prepares Closure Project occurrence reports; and provides miscellaneous project administrative support (e.g., document preparation, control, and maintenance and records management).
- **Project Planning/Controls** – Develops Closure Project schedules; identifies resource requirements; maintains the PMP; manages the Closure Project change control process; monitors and reports Closure Project performance; manages work control, including plan of the day (POD) and plan of the week (POW); administers subcontracts and task orders; and purchases equipment and supplies required to support Closure Project activities.
- **Environmental Compliance** – Represents the project to the regulatory agencies; implements environmental stewardship requirements, and represents the project on Site-wide committees.
- **Operations Management** – Operates and maintains the 771 Closure Project to support Closure Project activities; ensures compliance with the Building 771 Basis for Interim Operations (BIO); maintains facility safety category systems (e.g., criticality, fire, ventilation); releases/authorizes work; conducts facility surveillances; maintains facility security; manages facility emergency preparedness; conducts RCRA inspections; and maintains RCRA compliance. Accountable for deactivation activities, decommissioning, and material stewardship activities.

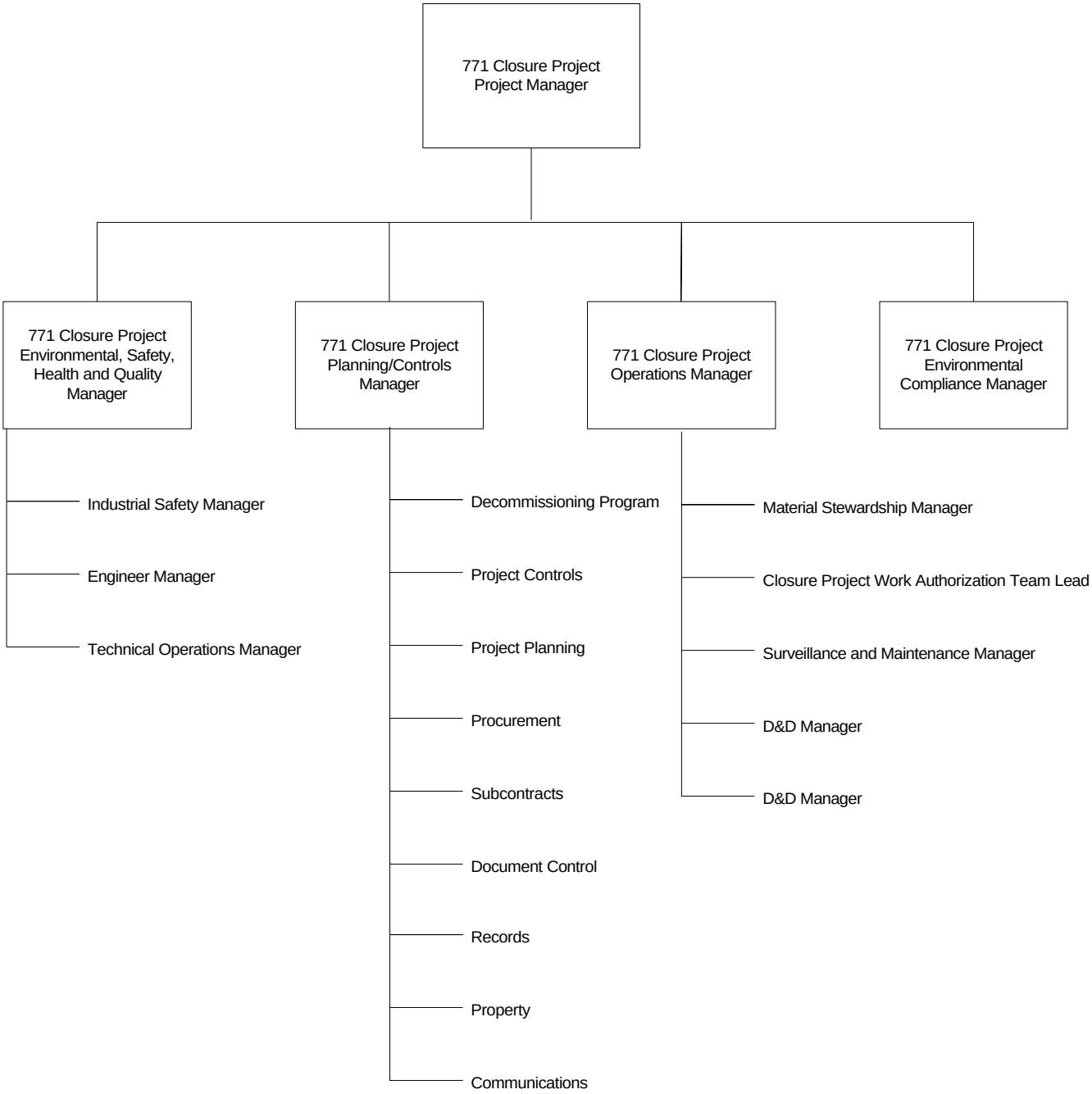

Figure 2. 771 Closure Project Organization

- Deactivation: Responsible for the removal of SNM holdup and "loose" equipment and materials, such as combustibles, furniture, and waste chemicals; preparation of gloveboxes for decommissioning; removal of organic liquids from equipment and systems; removal of classified material/tooling; and removal glovebox line- and non-line generated material.
- Decommissioning: Responsible for the removal, size reduction, and decontamination of facility components and for facility demolition as described in this DOP.
- Material Stewardship: Provides commodities to support Closure Project needs; manages wastes and coordinates inter-building material movements through facility disposition; provides nuclear material safeguards support (e.g., SNM inventory, assay, and accounting); and provides non-destructive assay services.

2.2 DOE and LRA Interfaces

As owner of the Site, DOE oversees closure operations; provides direction to the contractor regarding funding and overall direction; and communicates with the regulators and other stakeholders (e.g., the Rocky Flats Citizens Advisory Board [RFCAB], the Rocky Flats Coalition of Local Governments [RFCLOG], and the public) regarding the status of the 771 Closure Project. In addition, DOE is responsible for the enforcement of health and safety provisions of certain federal regulations.

CDPHE is the LRA for the IA, and thus is the LRA for decommissioning activities conducted pursuant to RFCA. EPA is the Support Regulatory Agency in the IA, so both CDPHE and EPA participate in oversight of decommissioning activities at RFETS. CDPHE, EPA, and Defense Nuclear Facilities Safety Board have executed a Memorandum of Understanding (MOU) with DOE to define their respective roles and responsibilities for oversight of activities conducted in the IA.[18] In that portion of the Site where each is the LRA, CDPHE and EPA have authority to direct DOE to stop work or perform particular tasks required under RFCA when conditions present an immediate risk to public health or the environment.

2.3 Working Relationships

The personnel of DOE, its contractor, subcontractors, CDPHE, and EPA will use the RFCA consultative process[19] to establish and maintain effective working relationships with each other and with the public throughout the decommissioning process. As described in the DPP, the principal aspects of the consultative process are as follows:

- **Timely Sharing of Information** – Information sharing activities will include but need not be limited to: updates of the overall Site CPB, briefings on the development of work plans; briefings on changes to the approved baseline; standing invitations to project planning meetings and pre-evolution briefings (PEBs); and consultations on decommissioning strategy.
- **Collaborative Discussions of Program Changes** – The goal of these collaborative discussions is to raise and resolve issues without delaying decommissioning activities.
- **Designation and Use of Project Points of Contact for Information Exchange and Resolution of Issues** – The LRA, DOE, and the contractor will designate points of contact to facilitate open communication and resolution of issues.

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[18] Memorandum of Understanding Governing Regulation and Oversight of Department of Energy Activities in the Rocky Flats Environmental Technology Site Industrial Area (IA), executed February 15, 1996, which is contained in Attachment 1 of RFCA.

[19] The consultative process is described in ¶¶51-61 of RFCA, in Appendix 2 of RFCA, and in Section 1.1.1 of the DPP.

- **Respect for the Roles and Responsibilities of the Parties** – The LRA and DOE will have distinct roles and independent decision-making responsibilities. In general, the role of DOE is to oversee program and Closure Project planning, and to approve the CPB and baseline changes. The role of the LRA is to approve the DOP and other RFCA decision documents, oversee the planning and implementation of work, ensure protection of human health and the environment, and monitor compliance with RFCA and Closure Project ARARs.
- **Training** – To facilitate the consultative process, the LRA and DOE may develop and provide training to their respective staff and to the contractor, subcontractors, and interested members of the public.

Per RFCA, CDPHE is the LRA for decommissioning activities under CERCLA.[20] To expedite the decommissioning process, the parties have agreed the LRA may exercise authority by participating in the IWCP process. For the purposes of this DOP, this means the LRA has an opportunity to discuss issues and ask questions, but it does not mean the LRA has approval authority for IWCP work packages. DOE and its contractor or subcontractors will advise the LRA of IWCP meetings and roundtable review sessions, and will provide relevant information in a timely manner. The LRA, DOE, and the contractor or subcontractors may use these roundtable review sessions as a forum for RFCA consultation. If this process does not address the LRAs concerns, the LRA may issue a "stop work" order pursuant to RFCA.[21]

[20] See RFCA ¶70.

[21] See RFCA (¶¶176-180).

3 771 CLOSURE PROJECT DESCRIPTION

The 771 Closure Project is comprised of Building 771 and various support facilities located within the Site's IA. Figure 3 shows the 771 Closure Project and some facilities surrounding the Project. Not all of the facilities within the 771 Closure Project are annotated on the drawing, and not all of the facilities annotated on the drawing are part of the 771 Closure Project. The following sections provide a descriptive overview of the 771 Closure Project.

3.1 Building History and Description

Building 771 is located in the north-central section of RFETS. The building is predominantly constructed of reinforced concrete with some non-production portions of the building constructed of concrete block and fabricated metal. The original building was a two-story structure built into the side of a hill with most of the three sides covered by earth. The fourth side, facing the north, provides the main entrance to the building. The original building measures 262 feet (north to south) by 282 feet (east to west) on the ground floor and 202 feet by 282 feet on the second floor. The building is 31 feet tall, and there are no outside windows in the main building.

Since completion of the original building, six major additions have been constructed. This series of expansion brought the total area of the building to approximately 151,000 square feet. The first addition was Building 771A, which was constructed in 1962. It is a one-story structure, approximately 41 feet by 110 feet on the north side of the main building. Offices and the cafeteria were moved into Building 771A when it was completed. This addition is separated from the process areas by a hallway and doors, and has a separate ventilation system. Completed in 1966, the 771B office addition is a one-story building, measuring 41 feet by 81 feet. The addition was built on the north side of the main building, west of 771A. The Dock Number 1 addition was added to the northwest side of the main building in 1968. The maintenance shop on the west side of the main building was constructed in 1970. The maintenance shop is 60 feet by 77 feet. The waste packaging facility, Building 771C, was built in 1972, and is a one-story addition to the east side of Building 771, extending to the west side of Building 774. Building 771C was used to store, count, and ship waste; waste packaging and repackaging occurred within Building 771

A plenum deluge catch tank shed, built in 1974, was added on the west side of the original building adjacent to the maintenance shop addition. It is a one-story, 24 feet by 30 feet shed. Inside the shed is a 4,000-gallon capacity filter drainage catch tank and support system to collect the water used while fighting a fire inside the filter plenums or incinerator.

Building 771, the primary facility for plutonium operations, was one of the four major buildings to be constructed and placed in operations at RFETS. Building 771 operations included the chemical and physical operations for recovering plutonium and refining plutonium metal, plutonium chemistry and metallurgical research, and a radiochemical analytical laboratory. The following provides a chronology of Building 771:

1951 Construction begins in November.

1952 Building 771 is occupied.

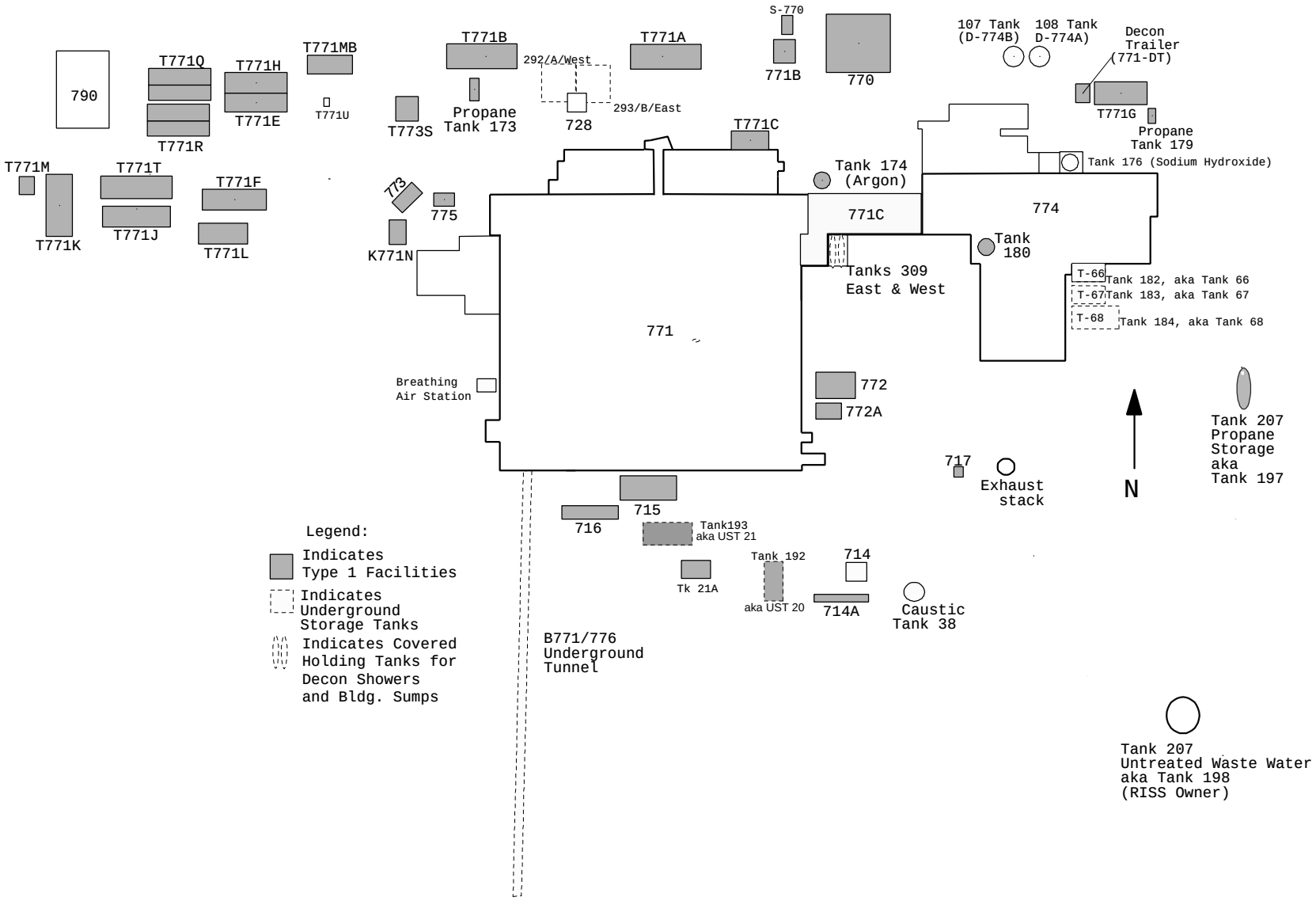
1953 The first operations begin in May.

1957 On September 11, a glovebox fire occurs in the building, resulting in the transfer of a plutonium foundry, fabrication, and assembly operations to Building 776/777.

1958 A plutonium recovery incinerator begins operations.

1959 The solvent extraction process for plutonium recovery is replaced with an anion exchange process.

Figure 3. 771 Closure Project Facilities



1963/64	Building 771A is constructed to increase plutonium production. Processes were expanded to include an americium recovery line, dissolution lines, filtrate recovery, and batching, calcination, and fluorination operations.
1967	An office expansion, 771B, is added to Building 771.
1970	An addition is completed on the west side of the building to consolidate all maintenance, pipe, sheet metal, and painting activities.
1971	Building 771C, a drum-handling facility, is completed.
1979	Plutonium recovery operations in Building 771 are discontinued. Cleanup operations begin in Building 771.
1980	Building 771 operations are restarted due to material accountability problems in Building 371.
1989	Building 771 plutonium operations are shut down in November as part of an overall plutonium operations shutdown ordered by DOE.

Building 771 Stack is a reinforced concrete stack at the southeast corner of Building 771. The stack has an inside diameter of 10 feet, the base underground is 19 feet across, and the stack rises 150 feet aboveground. The stack wall is 6 inches thick at the top and 11.5 inches thick at the base. The stack provides exhaust for the main filter plenum, which receives exhaust from the high-efficiency particulate air (HEPA) filtration system; the heating, ventilating and air conditioning (HVAC) system; and the incinerator.

Building 774 was designed to treat the liquid process wastes generated in Building 771. Building 774 was originally a two-story rectangular structure of poured-in-place concrete. By 1989, seven additions had been made to the building, resulting in multiple levels varying from one to four stories in height. The additions are constructed of block wall, reinforced concrete, metal-on-metal framing and transite. Because of the additions, floor space increased to 25,000 square feet. The facility is built on a steeply sloping site. The first floor on the north side is 7.5 feet below-grade, and the fourth floor on the south side is 4 feet above-grade.

As RFETS expanded to accommodate increased production of nuclear weapon triggers, Building 774 began processing radioactive acidic and caustic wastes, aqueous and organic wastes, waste oils, and non-radioactive waste photographic solutions. Buildings 111, 112, 130, 371, T371J, 441, 444, 460, 551, 559, 664, 707, 750, 771, 776, 777, 881 and 991 generated one or more waste streams that were processed in Building 774. In 1971, the waste treatment operations in Building 774 were enclosed to provide containment of radioactive airborne particles.

The goal of the Building 774 waste treatment process was to reduce liquid radioactive wastes and convert them into a form suitable for transport off-site for storage and disposal. In general, wastes were either piped directly into Building 774, or transferred in drums, containers, or other types of packaging. The waste entered a series of interconnected tanks designed to treat acidic, caustic and radioactive wastes and separate relatively low-level radioactive effluent from contaminated solids or sludges. Four processes were used in the building to meet certain characteristics of the waste. The waste may have passed through one or more of the following processes:

- Neutralization and filtration of acidic wastes containing large quantities of metal ions or chloride ions. The main purpose of this process was to remove the large quantities of metal hydroxide solids from the waste stream, as these solids hampered the decontamination ability of the succeeding flocculation and clarification processes
- Batch neutralization, precipitation and filtration of acidic wastes containing only small quantities of metal ions or basic wastes containing large quantities of undissolved solids;
- Continuous radioactive decontamination of neutral and caustic wastes; and

- Solidification of aqueous wastes containing complexing agents, certain radioactive isotopes, or hazardous chemicals that were undesirable in the regular waste system. These wastes were mixed with an absorbent material and Portland cement in barrels for disposal. This process was eventually replaced by the organic and sludge immobilization system. The organic and sludge immobilization system accepted waste oils from any building at the Site that contained transuranic material and converted the liquid waste into solid waste.

The second stage of the decontamination process included two separate radioactive waste decontamination processes. The benefit of segregating the wastes was better utilization of the waste storage ponds based on whether the wastes met standards for radioactive and/or chemical contamination.

The slurry from the decontamination process was held in a slurry tank until it was processed by vacuum filtration to separate the solids from the liquid. The separated solids were mixed with a solidifying agent, and packaged for shipment and long-term storage as transuranic-mixed waste.

The role of Building 774 diminished with the inauguration of the new process waste treatment facility in Building 374. Building 774 continued to process contaminated organic wastes that could not be incinerated, and the liquid process wastes generated in Building 771.

Building 728 was constructed as a sewage lift station with two 25,000-gallon below-grade holding tanks (tanks 292 and 293) for surge purposes, and is located approximately 35 feet north of the west half of the Building 771 office addition. The overall structure of the building is constructed primarily of cast-in-place concrete. The portion of the building that is visible above grade is approximately 7 feet by 15 feet and extends 4.5 feet above adjacent grade. The remainder of the structure extends approximately 12 feet below grade and occupies a footprint of 33.5 feet by 24.5 feet.

3.1.1 System Interfaces

A number of systems are connected to the 771 Closure Project and other facilities on site. The connections will be considered as closure activities are planned, and actions will be taken to prevent unexpected disruption of services. The following bullets detail the systems:

- Electrical - connected to the 515/516 Substation
- Nitrogen - connected to the Nitrogen Plant
- Argon - connected to a tank outside the facility
- Plant Air - received from Building 776
- Breathing Air - received from Building 707/708
- Criticality System - connected to the plant-wide system
- Water - received from Building 124
- Steam - received from Building 443
- Sanitary Sewer - connected to the plant-wide system
- Liquid Process Waste - connected to the plant-wide system
- Natural Gas - connected to the plant-wide system
- Telephone System - connected to the plant-wide system
- Fire Protection Systems - connected to the plant-wide system
- Security Protection Systems - connected to the plant-wide system
- Grounding/lightning system - interconnects Building 771, Building 715 and Building 774.

3.1.2 Physical Interfaces

Three reinforced concrete box tunnels connect Building 771 to other structures:

- A 267-foot tunnel connects Building 771 to Building 776 for purposes of moving materials. The tunnel measures 8 feet by 10 feet by 267 feet. The tunnel has a 6% grade. The walls and roof are 1 foot thick, and the floor is 1.25 feet thick.
- A 170-foot utility tunnel connects Building 771 to Building 774. The tunnel measures 3.5 feet by 3.5 feet by 170 feet.
- A 140-foot exhaust duct tunnel connects Building 771 to the exhaust stack (measures 8 feet by 10 feet by 104 feet). The exhaust tunnel floor is 1 foot thick, and the walls and roof slab are 10 inches thick.

3.2 Current Status

The following summarizes the current decommissioning status for the Building 771/774 Project:

- All 240 gloveboxes have been removed.
- All 251 tanks previously containing over 12,000 liters of liquids have been removed.
- All 41 liquid systems have been drained.
- Approximately 275 drums of TRM sludge have been removed from former processing tanks.
- Eleven of 12 filter plenums have been decontaminated and/or dismantled.
- Under building characterization has been completed.
- Final surveys in the former maintenance shop have been initiated.
- The facility is criticality incredible and operationally clean.

4 PROJECT APPROACH

The decommissioning cost and schedule planning process for the 771 Closure Project has been completed, and the costs and schedules are included in the RFETS Closure Project Baseline (CPB). During the course of the 771 Closure Project, there may be instances where circumstances differ from those predicted. In such cases, planned activities may be revised without revising the CPB or DOP, if the activities are still within the scope of this DOP and the referenced RSOPs consistent with RFCA and the DPP. Significant changes will be shared with the LRA and stakeholders as part of the RFCA consultative process.

4.1 Work Planning and Execution

Decommissioning activities will be planned and executed in accordance with the RFETS Integrated Safety Management (ISM) System, as described in the ***RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities***.

4.2 771 Closure Project Characterization

The 771 Closure Project characterization involves a three-step approach: scoping characterization, RLC, and in-process characterization. The following paragraphs describe each step in more detail. The pre-demolition survey information is documented in Section 4.6. Under building pre-remediation characterization is addressed in Section 4.5.

4.2.1 Scoping Characterization

During scoping characterization, existing records and documents were collected, and present and former Building 771 employees were interviewed to determine the radiological, chemical and physical conditions of the Cluster. Based on the information collected, the 771 Closure Project team proceeded to conduct the RLC.

4.2.2 Reconnaissance Level Characterization

The purpose of RLC is to identify the location and extent of radiological, chemical and physical hazards associated with a facility. The RLC for the 771 Closure Project was completed in August 1998. The RLCR documents results for the 771 Closure Project. Hazards were assessed based on a review of historical records and process knowledge. The RLCR did not contain detailed information on the facilities exterior to Buildings 771 and 774; therefore, the RLCR[22] will be amended and submitted for concurrence on those facilities.

Potential physical hazards within the 771 Closure Project consist of those common to standard industrial environments, including hazards related to energized systems, utilities, gas cylinders, trips and falls, and forklift operations. The buildings have been relatively well maintained and are in good physical condition. Consequently, there are no unique physical hazards associated with any of the buildings within the 771 Closure Project.

[22] This RLCR is being prepared in parallel to this DOP modification and should receive LRA concurrence during the public comment period. The draft report and data packages are available in the administrative record file.

4.2.3 In-Process Characterization

Additional characterization will be conducted during decommissioning, as facility components are removed and building surfaces are further exposed. This type of characterization is referred to as in-process characterization. Data from in-process characterization is used to identify additional hazards; refine approaches to component removal, size reduction, and decontamination; revise waste volume estimates; and modify ES&H controls, as necessary. In-process characterization is also conducted to verify that decontamination activities have achieved the applicable performance specifications, such as release or reuse criteria and WAC. Detailed information regarding the characterization process and associated requirements is contained in DDCP.[23]

4.3 Dismantlement Sets and Decommissioning Areas

The decommissioning work is broken down into Dismantlement Sets and Decommissioning Areas. In general, Steelworkers complete Dismantlement Sets, and Building Trades complete Decommissioning Areas. Steelworkers conduct work on highly contaminated systems with removal contamination greater than 2,000 disintegrations per minute (dpm). Building Trades generally work in Areas with removable contamination less than 2,000 dpm, unless some ventilation remains in place by the Steelworkers to maintain differential pressure.

4.3.1 Dismantlement Work Set Descriptions

The following table indicates the Set number and a brief description of those Sets. The Sets were established for dismantlement activities. Dismantlement sets include scope to remove process equipment and associated items, but leave in place elements needed for safety and convenience of the workers performing activities in the Areas. For example, fire suppression and alarm systems, ambient lighting, domestic water, sanitary drains, and various tools are among the items that may be left in place after dismantlement. Dismantlement consists of planning, disassembly and removal of equipment components and satisfactory packaging for disposal of the resulting waste. Although the Set descriptions indicate piping, conduit, and ventilation will be removed, there may be some instances where miscellaneous equipment and/or piping, conduit, and ventilation remain for the following reasons:

- It meets the unrestricted release criteria,
- There are no advantages to removing the equipment,
- Due to logistics in the Set, the equipment can be more readily removed during the Area decommissioning, and/or
- The equipment is necessary for safety or coordination reasons.

If equipment is not removed for any of the four reasons stated above, the Set will still be considered complete for dismantlement purposes.

Table 4. Set Descriptions

Set	Description
76	This Set involves the removal and packaging of the Plenum FU-2A, FU-2B, and FU-2C, internal HEPA filters and baffle plates, and the exhaust fans.
78	This Set involves the removal and packaging of the first stage of HEPA filters and the contaminated metal framework and sheetmetal in the main exhaust plenum and Tank V-2 in Room 190.

[23] Rocky Flats Environmental Technology Site Decontamination and Decommissioning Characterization Protocol (M AN-077-DDCP), latest revision.

4.3.2 Decommissioning Areas

The following table indicates the Area designation and a brief description of those Areas. The Areas involve decontamination, dismantlement, and demolition activities. Some miscellaneous equipment (such as small section of piping, ducting, and/or conduit) may remain in the Areas after decontamination, component removal, and size reduction because it meets the unrestricted release criteria, does not interfere with the pre-demolition survey, and there is no reason to remove it.

Table 5. Area Descriptions

Area	Description
AA	This Area involves the corridor B office area and corridor F office area. Corridor B office area includes corridor B and offices 116, 117, 117A, 118, 118A, 119, 119A, 119B, 119C, 119D, 124, 125, 125A, 125B, 125C, 125D, 125E, 126, 126A, and 126B. Corridor F office area decommissioning includes rooms 103, 104, 105, 105A, 105B, 107, 109, 110, 110A and 110B; corridor F; and a criticality alarm panel. The activities associated with the Area decommissioning include the removal of utilities piping; remaining ventilation systems, interior partitions, and drop ceilings; decontamination; and the demolition of the office building structure.
AB	This Area includes rooms 301, 302, 303, 304, 305, 306 and 308; drum counters; scales; exhaust fans; and motors. The activities associated with the Area decommissioning include dismantlement of the annex area; removal of utilities piping, remaining ventilation systems, interior partitions, and drop ceilings; decontamination; and the demolition of the annex building structure.
AC	This Area includes rooms 120, 122, 123, 123B, 123C, 133 and 135; the men and women's locker rooms; the janitor's closet; and the laundry cage in the men's locker room. The activities associated with the Area decommissioning include dismantlement of the locker room area; removal of utilities piping and remaining ventilation systems; and decontamination.
AE	This Area includes room 157. The activities associated with the Area decommissioning include dismantlement of the 157 stock room area and removal of utilities piping, remaining ventilation systems, interior non-load bearing CMU, and drywall partitions. Interior surfaces will have paint removed to facilitate pre-demolition survey (PDS). In-process characterization will identify areas of surficial contamination, and surface decontamination will remove surface contamination. An estimated 25% of floor slabs will be removed during decontamination activities.
AF	This Area includes rooms 135A, 135B, 141, 151, 151A, 151B, 151C, 151E, 151F, and 152; the elevator area; 151 radiation control area; the RCT areas; SAAM panel; and decontamination showers. The elevator area includes rooms 142, 145, and 242; electrical control panel; elevator cage; and hydraulic unit. The activities associated with the Area decommissioning include the removal of utilities piping, remaining ventilation systems, interior non-load bearing CMU, and drywall partitions. Interior surfaces will have paint removed to facilitate PDS. In-process characterization will identify areas of surficial contamination, and surface decontamination (scabbling) will remove contamination. Floors will be removed from rooms 114, 141, and 149. Walls and the ceiling will also be removed in room 141.
AG	This Area includes the Building 771 stack, Building 771 stack tunnel, Building 776 tunnel, and Building 774 tunnel. The activities associated with the Area decommissioning include the removal of stainless steel liner in the 771 stack tunnel, Building 776 tunnel, and Building 774 tunnel; utilities piping, remaining ventilation systems and disposition. Interior surfaces will have paint removed to facilitate PDS. In-process characterization will identify areas of surficial contamination, and surface decontamination (scabbling) will remove contamination. It is anticipated that the floors and lower portion of the walls will need to be decontaminated.

Table 5. Area Descriptions

Area	Description
AH	This Area includes room 283 east, exhaust unit S-8, air handling unit AHU-2, and exhaust fans #5 and #6. This area also includes rooms 283A, 283B, 283H, 283I, 283J, and 283 center and exhaust fans #2, #3, and #4. The west 283 HVAC exhaust and utilities area includes rooms 283C, 283D, 283E, 283F, 283G, and 283 west; air handling unit AHU-3, exhaust fan #1, and the uninterruptible power supply (UPS) battery system. The activities associated with the Area decommissioning include the removal of utilities piping and remaining ventilation systems. Interior surfaces will have paint removed to facilitate PDS. In-process characterization will identify areas of surficial contamination, and surface decontamination (scabbling) will remove contamination. In addition, the activities associated with the Area decommissioning include the removal and packaging of equipment on the Building 771 second floor except the plenums (see sets 74 through 78 for plenums scope). The second floor equipment includes the main supply plenum, test plenum, fans from the filter plenums, bag-filters, air-washers, deep-bed filters, knock-out, and condensate tanks. Control panels, transformers, electrical switch gear, motors, pumps, various instruments, racks, and various tools such as portable lights, welders, ladders, air movers, tool boxes, dollies, cabinets, desks, lockers, and other items will also be removed. Pipes, conduit, and ventilation duct will be removed as part of the Area decommissioning.
AJ	This Area includes outbuildings not addressed elsewhere. The activities associated with the Area decommissioning include decontamination and demolition of closure project outbuildings, underground storage tanks (UST's), tanks and pads, and appurtenant structure.
AL	The activities associated with the Area decommissioning include PDS and demolition of Building 771 and the connecting tunnels.
AM	This Area includes Building 774. Building 774 includes glovebox 5 with its associated microwave chiller and tank T2F in Room 202; glovebox 355 in Room 103; reagent tanks and pumps in room 241; oil storage tanks 102, 103, and 104; the caustic storage tank outside Building 774 hatch entry; and miscellaneous items in rooms 250 and 212. The plenum in Room 203, and other items located in Rooms 301, 302, 303, 303A, 304, 305, 306, 320, 321, 200, 204, 205, 206, 207, 208, 209, and 220 and the 322 storage shed are also contained within this Area. The activities associated with the Area decommissioning include removal of utilities piping, remaining ventilation systems, interior non-load bearing CMU, and drywall partition; decontamination; PDS; and demolition. Interior surfaces will have paint removed to facilitate PDS.
AN	This Area includes the indirect/direct evaporative cooling area. The indirect/direct evaporative cooling area includes the 8 new intake air systems, piping, valves, electrical distribution and control panels, and the metal building. The activities associated with the Area decommissioning include the removal of equipment and appurtenant structure associated with the indirect/direct evaporative cooling systems.

4.4 Facility Component Removal, Size Reduction, and Decontamination

This section contains information on the 771 Closure Project approach to component removal, size reduction, and decontamination. In some instances, the sequences of activities and methods are specified. The information contained within these sections is based on the current planning baseline. The actual sequence and methods used may differ from what is indicated in this section; as long as the activity is within the scope of the ***RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities***, there will be no modification to the DOP. Throughout this section, statements are made on what type of waste an activity will create. These statements are based on process knowledge and included for information purposes. All waste will be characterized and packaged in accordance with Site Waste Management Programs.

4.4.1 Component Removal and Size Reduction

For the purposes of this DOP, component removal refers to the physical disassembly, size reduction (if necessary), and removal of facility components, including gloveboxes, tanks and ancillary piping, fume hoods, ventilation and filtration systems, other utilities and equipment, walls, ceilings, floors, and structural members. These items must be removed to allow access to building surfaces for decontamination and PDS. Component removal and size reduction will be conducted in accordance with the ***RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities***.

Initially, as work begins in each room, machinery and some equipment will be removed. These are items that are at floor level, generally do not require size reduction, and are not attached to critical safety systems (i.e., zone I ventilation, zone II ventilation and criticality alarms). These items will be isolated from utilities and any other potential energy-producing systems and removed as waste or a recyclable product.

Many items will require size reduction and/or decontamination to place them into waste containers. The central size-reduction area within the building will be used for components that can be moved. Items that are too large to move will be size reduced in place.

Equipment contaminated above the High Contamination Level, as defined in the Site Radiological Manual, will be removed during dismantlement. Consequently, the Sets contain the process equipment such as gloveboxes, tanks, process piping, and other pieces of process-related equipment. Each Dismantlement Set is organized around a room or process to aid in the engineering required to remove the Set. Generally, the following is the sequence for removal of a typical, Dismantlement Set; these steps are typical, and some steps may not be required:

- Execute work package prerequisites;
- Isolate the work area using Lock-out/Tag-out;
- Return gloveboxes to service;
- Remove equipment internal to the glovebox;
- Remove utility and external equipment;
- Decontaminate the glovebox;
- Survey for radiological and non-radiological contamination;
- Apply fixatives;
- Remove the glovebox from ventilation;
- Erect soft-sided containment, if necessary;
- Remove structural support;
- Separate glovebox, if required;
- Transport glovebox to size-reduction area, if necessary; and
- Size reduce glovebox and package as waste.

4.4.2 Decontamination

Decontamination is defined as the removal of contamination from building and equipment surfaces and beneath surfaces by manual, mechanical, chemical, or other means. The purpose of decontamination is to reduce exposure to radiological and chemical hazards, minimize the generation of radioactive and hazardous waste, and to salvage equipment and materials for future use. Decontamination will be conducted in accordance with the ***RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities*** and consistent with the DPP and Modifications to RFCA Attachments, approved June 2003.

The Building 771/774 structure will be dispositioned in accordance with the framework for contaminated soil in accordance the Modifications to RFCA Attachments, approved June 2003. Based on the

Modifications to RFCA Attachments, approved June 2003, decontamination and facility preparation before demolition will adhere to the following criteria:

- The Building 771/774 slab and structure within 0 to 6 feet of the final proposed grade will be decontaminated to the unrestricted release criteria and 0 to 3 feet will be removed during demolition.
- The Building 771/774 slab and structure below 6 feet of the final proposed grade will be decontaminated to ensure that it will not exceed 7 nCi/g and encapsulated to ensure that the removable contamination will not exceed the release criteria.

It is anticipated that if the contamination is surficial, it will generally be decontaminated. If the contamination extends several inches into the concrete, the concrete will generally be removed, if it exceeds the 7 nCi/g.

The decontamination will be performed in the following general sequence.

At the close of the Dismantlement Set activities, the areas will be empty of gloveboxes, tanks and systems providing services to gloveboxes and tanks. The electrical systems supplying lighting and distribution will remain in place, and the Zone I and II ventilation systems will have been removed. Asbestos removal internal to the structure will be completed, and the areas will be isolated from the balance of the structure to allow decontamination activities.

Room or area walls will be used as containment barriers, or temporary containment barriers will be installed to ensure that decontamination activities are isolated from the balance of the structure. This will ensure that migration of contamination can not occur to the balance of the structure. Mobile HEPA ventilation will be installed for ventilation of areas requiring decontamination. HEPA ventilation exhausted to the environment will be monitored, or exhausted to the building ventilation systems. Dismantlement activities associated with Sets will be accomplished before commencement of dismantlement and decontamination activities associated with the Decommissioning Areas.

Following Dismantlement Set activities, remaining electrical systems will be removed. Temporary electrical services will be installed. Lighting fixtures will be removed, acoustical and metal-pan ceiling fixtures removed and packaged for disposal.

Remaining safety systems will be removed back to the Area boundary, and any necessary modifications performed to replace required safety items.

Remaining utility supply systems will be removed to the Area boundary; and temporary services for support of the decontamination activities installed for supply to the Area.

Interior, non-load bearing block walls and/or gypsum partition walls will be removed and packaged for disposal as low-level waste (LLW).

Scaffolding will be installed throughout the facility, as necessary, to gain access to higher elevation work. Ceilings and upper walls will be decontaminated before lower walls and floors. Concrete ceilings will be decontaminated as necessary, “metal deck” ceilings wiped down, initial surveys completed, and the decontaminated surfaces covered to protect against re-contamination. In metal decking areas, the “pigeon holes” (open areas due to the shape of the decking materials) will be physically covered to prevent re-contamination.

Piping will be flushed before pipe removal activities are initiated. Piping uncovered during floor removal will be removed during decommissioning, as necessary. Floor drains and piping under the slab will be remediated in accordance with the Modifications to RFCA Attachments, approved June 2003, (i.e., grouted and/or encapsulated to the extent practicable), as necessary. Floor drains and "below-slab" services not exposed by floor removal will be isolated and identified for removal by ER, as necessary.

Pre-demolition surveys of interior surface areas will be performed, and permanent isolation barriers for decontaminated Areas will be installed to prevent migration of contaminants into areas decontaminated to unrestricted release or encapsulated so the removable contamination will not exceed the release criteria.

Systems and equipment attached to the exterior surfaces of the structure will be removed, and initial surveys completed. Areas of the exterior surface requiring decontamination will be decontaminated using local-area containment and ventilation.

Before demolition activities, removal of asbestos-containing materials in the roofs will be accomplished.

Following decontamination of the exterior structure, and removal of remaining asbestos roofing materials, pre-demolition surveys of the building structure will be completed.

4.4.3 Removal of Building Ventilation and Filtration Systems

Building ventilation and filtration systems will be removed in accordance with the ***RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities***. Historically, the ventilation zones are defined as Zone I - Glovebox exhaust; Zone II - Room exhaust; Zone III - Building corridor exhaust; and Zone IV - Office and front area exhaust. These definitions are based on the negative pressure differentials that are maintained for certain equipment and areas. The zones have been redefined for planning purposes to Zone 1 - Glovebox exhaust and Zone 2 – will contain all other ventilation.

The HVAC system controls volume, temperature, and humidity of the atmosphere, while maintaining confinement of radioactive materials by means of pressure differential control and exhaust air filtration. Air pressure is increasingly negative from the hallways, to the rooms where radioactive materials are being used, to the gloveboxes. Pressure differentials are maintained through the control of supply and exhaust air. Airborne plutonium would have to pass upstream against several stages of increasing pressure before it could escape to the environment. Automatic electrical interlocks prevent the building from becoming pressurized.

Within Building 771, twelve systems supply the airflow requirements of 210,000 to 250,000 cubic feet per minute under normal operating conditions. Outside air is taken in on the second floor through bird screens and pneumatically operated inlet dampers, and filtered and washed. Standard air washing equipment scrubs and cools the air. Airflow is controlled by a set of dampers at each supply fan, and backflow dampers are provided. Air flows through ductwork to the respective areas.

As facility components are removed and/or decontaminated, workers will complete the removal of remaining utilities, including building ventilation and filtration systems. Due to the potential for radiological and/or chemical contamination within system ductwork, there is a possibility for releases of hazardous and/or radioactive materials to the environment. Therefore, the removal sequence is extremely important and will be planned carefully for each building/Area. Although the approach may differ on a building-by-building or Area-by-Area basis, the general removal sequence described below will be utilized:

- Airflow studies will be performed in accordance with the Radiological Safety Practices Manual to determine feasibility of the removal action and identify potential problems and options.
- Zone I plenums will be maintained until the gloveboxes and ductwork have been stripped out.
- Glovebox removal will be initiated at the glovebox farthest away from the plenum, and work will continue toward the plenum to ensure the air continues to flow from areas of least contamination to areas of higher contamination. There may be exceptions to this rule depending on access restrictions.
- Air studies will continue throughout the glovebox removal to ensure the zones are balanced and negative pressure is maintained in accordance with the authorization basis. Airflow will be balanced using the Zone II system and/or temporary ventilation and filtration systems.
- Plenums and associated ductwork will be removed.
- Airflow will be balanced, if necessary, using temporary ventilation and filtration systems.

4.4.4 Room 141

Room 141, sometimes referred to as an "infinity room", was originally constructed to function as an SNM storage vault, and subsequently re-configured to function as a pump room. Operational problems with the pumping operation resulted in radionuclide bearing acidic solution spills contaminating the floor and the pump pedestals. The resulting contamination was so high that the operation was eventually phased out. Room 141 will be completely removed. Following second floor decontamination activities, the elevated floor structure that surrounds Room 141 will be removed. The interior of Room 141 will be fogged, and a complete containment structure will be constructed to facilitate removal of concrete structural material. Concrete walls, ceiling, and floors will be removed, dispositioned as TRU and LLW, and subsurface media will be protected before transfer to ER for remediation activities. Subsequent remediation actions to remove contaminated concrete resulted in high airborne concentrations, and the room was eventually sealed and abandoned. Lead shielding was present during the pump operation periods. The acid spills may have deposited some lead contamination in the concrete structures. Room 141 will be removed instead of decontaminated; removal will be conducted in accordance with the ***RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities***. In general, Room 141 removal will be performed in the following sequence.

- Room 141 (inner and outer surfaces) will be surveyed to determine the requirements for decontamination and encapsulation.
- Before demolishing the building, the second floor above Room 141 and outside walls of Room 141 will be decontaminated to unrestricted release or encapsulated so the removable contamination will not exceed the release criteria.
- The floor slab inside Room 141 will be divided into 10 sections, approximately six feet by six feet (including the thickness of the walls). Each section will be drilled to accept at least two lifting bolts. These bolts will be secured in place and will extend high enough to be above the final concrete level to provide a lifting point during removal.
- A barrier will be installed across the doorway and concrete will be poured into Room 141 to a level approximately six inches above the existing pump pedestals.
- After installation of new concrete, remaining interior walls and ceiling of Room 141 will be decontaminated to unrestricted release or encapsulated so the removable contamination will not exceed the release criteria.
- Barriers will be placed around Room 141 and precautions will be taken to protect 141 during demolition of the rest of the building. The newly poured concrete will also be encapsulated and protected to prevent damage during room demolition.
- The ceiling and the walls of Room 141 above the newly poured concrete will be demolished and packaged for shipment
- The main building structure will be demolished around Room 141 leaving only the floor slab (including enough flooring to support the containment tent), the four outer walls, and the ceiling

(second floor). The floor slab (and the soil underneath) around the outer walls of Room 141 will be excavated to a point wide enough (approximately two feet) and deep enough to allow the use of a diamond wire saw to cut the floor slab.

- The floor slab (including newly poured concrete) will be cut with the diamond wire saw into 10 sections. The newly exposed surfaces (from the cuts) will be encapsulated with liquid poly to prevent airborne contamination during the removal process.
- The 10 flooring sections will be individually packaged as waste.

4.5 Under Building Characterization

Characterization of the Building 771 under building contamination (UBC) was conducted in two phases using the methodologies described in the Industrial Area Sampling and Analysis Plan (IASAP) for the Rocky Flats Environmental Technology Site (RFETS)[24].

Phase 1 was a limited sampling program implemented in 2001 that was designed to assist the 771 Closure Project in developing a strategy for building demolition, and to determine health and safety requirements for workers if the slab were removed. The sampling approach was described in Addendum 1 to the IASAP[25]. This approach consisted of collecting samples near the inside perimeter of Building 771 and in additional areas where UBC was most likely to occur, such as at known spill locations or where cracks or other pathways to the underlying soil were present.

Thirty-two samples were collected from 16 locations beneath the slab for the intervals 0 to 2 feet and 2 to 4 feet. Samples were analyzed for radionuclides, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyl compounds (PCBs), total metals, total petroleum hydrocarbons (TPH), cyanide, and nitrates. Results are summarized in the Building 771 Phase 1 Under Building Characterization Sampling Report[26]. Based on this preliminary information, decommissioning proceeded with planning to allow some of the deeper structures to remain.

Phase 2 characterization sampling is described in IASAP Addendum IA-03-01[27]. Sampling began in late 2002 and was completed in 2003. This sampling effort addressed the remainder of the Building 771 UBC, the Building 774 UBC and all associated Individual Hazardous Substance Sites (IHSSs) and Potential Areas of Concern (PACs) in the 700-4 Group. This sampling effort was designed to determine whether remedial actions were required. The IASAP 11-meter statistical grid was not used to determine sampling locations at UBCs 771 and 774. Through agreement with the regulatory agencies, a 22-meter statistical grid was used because more emphasis was placed on biased sampling at sumps and tanks.

An additional 148 locations were sampled from IHSS Group 700-4; 49 locations within Buildings 771 and 774, and 99 outside locations. Results are currently being compared to the RFCA Wildlife Refuge Worker Action Levels and will be evaluated using the soil risk screen as required. At this time, it is anticipated that no remedial action will be required. However, the following sampling results may require evaluation.

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[24] DOE, 2001a, Industrial Area Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

[25] DOE, 2001b, Addendum 1 to the Industrial Area Sampling and Analysis Plan, Preliminary Building 771 Under Building Contamination, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

[26] DOE, 2001c, Building 771 Phase 1 Under Building Contamination Characterization Sampling Report, DOE, 2001, Industrial Area Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

[27] DOE, 2002, Final Industrial Area Sampling and Analysis Plan, FY03 Addendum IA-03-01, IHSS Groups 300-3, 300-4, 400-8, 700-4, 800-1, and 900-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

Three UBC sample locations collected from under the 774 basement have detectable Americium-241 activities in the sub-slab soils ranging from 116 to 1,735 pCi/g. The samples were analyzed using gamma spectroscopy, and the plutonium activity is calculated based on the americium activity. To get a more accurate determination of the plutonium activity at the highest americium location, an additional sample was recently collected for alpha spectroscopy analysis that provides an accurate plutonium activity. At this time, results have not been received. The depths of these sample intervals are approximately 16 feet below current ground surface elevation.

An additional UBC sample also had a slightly elevated arsenic concentration. As with the Phase 1 investigation results, arsenic at this concentration is consistent with other background levels found in soils around the Site.

Based on the preliminary results of the recent investigations, no further accelerated action is proposed and documented in a Data Summary report for LRA approval for IHSS Group 700-4, either in the under building areas or outside of the buildings. The sampling effort will be documented in a data summary report[28].

4.6 Pre-Demolition Survey

Before facility demolition, a pre-demolition survey (PDS) will be conducted to verify the nature and extent of radiological and chemical contamination in the facility. The survey will be conducted in accordance with DDCP. In general, the characterization process will incorporate the following steps:

- The 771 Closure Project team will develop characterization packages for taking final measurements and samples.
- DOE and the LRA will review the sampling results.
- DOE and/or the LRA may conduct an independent verification of the characterization data, if required.
- The LRA, at its discretion, may review the results from an independent verification.
- During the characterization process, the LRA will have access to the facilities to collect samples or measurements, at its discretion.

The PDS is intended to verify that the condition of the survey unit meets the requirements for demolition and disposal as provided in this DOP. The PDS is conducted in accordance with the requirements of the PDSP. The type of data necessary to satisfy the objectives of PDS include total surface contamination measurements, removable surface contamination measurements, and scan data. Surface media sampling will only be required on a limited basis, given that suspect surface media will be removed during decommissioning.

Additional information required to design the PDS include in-process survey data and updated maps to reflect structural alterations. In-process surveys are performed to assess the changing radiological conditions during the course of decommissioning and to confirm that an area is free of gross contamination. In-process survey data will be incorporated into the PDS report.

PDS will not be repeated for Type 1 structures, if isolation controls were maintained throughout the duration of the project. Verification surveys will be performed before the release of these structures to confirm that radioactive material was not introduced into these areas. Structures such as administrative support trailers, guard stations and trailers, and auxiliary support trailers and outbuildings (acid storage,

[28] DOE, in progress, Data Summary Report for the FY03 Addendum IA-03-01, IHSS Groups 300-3, 300-4, 400-8, 700-4, 800-1, and 900-3, Rocky Flats Environmental Technology Site, Golden, Colorado, December.

maintenance, etc.), as well as the Building 771 indirect/direct evaporative cooling are included in this category.

Non-radiological contaminants will be addressed at the RLC and in-process phases of decommissioning. In general, non-radiological contaminants will have been removed before the PDS begins, very little, if any, additional sampling will be needed. The non-radiological sampling methodology will be documented in the Pre-Demolition Survey Report. In limited cases (e.g., Building 771/Building 774 roof), non-radiological characterization may be required during the PDS phase.

Based upon available data/information, the following sampling plan is recommended in order to support the PDS effort for both radiological and non-radiological constituents.

- The building surfaces will be divided into survey units based on the requirements outlined in the PDSP. The types of measurements that will be performed during PDS include total surface contamination, removable surface contamination, and surface scans.
- Surface media samples may also be required on a limited basis. For this estimate, the 771 Closure Project will be delineated by the (13) decommissioning areas.

The areas that have not been decontaminated to the unrestricted release criteria and will remain in place after backfilling will be characterized in accordance with a project-specific characterization package prepared in accordance with the DPP,[29] DDCP, PDSP,[30] and the Industrial Area Sampling and Analysis Plan[31]. The objective of this characterization effort is to ensure that the nature and extent of contamination is adequately defined and that the material that will be left in place is consistent with the framework for contaminated soil.

The slab has been characterized using two methods: core analysis and in place gamma spectroscopy. Due to the history of the building, the decision was made to not use a grid based characterization approach and instead to use biased locations based on process knowledge. Seventeen biased and 43 random locations were selected for in place gamma spectroscopy. This information combined with the core analysis completed during the under building sampling (documented in Section 4.5); the Modifications to RFCA Attachments, approved June 2003, outlined in Section 4.4.2; and the final grade will dictate, which areas require decontamination and which areas can have the contamination fixed and controlled during demolition.

Figures 4 and 5 are first floor plans of Building 771/774 that show conceptually how the facility will be divided into the three zones and decisions made on what will require decontamination and what areas can have contamination remain in place with controls applied during demolition. These drawings are conceptual in nature and are based on the current characterization and final grade information. Final maps will be included in the contractor demolition plan.

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[29] Section 2.3 of the DPP indicates, "Facility characterization activities need to be consistent throughout the facility disposition process. To meet this goal, the Site will follow the RFETS Decontamination & Decommissioning Characterization Protocol developed for that purpose, unless it is modified through individual decision documents."

[30] Section 3.0 of the PDSP indicates, "The pre-demolition survey is designed to demonstrate that DOE-added radioactive materials have been removed from RFETS facilities to the extent that residual levels of contamination are below the derived concentration guideline levels (DCGLs) or to document that residual levels above the DCGLs remain."

[31] Addendum 1 to the Industrial Area Sampling and Analysis Plan, Preliminary Building 771 Under Building Contamination; Building 771 Phase 1 Under Building Contamination Characterization Sampling Report, Industrial Area Sampling and Analysis Plan; and Final Industrial Area Sampling and Analysis Plan, FY03 Addendum IA-03-01, IHSS Groups 300-3, 300-4, 400-8, 700-4, 800-1, and 900-3.

Figure 4. Building 771 Floor Plan Demolition Concept

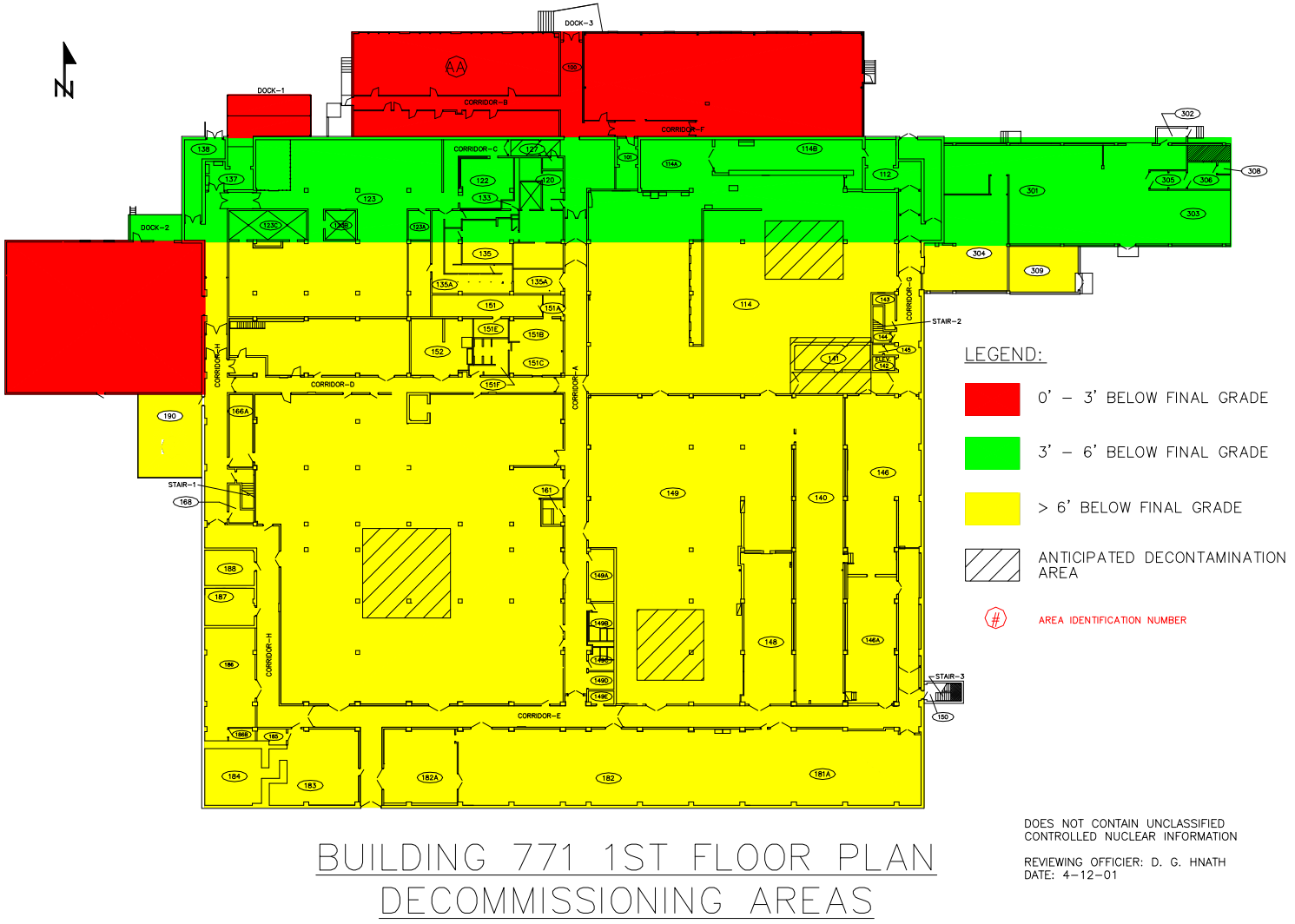
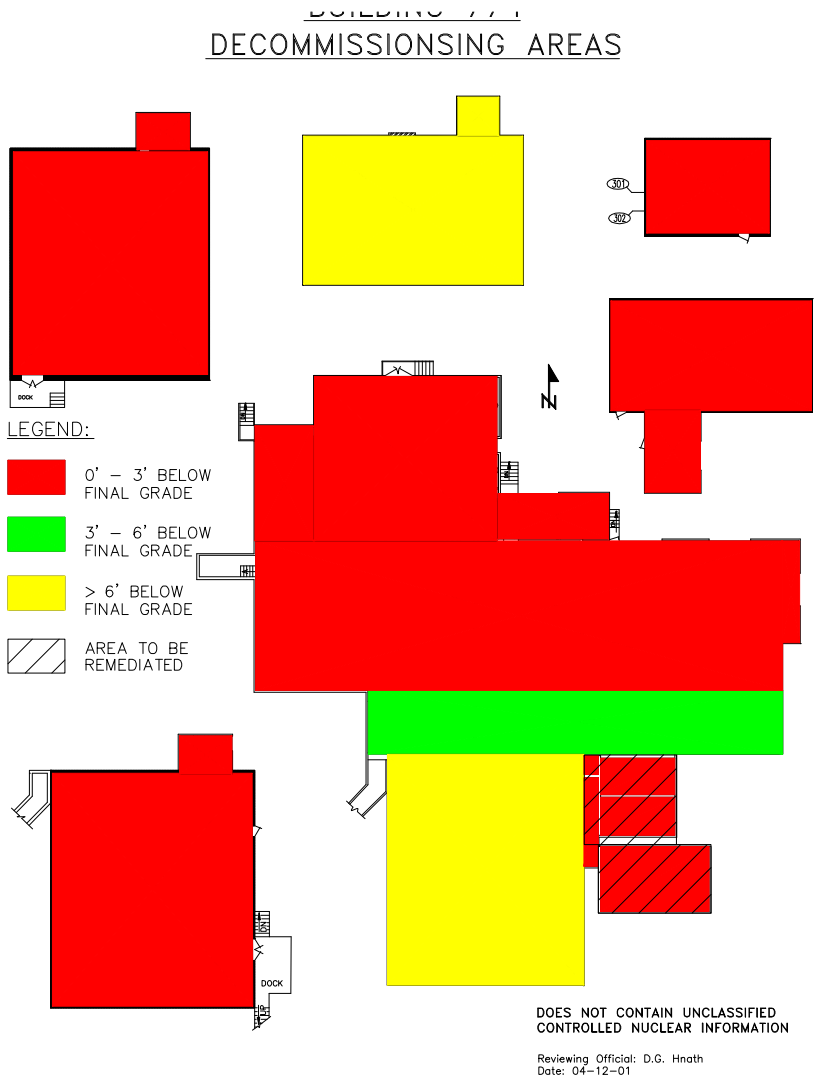


Figure 5. Building 774 Floor Plan Demolition Concept



An independent verification (IV) survey may be performed on an established percentage of survey units (typically five percent) following the completion of the PDS. The independent verification contractor (IVC) will be selected and funded by the DOE and/or LRA such that independence is maintained from the 771 Closure Project personnel.

4.7 Facility Demolition

This section contains extensive information on the 771 Closure Project approach to demolition. In some instances, the sequence of activities and methods has been specified. The information contained within these sections is based on the current planning basis. The actual sequence and methods used may differ from what is indicated in this section; as long as the activity is within the scope of the ***RSOP for Facility Disposition*** and consistent with RFCA and the DPP, there will be no modification to the DOP.

The demolition phase of decommissioning includes removal of the building shell, slab, foundation and facility footing to a depth at least three feet below the final proposed grade. The demolition will be conducted in accordance with the ***RSOP for Facility Disposition*** and consistent with RFCA and the DPP. A Colorado registered structural engineer will be utilized as indicated in the ***RSOP for Facility Disposition***.

4.7.1 Demolition Planning and Execution

In general, the demolition scope will focus on remaining structures, facilities and appurtenances associated with the 771 Closure Project, as globally defined by Dismantlement Sets and Decommissioning Areas. The scope includes such associated appurtenances as retaining walls, loading docks, pads, temporary structures, and underground utilities or structural features to the edge of the foundations. In accordance with the ***RSOP for Facility Disposition***, a contractor demolition plan will be prepared including the minimum requirements specified in that document. In addition, the contractor demolition plan will detail how areas of fixed contamination will be protected during demolition activities and the project will mitigate potential areas of void space.

It is anticipated that in areas where contamination will remain, the following conditions will apply:

- The location, area, and type/quantity of the contamination will be delineated and included in the Project Closeout Report
- The contamination will be fixed and encapsulated, which could include paint, steel plates and commercial brand encapsulants
- Material will be placed over the area to minimize the potential for disturbance during demolition. The material could consist of soil and/or gravel placed in a 1 to 2 foot lift over the area.

Sidewalks, fences, and aboveground exterior utilities will be removed on a case-by-base basis and coordinated with the Remediation, Industrial Decommissioning, and Site Services (RISS) Project. Asphalt roadways and the remaining underground utilities will be addressed under a separate ER decision document.

4.7.1.1 Overview

Demolition will be accomplished using a variety of mechanized equipment, primarily of the tracked variety due to the high incidence of tire failures that accompanies the use of rubber-tired equipment. Tracked excavators fitted with quick-change attachments are the preferred piece of equipment, using a variety of hydraulic shears, grapples, thumbs and vibratory demolition hammers to accomplish various demolition needs. A large tracked excavator properly outfitted can be used effectively on most two to three story tall demolition applications. Additionally, the detachable tools can be fitted with remote operated fogging water-spray nozzles for dust control purposes in order to prevent personnel with dust control spray hoses from getting into tight locations with limited escape routes. During demolition,

airborne dust will be monitored on a visual presence or absence criterion, with dust control water spray being applied as required from a fire hose equipped with a fog nozzle.

Excavators can easily direct load debris into disposal containers or trucks, or front-end loaders can also be brought in depending on the debris haul distance. The following bullets provide the general sequence of activities associated with the demolition of the 771 Closure Project:

- Mobilization,
- Site preparation,
- Removal of overhead obstructions,
- Removal of site features required to execute demolition (paved lots and streets for ease of access, retaining walls, fences, exterior fire system components),
- Demolition of outbuildings and site features closest to the Building 771 and 774 footprints,
- Demolition of remaining outbuildings and site features,
- Demolition of structures and appurtenances specific to Building 771 and 774 but independent of the main production floor space of Building 771 (e.g. Building 771 office spaces and maintenance shop) and soil removal around Building 771,
- Demolition of the main Building 774 building structure,
- Demolition of the main Building 771 building structure after using Building 771 as the containment for UBC remediation,
- Site cleanup, and
- Demobilization.

The demolition sequence is based on technical requirements. However, starting the demolition process on the smaller outbuildings will ensure that the process is refined before the more complicated structures are initiated.

4.7.1.2 Mobilization

The demolition execution will begin with the mobilization of the demolition contractor followed by site preparation. A central contractor's area will be established in an existing improved area, such as the paved area along the north side of Building 771 and Building 774. The decommissioning contractor may mobilize the following items: office trailers, shower/change facilities, lunchroom, portable toilets, hand wash units, and tool/equipment storage. A security fence will be established for access control purposes only.

4.7.1.3 Site Preparation

As part of site preparation, existing features associated with site utility systems will be located and marked. These systems will be evaluated for isolation purposes. The sanitary sewer system will need to be isolated to preventing inflow of inappropriate wastewater generated by demolition dust control activities. Electrical and communication needs within the 771 Closure Project area will be dynamic, but it is likely that power fed from the main distribution point at the south side of the Building 771 will be terminated to allow for the removal of site features in the area.

Critical power requirements will be identified as a part of the design process. Maintaining sump and foundation pumps for control of groundwater, power to sanitary sewer lift stations, and some area lighting will be necessary.

Protective barriers or fences will be erected around permanent site features designated to remain after completion of demolition and site restoration. Electrical distribution switchgear, overhead distribution lines, and area lighting to remain operational during and/or after the demolition will be protected as required and flagged for added operator awareness and overall visibility.

Run-on and run-off control features will be erected or implemented. Installation of temporary diversion berms, erosion control silt fencing, and interceptor ditches, as well as the clean out of existing drainage culverts and ditches will be accomplished as required to divert significant overland flow away from the demolition area.

Traffic patterns and specific-loading areas for waste management will be established, as will temporary stockpile areas for debris. For any backfill material that appears likely to be in temporary storage for a long period, a more permanent area will be created that will encompass additional erosion or run-on/run-off controls as necessary. The location of any long-term backfill stockpile area will be coordinated with ER. Finally, any known contaminated surficial soils in the areas immediately adjacent to planned demolition activities will be delineated and controlled by ER.

4.7.1.4 Removal of Site Features

Initial demolition tasks will involve stripping remnant equipment, stacks, and other materials from rooftops. The removal of overhead obstructions will reduce the possibility of equipment encountering energized electrical lines, and will allow access for operating cranes and long reach tracked excavators. The removal of remnant equipment is required early in the process in order to free up the roof system for dismantling/removal of suspected asbestos containing material in the roof membrane.

4.7.1.5 Demolition of Outbuildings

The majority of the outbuildings in the 771 Closure Project are small, light, steel-framed structures with corrugated metal siding, and were placed on cast-in-place concrete slabs. These structures will be shredded and sized on their respective concrete slabs with the tracked excavator using a detachable hydraulic shear. Metal materials will be shipped off site for recycling, with any non-recyclable items being direct loaded into containers for off site disposal. Dependant upon identification or investigation of environmental media concerns, the concrete slab/foundation associated with the building will be broken up using a vibratory hammer attachment to the excavator, with the rubble being designated as suitable for onsite backfill. The remaining outbuildings are temporary trailers, and will be dispositioned as property. Additional information obtained from in-process characterization, ER characterization, and other data obtained during the work will also be used to determine the appropriate techniques for slab removal and excavation.

Demolition activities will be initiated with the features closest to the Buildings 771 and 774 footprints to free up these areas for support and preparatory activities. For example, the remnant building shell and foundation associated with Building 715 and Building 716 will need to be removed to clear the area for the removal of soil from the buried south wall of Building 771. Removal of remnant underground storage tanks (USTs) in this area is necessary for the same reason. It is assumed that five USTs remain in the area to the south of Building 771. Two former diesel/fuel oil USTs appear to have been abandoned in place using foaming techniques. Three other USTs are suspected beneath the concrete slab of Building 716. These tanks will be removed before removing the soil from behind the south wall of Building 771.

4.7.1.6 Demolition of Structures and Appurtenances Specific to Building 771 and Building 774

The next area to address in the demolition process will be those structures and appurtenances specific to Building 771 and Building 774, but independent of the main production floor space of Building 771. The objective is to remove structures, which do not allow unrestricted access to the main building structure. These structures include, but are not limited to: Building 771A and B office spaces, T771C, Building 771C annex, West Dock, Maintenance Shop and Deluge Tank Annex; and Building 774 East Dock, hatch cover, Rooms 206-208, 212, and 250-251. Removal of these features allows access to the elevated portions of the respective buildings, as well as provides loading platforms for loading waste containers and debris hauling trucks. For Building 771, this action exposes the main structure, as defined by the

three buried cast-in-place concrete walls on the south, east and west sides, and the cast-in-place concrete firewall between the office spaces on the north side of the main Building 771 footprint and the main operations area.

At the same time, the demolition contractor will be moving soil away from the east, west, and south walls of Building 771 down to an elevation approximately coincident with the second floor framing/slab. Removal of this soil will relieve passive earth loading pressure from the top one-half of the wall, and will allow for the removal of the roof framing system. The concrete walls making up the main structure of the building were not designed or constructed as retaining walls; demolition will leave as much of these concrete walls in place, as possible. The objective of the soil removal and demolition is to leave the area in a safe configuration until the site is backfilled during site restoration. The maximum amount of wall to be left in place would correspond to a line 3 feet below the anticipated final grade of the hillside. Demolition of the eight-foot retaining wall south of the 771C Annex will be accomplished at this time to facilitate soil removal from the Building 771 east wall.

As soil is removed from the south, east and west sides of Building 771, it will be transported to a temporary stockpile area adjacent to the demolition project (assumed within one-mile round trip for estimating purposes). The anticipated configuration of the excavation behind the buried walls is a 15-foot horizontal working surface immediately behind the wall with the excavation sloping up to the nearest undisturbed grade at a slope of 1.5 feet horizontal to 1 foot vertical. Engineering calculations will be made to validate the above described scenario of exposed unsupported wall lengths based on the remaining passive soil loading, active loading from machinery operating in the vicinity of the wall, revised wind loading, and interior structural framing to remain abandoned-in-place.

4.7.1.7 Removal of the Main Building 774 Structure

The demolition approach for the Building 774 footprint will follow the same overall approach of working off of the existing first-floor slab elevation and collapsing demolition materials and debris into, and onto, this surface for segregation, sizing, and direct loading into containers and trucks positioned along the existing north side paved loading area. In addition, the Room 322 Storage Shed and Building 774, Door No. 12 concrete areas will be used to take advantage of working off of the stable grade adjacent to the exterior of these walls.

4.7.1.8 Demolition of the main Building 771 Structure

The demolition of Building 771 will be initiated with the removal of the slab, as required for ER access. After the UBC has been remediated, the remaining demolition will be completed. Once the office and loading areas have been removed to the elevation of the existing finished floor, and engineered soil removals have been accomplished to relieve passive soil loading conditions; an opening will be advanced into the main Building 771 structure from the north wall, moving south onto the finished floor slab of the first floor. The building structure will be demolished using tracked excavators, working off the first floor slab, equipped with detachable hydraulic shears and using the remnant slab of the office area as a staging area and loading areas. The concrete wall will be removed to a point a minimum of 3 feet below the proposed grade. This will be accomplished using the tracked excavator, working along the indicated projection of the final grade (minus 3 feet) using the demolition hammer to “score” the line, followed by a combination of shears and hammer to remove the loosened concrete wall above the line. This action would likely be accomplished from the exterior of the foundation wall with the concrete failed either into or out of building to be further sized and segregated from reinforcing steel as appropriate for disposition as on site clean fill.

As materials are generated from the demolition process, they will be evaluated and segregated on the basis of ultimate disposal pathway, sized according to predetermined disposition acceptance criteria, and placed into containers or transport trucks for shipping to the appropriate disposition location or destination. Empty disposal containers and haulage trucks will be staged along the north side of this

loading dock, with demolition debris loaded directly for transport. Piles of segregated materials may remain staged on the dock until an appropriate amount has been generated and an appropriate container can be delivered.

The interim goal of the demolition effort will be to leave a three-sided "handball court" configuration for the Building 771 foundation area. Leaving the first two bays of structural concrete framing between the first and second floors, as well as the associated second floor slab, will provide support for the three walls of the "handball court", leaving the area safe for worker access. This will likely be the final configuration of the foundation for Building 771, before ER commencing final site restoration. Figures 4 and 5 provide an aerial view of this concept.

Site restoration activities will be conducted after a no further accelerated action has been obtained for the under building contamination. Backfill operations may be conducted by decommissioning or environmental restoration and details on the activity will be contained in work packages. The requirements for the backfill activity will be based on the groundwater modeling and land configuration to provide a relatively stable surface suitable for a wildlife refuge. Backfill operations may involve soil, recycled concrete and/or flowable fill. Sections 4.7.3 and 5.5 contain additional details on the potential backfilling methods.

4.7.2 Demolition of the Stack

The current demolition planning indicates that the stack structure will be demolished using explosives. The inclusion of the use of explosives on the 771 stack assumes that the stack will meet the unrestricted criteria. If it does not meet the unrestricted release criteria and cannot be decontaminated to meet the unrestricted release criteria, then a modification to the DOP or separate RFCA decision document will need to be prepared to address the decommissioning of the stack. During installation of the exhaust monitoring ports, when core samples were removed, it was observed that the concrete core would not hold its shape. It was concluded that the concrete might no longer exhibit adequate design strength. This loss of design strength could prohibit the successful demolition of the stack using mechanical methods and scaffolding. This use of explosives is essential because it avoids having to perform dangerous manual labor tasks at extreme height on a scaffolding system with questionable integrity. In accordance with the ***RSOP for Facility Disposition***, a Demolition Plan will be prepared that detail how the explosives will be used to demolish the stack. A schedule will be established with the stakeholders to discuss the Demolition Plan with particular focus on the use of explosives.

Concerns about contractor experience, security and safeguards, and the consequences of a misdirected fall of the stack will be studied and addressed by choosing personnel with demonstrated experience; following the requirements of site safety and environmental programs; communication with regulators and stakeholders during planning; rehearsals; and engineering the amount and placement of explosives.

Two methods are possible under the explosives alternative: exploding a wedge out of the stack base and allowing the stack to lay over in a controlled fashion into a prepared area, and imploding the stack so that it collapses into it's base. The demolition of the stack will be developed around the layover method, allowing the stack to fall due east toward Pond 207C, into a prepared trench. As described in the *Historic American Engineering Record No. CO-83-N* (e^2M, 1997), the stack is estimated to extend 150 feet above the average adjacent grade. There is approximately 210 feet from the east side of the stack to the western edge of the Pond 207C berm, and this is adequate distance to prepare the layover area without having to breach the pond basin, and allow for an adequate margin for safety. To minimize impacts to personnel working in the local area, it is anticipated that this stack is one of the last features of the 771 Closure Project to be demolished.

The first step in site preparation for the 771 stack will be to remove the propane above ground storage tank (AST) and concrete support saddles from depression due west of the former 207C Pond. Once the

tank has been removed, and on approval to excavate soil in the stack area, the Building 771 demolition subcontractor will prepare the layover area. This will involve a combined trench/soil berm feature that follows existing grade, and takes advantage of the existing depression east of the stack occupied by an AST. A typical cross section of this feature would indicate a trench excavated an estimated five feet deep and 15 feet wide, with an associated 10-foot berm on either side of the trench. Any extra soil needed to construct this feature would be obtained from soil removed to expose the subgrade portion of the stack base, augmented with soil removed to facilitate the safe demolition of subgrade features of Building 771 and Building 774 structures. Appropriate sloping of the sides of the berm will be considered in order to comply with RFETS excavation safety requirements. This berm will be constructed of loose lifts of soil material, with no formal compaction effort planned. The base of the trench will be prepared by placing two feet of uncompacted soil along the impact zone to dissipate energy. The impact zone may be lined with a cover of wetted geotextile fabric to control dust; in addition to water spray during and after detonation.

Once the explosives are placed, and additional preparatory tasks have been completed, an appropriate area of the plant will be evacuated, and the explosion will be initiated. Detonation would remove the two legs and effect a notch, with the presence of the notch combining with the stack weight to create a downward displacement. The stack structure will fall into the prepared trench. After the explosives expert has verified that no unexploded charges are present, the evacuation area will be released, and the demolition subcontractor will initiate sizing and segregation of concrete debris such that the debris can be loaded out for haulage to the PA concrete stockpiling location at the 207C Pond area. Reinforcing steel will be placed aside at the demolition site for subsequent disposition as recyclable material. A tracked excavator equipped with a vibratory hammer or hydraulic shear will demolish remaining stack base concrete down to a point a minimum of three feet below grade. Concrete debris will be removed from the portion of the stack base that will remain.

Once concrete debris has been removed from the area, the demolition subcontractor will remove the berm feature, and re-grade the site at the direction of ER. This regrading effort will only focus on leaving the site in a safe and environmentally compliant configuration. ER activities may still be required and executed in these areas. The demolition subcontractor as directed by ER will place erosion and run-on/run-off control features.

The inclusion of the use of explosives in the DOP is the first step in evaluating the use of explosives on the 771 stack. The ***RSOP for Facility Disposition*** indicates that the Site must notify the LRA and stakeholders that explosives may be used as soon as it is proposed in the planning process. The DOP accomplishes that notification and provides the initial details on why explosives are proposed as the demolition method. Additional information on the explosives and particular methodology will be developed as the characterization information is completed and planning continues. A number of options for demolition and controls are being considered and will be discussed at the ER/D&D status meetings, as it is available. The process to meet the unrestricted release criteria is as follows:

- **Reconnaissance Level Characterization (RLC) Project** personnel are currently conducting the RLC for the stack. As characterization information is obtained, additional measurements and samples will be taken. The location, depth, and type of contamination found will determine the location and number of measurements and samples. If it is necessary to take measurements at higher elevations in the stack, samples could be taken using scaffolding, cranes using man-cages, and/or in-situ measurement devices.
- **Decontamination** Areas identified that exceed the unrestricted release criteria will require decontamination. The decontamination method will be consistent with those described in the RSOP for Component Removal, Size Reduction and Decontamination Activities. If the lower areas of the stack are contaminated, standard mechanical techniques can be used (i.e. scabbling, hydrolasing, etc.). If contamination exists at higher elevations, other techniques could be used

such as wall crawlers (uses scabbling, shot blast and water), structural scarifying machines, and/or the "hot spot" could be removed. Once decontamination is completed, the Pre-Demolition Survey (PDS) will be performed.

- **PDS** The extent of the PDS will be determined by the amount of contamination found. The techniques to perform the PDS will be similar to those described above in the RLC. Details on the PDS can be found in Section 4.6 of this document. Once the PDS is complete, a report will be written, which will include this data. DOE and the LRA will review and approve the data to ensure the stack meets the unrestricted release criteria.

4.7.3 Demolition of the Tunnels

The exhaust tunnel connecting Building 771 and the stack will be abandoned in place after an assessment has been completed to determine the depth of the tunnel, based on final grade; potential groundwater impacts; and the timeframe and consequences if the tunnel were to collapse. Based on these evaluations, no action may be required for the tunnel; holes may be required in the base of the tunnel for drainage; and/or the interior void space could be filled with flowable backfill - soil/Portland cement mix suitable of achieving compressive strength of approximately 50 psi (historically used at the RFETS to backfill underground electrical duct bank installations).

This will be performed as a decommissioning task in order to guarantee that interrelated tasks associated with the removal of Building 771 structure or the exhaust stack are not impeded or delayed. The soil under and around the tunnels will be characterized in accordance with the IASAP or an ER sampling and analysis plan, and the characterization will be integrated into the schedule for decommissioning the facility. If remediation is required, it will be conducted before dispositioning the tunnels and demolishing and backfilling the building. The tunnels between Building 771 and Building 776 and Building 771 and Building 774 will be abandoned using the same method described above.

If the tunnel(s) will negatively impact groundwater, or depth to the top of the tunnel(s) changes due to final contours, backfill, and/or covers, or contamination requiring remediation is found below the tunnel(s); then the tunnel(s) will be removed. If the groundwater modeling, land configuration, and/or ER characterization results change the tunnel disposition from that indicated in the DOP; then the consultative process will be used to determine the appropriate disposition method.

4.7.4 Project Cleanup, Demobilization, and Post-Demolition

The final task to be completed by the decommissioning contractor is to perform any backfill and compaction necessary to render the site safe for personnel involved in follow-on site closure actions. These backfilling operations would be limited to filling basement level openings, and providing fill material against walls to be abandoned in place to ensure they are fully stabilized. Final site backfill, re-grading, and site restoration will be conducted during the final Site remediation/restoration. The decommissioning contractor shall also be required to install final, or stabilize existing, temporary run-on/run-off controls or erosion controls. The decommissioning contractor shall then clean up the site for trash and miscellaneous debris, and demobilize.

Based on groundwater modeling and land configuration, methods may be necessary to direct the groundwater. The decommissioning project will install these groundwater management systems before demobilization and during backfill operations if the systems are not related to groundwater remediation activities, but are to maintain the stability of the area over time. It is anticipated that the groundwater control measures could include french drains, erosion control matting, and/or groundwater flow through areas punched through the Building 771/774 superstructure.

Demolition will remove the building structures to at least 3 feet below expected final grade. Concrete between 3 and 6 feet below the surface will meet the decontamination requirements for unrestricted release. The remaining portions of the building deeper than 6 feet below the surface will have some plutonium and americium contamination not exceeding 7 nCi/g in some portions of the concrete. These remaining portions of the building will be from 6 to 30 feet (not sure of deepest depths) below the final surface grade.

The backfill of the remaining building and soil covering will be compacted, graded and seeded to produce surface vegetation that will be designed for surface stability of the final slope. Based upon the completion of groundwater modeling, groundwater controls, such as the installation of a French drain to complement the footer drains, will be installed to minimize the possibility of groundwater flow over the remaining portions of the basement slab and formation of seeps that could lead to erosion of the backfill and graded soils covering the slab. The goal of groundwater controls is to minimize the possibility of erosion causing any of the remaining portions of the building to become uncovered, i.e., to maintain the 3-foot soil depth.

It is expected that the groundwater controls will be installed during the conduct of other accelerated actions that will be taken to address soil and groundwater contamination at IHSS's in proximity to the remaining portions of the buildings. In particular, it is expected that actions taken to clean up soils in IHSS 118.1, the carbon tetrachloride spill, will significantly reduce a major source contributing to groundwater contamination in this area. Other actions as necessary to protect surface water quality from contaminated groundwater will also be taken. It is expected that these actions will also address control of groundwater flow direction consistent with the erosion control goals for the remaining concrete.

Near-term recommendations upon completion of the actions in this area include the following:

- Excavation at and in proximity to the site will continue to be controlled through the Site Soil Disturbance Permit process;
- The planning for and conduct of accelerated actions in proximity to this area will consider and employ appropriate erosion controls during the conduct of these actions;
- Drilling for and/or pumping of groundwater (except for sampling, removal of groundwater infiltration from excavations and characterization purposes) will be prohibited;
- During the vegetation period, appropriate surface water run off controls will be taken to prevent surface erosion;
- Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences;
- Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas; and
- These controls will remain in place pending implementation of long-term controls.

These near term recommendations will be reevaluated in subsequent close out reports for all actions taken in this area.

Based on remaining environmental conditions after the final grading and successful vegetation of the area, no specific long-term stewardship activities are recommended beyond the generally applicable Site requirements that may be imposed on this area in the future, which are dependent upon the final remedy selected. Institutional controls that will be used as appropriate for this area include the following:

- Prohibitions on construction of buildings in the IA;
- Restrictions on excavation or other soil disturbance; and
- Prohibitions on groundwater pumping in the area.

No specific engineered controls are recommended. Periodic walkdown inspections of the area for indications of erosion or seeps and slope stability conditions will be conducted. No specific environmental monitoring is recommended as a result of the remaining concrete in the subsurface; however, the IMP process will be used for future evaluation and monitoring if needed. No specific physical controls, such as fences are recommended. This area will be evaluated as part of the Comprehensive Risk Assessment, which is part of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) and Corrective Measures Study/Feasibility Study (CMS/FS) that will be conducted for the Site. The need for and extent of any, more general, long-term stewardship activities will also be analyzed in RFI/RI and CMS/FS and will be proposed as part of the preferred alternative in the Proposed Plan for the Site. Institutional controls and other long-term stewardship requirements for Rocky Flats will ultimately be contained in the Corrective Action Decision/Record of Decision and as further described in RFCA Attachment 5, Section 1.2.

5 WASTE MANAGEMENT

Various waste types will be generated as a result of decommissioning activities within the 771 Closure Project. Waste estimates for these and other RFETS Closure Project activities are reported in the "Waste Generation, Inventory, and Shipping Forecast," which includes projections for waste volumes to be generated, stored and shipped from the Site in each fiscal year. As the Project progresses, waste volume estimates will be refined and updated on a quarterly basis, or more frequently if warranted by significant changes. This section of the DOP describes how the various wastes will be managed for facility decommissioning.

5.1 Waste Types

A variety of regulated wastes and recyclable materials are currently managed and stored in Building 771, and additional waste will be generated during decommissioning. Table 6 provides an estimate of the types and volumes of remediation waste and recyclable materials that will be generated during decommissioning. The waste types for component removal, size reduction and decontamination activities are addressed in the ***RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities***. The waste types for demolition activities are addressed in the ***RSOP for Facility Disposition***.

Table 6. Waste/Recyclable Material Estimates

Category*	Sub-Category	Volume	Proposed Destination
Rad-Regulated			
Transuranic (TRU)	TRU	1,860 m^3	Waste Isolation Pilot Plan (WIPP)
	TRU Mixed (TRM)	350 m^3	WIPP
	TRU/TRM Liquids	0.01 m^3	N/A
Low-Level (LLW)	LLW – Including Asbestos	4,110 m^3	NTS, Envirocare
	LLW – Structural Debris	2,790 m^3	NTS, Envirocare, GTS Duratek
	LLW – Surface Contaminated Objects (SCO)	10,600 m^3	NTS, Envirocare, GTS Duratek
	LLW – PCBs	1.8 m^3	Approved TSD
Low-Level Mixed (LLMW)	LLMW - RCRA solids	2.0 m^3	Approved TSD
	LLMW - RCRA liquids	2.9 m^3	Approved TSD**
Non-Rad Regulated			
Hazardous/Toxic	RCRA Solids	6 m^3	Approved TSD
	PCBs	1 m^3	Approved TSD
Sanitary	Non-Routine Sanitary	2,200 tons	Sanitary Landfill
	Friable Asbestos	880 tons	Approved TSD
	Non-Friable Asbestos	900 tons	Sanitary Landfill
Material for Recycle	Rubble/Structural Construction Debris	8,100 tons	Recycled On Site

* Waste volume estimates include demolished structures.
** Assumed to include on-Site treatment facilities.

5.2 Management Requirements for Remediation Waste

Hazardous and mixed wastes designated as "remediation" waste will be managed in accordance with the referenced RSOPs and with the remediation waste management requirements described in Building 771

Operations Order OO-771-231, which may be modified as appropriate. Hazardous and mixed waste not designated as remediation waste will be managed in accordance with the Colorado Hazardous Waste Act.

5.2.1 Remediation Treatment Units

Drum crushing activities will be conducted in Building 771. The unit, expected to operate through 2002, will crush both radioactively contaminated and non-contaminated drums. Approximately 70-100 radioactively contaminated drums may be lead-lined. Drum crushing activities will be conducted in accordance with procedure PRO-608-D&D-011, Size Reduction in Building 771/774. Per this procedure, lead-lined drums must be free of liquids before crushing. Drum crushing activities are not planned for beryllium contaminated drums. In the event crushing of lead-lined beryllium contaminated drums is necessary, the Job Hazards Analysis (JHA) and procedure will be revised accordingly. Crushed lead-lined drums will be managed as LLM or TRM remediation waste. The drum crusher is a self-contained unit designed to mitigate airborne releases. Lead trained workers will be using the appropriate personal protective equipment/clothing as dictated by the JHA. A unit specific information sheet is posted on the entrance of the area containing the unit. The unit will be inspected daily during lead-lined drum crushing operations and weekly when remediation waste is located in the area in accordance with Operation Order 00-771-231.

5.3 Management Requirements for Compliance Order Wastes

The Site's inventories of waste chemicals, idle equipment containing hazardous materials, and mixed residues contained in tank systems are governed by the terms and conditions of compliance orders on consent. All idle equipment has been removed from the building. In accordance with paragraph 66, the Mixed Residue Compliance Order on Consent has been terminated in Building 771.

5.4 Waste Disposal

Wastes generated as a result of facility decommissioning activities will be remediation waste and packaged and characterized in compliance with RFETS waste management procedures, which implement disposal site WAC and U.S. Department of Transportation (DOT) packaging requirements. Disposal locations will be selected by the contractor based on the properties of the particular waste stream.

5.5 Waste Minimization and Recycling

Waste minimization and recycling will be integrated into the planning and management of the remediation waste generated during decommissioning. Unnecessary waste generation will be controlled using work techniques that prevent the contamination of areas and equipment; preventing unnecessary packaging, tools, and equipment from entering radiological contaminated areas; and reusing contaminated tools and equipment when practical.

Standard decontamination operations and processes will be evaluated for waste minimization potential and suitable minimization techniques will be implemented. Property with radiological contamination or property containing hazardous materials may be reused or recycled on Site, off Site by other DOE facilities, or by publicly or privately owned facilities having proper authorization to take possession of the property.

Recycling options that may be considered for materials generated during decommissioning are listed in Table 7. Materials will be recycled based on availability of appropriate recycle technologies, availability of approved facilities, and cost effectiveness.

Table 7. Material Recycling Options

Material	Recycle Option	Comments
"Clean" scrap metal (not radioactively contaminated and not considered hazardous in accordance with RCRA)	Recycle through approved scrap metal vendors via contract.	Material must meet receiving facility's WAC and license requirements, if any.
Radioactively contaminated scrap metal	Recycle by means of metal melt process vendors.	Material must meet the receiving facility's WAC and license requirements, if any.
Radioactive mixed scrap material (i.e., radioactively contaminated scrap metal mixed with hazardous constituents)	261.6, recycle exemption	Currently trying to locate and approve facilities that can manage this type of material.
Non-radioactive scrap metal contaminated with beryllium	Decontaminate and recycle through approved commercial facility.	Decontamination must meet the release criteria prescribed by 10 CFR 850.
Clean building rubble	Reuse on Site as backfill.	Must meet release criteria established in the ***RSOP for Recycling Concrete***.
Clean wiring and other electrical components.	Recycle through approved commercial recycling facility.	Material must meet the receiving facility's WAC and license.
Clean bulk plastics and glass	Recycle through approved commercial recycling facility.	Material must meet the receiving facility's WAC and license.
Used lead acid batteries	Recycle through approved commercial recycling facility.	Material must meet receiving facility's WAC and license requirements, if any.
Used oil	Recycle through approved commercial fuel blending facility.	Material must meet receiving facility's WAC and license requirements, if any.

An estimated 8,000 m^3 of structural rubble (i.e., concrete) and 97 m^3 of structural steel will be generated during decommissioning. Concrete that meets the unrestricted-release criteria prescribed by the ***RSOP for Recycling Concrete*** will be recycled as fill material to contour the land when decommissioning activities are completed. Concrete not meeting the unrestricted-release criteria will be disposed of at an appropriate disposal facility.

The recycled concrete will not be transported and stockpiled as indicated in the ***RSOP for Recycling Concrete***. Instead, it will be verified that there is minimal reinforcing steel in the debris and the debris will be placed into depressions as backfill material. The debris will generally have two flat surfaces, and will not exceed twelve inches in thickness. Layering the backfill would mean that a uniform layer of concrete debris would be placed in a thickness not to exceed two feet. Then a layer of soil or crushed concrete would be placed on top of the concrete, followed by a formal compaction effort to facilitate moving the concrete debris into a stable configuration, as well as forcing soil into void spaces between adjacent pieces of concrete. This layering would then continue to a point 3 feet below the anticipated final grade, with the final 3-foot lift of backfill being entirely soil.

Implementing this approach could significantly decrease cost by eliminating the steps involved with loading and transporting debris to the PA stockpiling area, size reduction at that location, and loading and transportation back to a fill site.

In accordance with user guidelines from the US Department of Transportation and Bureau of Reclamation, a method specification is the typical standard for placement criteria for embankments and fills using coarser materials. A method specification is a standard placement process that results in a relatively uniform fill. With respect to the recycled concrete, the method specification will consist of placing the layers as indicated above, and compacting the layers with two to five passes of tracked equipment no less than 20,000 pounds and exerting a foot pressure not less than 6½ pounds per square inch. Water will be applied throughout the placement and compacting process to minimize dust and facilitate compaction. The criteria for the placement activity will be no visual deflection of the fill during the equipment pass.

6 CLOSURE OF RCRA-REGULATED UNITS

The information contained in this section supercedes the RCRA closure requirements in the RCRA permit and Interim Status Closure Plan. Approval of this DOP serves as the RCRA permit modification. RCRA-regulated units located within the 771 Closure Project are listed in Table 8. These units will be closed in accordance with the closure performance standards described in this section. Closure performance standards are presented in this section for the 11 container storage units (Buildings 771 and 774), 2 gloveboxes (Building 774 only), 148 tanks (Buildings 771 and 774) and 3 treatment units (Building 774). Closure information for the incinerator located in Building 771 will be submitted in a separate closure description document (CDD) or as a minor modification to the DOP. RCRA-regulated units will be closed before building demolition.

6.1 Closure Options

Closure may be conducted in two stages: first by rendering a unit or portion of a unit "RCRA stable"[32] (if it is a permitted or interim status unit) or "physically empty" (if it is a mixed residue unit), then by completing the activities associated with the closure options described below.

6.1.1 Clean Closure

RCRA-regulated units may be "clean closed" by documenting the absence of contamination or by decontaminating the unit.

6.1.1.1 Historical Knowledge Confirmation

For units having a complete, detailed operating history, clean closure will be demonstrated when the following criteria are met:

- A review of the RCRA Operating Record indicates hazardous or mixed waste was never spilled in the unit, or complete documentation exists to demonstrate releases were adequately cleaned up (i.e., if a spill did occur, visible residual liquids and solid wastes were removed and the spill area was decontaminated). This justification requires LRA concurrence.
- A visual inspection of the unit and associated ancillary equipment notes the absence of hazardous or mixed waste stains and/or residuals.

6.1.1.2 Decontamination

Units to be "clean closed" by decontamination will typically be washed and rinsed, scabbled, or hydroblasted in accordance with the methods and controls specified in the ***RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities***.

[32] "RCRA Stable" is the first step toward closure of permitted or interim status units, whereby wastes are removed from the unit and the possibility of future waste input is eliminated. For tank systems, this means a tank and its ancillary equipment have been drained to the maximum extent possible using readily available means, with the objective of achieving less than one percent by volume holdup, no significant sludge remaining and no significant risk associated with the remaining residuals. Physical means, such as lock out/tag out or blank flanges, must then be used to ensure no waste is introduced to the system is defined in Part X.E of the RFETS RCRA Part B Permit and Closure Plan for Interim Status Units.

Table 8. RCRA-Regulated Units in the 771/774 Closure Project

Unit #	Room #	SET/ AREA #	Regulatory Status[33]	EPA Waste Codes (from WEMS)
771.1	172	AE	Permitted	See RFETS RCRA Permit
771.1	181A	AF	Permitted	See RFETS RCRA Permit
771.1	182	AE	Permitted	See RFETS RCRA Permit
771.1	183	AE	Permitted	See RFETS RCRA Permit
771.1	184	AE	Permitted	See RFETS RCRA Permit
771.1	186	AE	Permitted	See RFETS RCRA Permit
771.1	188	AE	Permitted	See RFETS RCRA Permit
771.1	Annex	AB	Permitted	See RFETS RCRA Permit
774.1	241	AF	Permitted	See RFETS RCRA Permit
Tank #	**Unit #**	**SET/ AREA #**	**Regulatory Status[34]**	**EPA Waste Codes (from WEMS)**
T-40 (old)	55.13		RCRA Stable	D001, D002, D004-D011, D018, D019, D028, D029, D035, D038, D040, D043, F001-F003, F005, F007-F009

[33] Regulatory status indicates the status of the unit at the time of the DOP approval

[34] Regulatory status indicates the status of the unit at the time of the DOP approval

For units to be washed, a suitable decontamination solution will be used to remove visible waste residuals and contaminants. Following decontamination, the unit will be rinsed with clean water. The final rinsate will be tested to determine whether:

- The pH of the rinsate is between 6 and 9; and
- The concentrations of priority pollutants (identified as having been managed in the unit) and heavy metals are below the action levels for groundwater, as defined in Attachment 5 of RFCA. Rinsate meeting the groundwater action levels for listed waste constituents associated with the unit and the LDR standards for characteristic waste will be deemed to be "no longer contained in" and will be managed as non-hazardous waste.

The final rinsate will not exceed a volume of two gallons per 100 ft^2 of surface area rinsed, and for internal surfaces, such as tank systems, the final rinsate will not exceed a volume of 5% of the capacity of the system. If test results indicate the standard has been met, the unit will be considered "clean closed." Units that cannot be decontaminated to meet the performance standard will be removed before building demolition and managed as hazardous or mixed waste.

Scabbling or hydroblasting may be utilized to decontaminate contaminated surfaces. Following decontamination, surfaces must meet the following criteria:

- A visual inspection of the unit and associated ancillary equipment confirms the absence of hazardous or mixed waste stains and/or residuals; and
- Radiological surveys verify surfaces are at or below the release criteria for removable contamination identified in the ***RSOP for Facility Disposition***.

Other more aggressive decontamination techniques may be utilized as necessary. Other techniques include grit blasting, high-pressure steam cleaning, scarifying, grinding and "shot" blasting.

Areas that do not meet the visual inspection criteria will be removed as hazardous or mixed debris. Areas that do not meet the unrestricted release criteria will be disposed of as non-hazardous radioactive waste.

6.1.2 Unit Removal in Conjunction with "Debris Rule" Treatment

Alternatively, RCRA-regulated units may be closed by removal and treated in accordance with the "debris rule." The debris rule applies to unit equipment or structures that have no intended use or reuse, and are slated for removal and discard. To meet the "debris rule" standard, decontamination or use of alternative treatment options will be conducted using the "abrasive blasting" physical extraction technology, or other appropriate technology identified in Part 268.45 of 6 CCR 1007-3 (Table 1, Alternative Treatment Standards for Hazardous Debris). Application of a "debris rule" technology may occur before unit removal provided the tank has no future use. If, after treatment, the equipment or structure meets the standard for a clean debris surface, it will be managed as a solid waste. In the event the standard is not met, the equipment or structure will be removed and managed as hazardous or mixed waste. Treatment residuals generated from extraction and/or destruction technologies used in the closure of RCRA-regulated units (including rinsate) will be characterized in compliance with 6 CCR 1007-3, Part 262.11 and managed accordingly.

6.1.3 Unit Removal without On-Site Treatment

RCRA units that are not decontaminated to meet the "clean closure by decontamination" standard will be removed, size-reduced (if necessary), and packaged to meet the waste acceptance criteria (WAC) of the approved disposal facility. In the event the waste cannot be shipped directly to a disposal facility, it will be stored in compliance with the remediation waste management requirements identified in Operations Order 00-771-231, as may be modified.

6.1.4 Partial Closure

As tank systems are removed, piping may be inaccessible. Inaccessible piping is typically encountered above ground in areas where ventilation and/or other piping has yet to be removed, or piping is embedded in the slab. Once the piping has been tapped and drained (e.g., vented, purged and drained), the piping will be labeled in accordance with Operations Order 00-771-236. Operations Order 00-771-236 requires piping left-in-place to have the following information displayed on the pipe or the outermost portion of the containment, at each end:

- Labels identifying the pipe as abandoned pipe;
- Identification of potentially hazardous material (previously managed in the abandoned piping); and
- Location of other pertinent information (i.e., work packages)

On a quarterly basis, personnel will inspect the "abandoned piping" to verify labeling requirements are in place. Inaccessible above ground piping will be removed before demolition, typically as part of a Dismantlement Set or Decommissioning Area.

Portions of the slab will be removed before demolition based on the contamination levels. Slab removed with embedded piping that had previously stored only characteristic hazardous waste will be managed as non-hazardous waste. Slab removed with embedded piping previously storing listed hazardous waste will be managed as hazardous waste unless the piping is segregated or appropriately treated before disposal.

The ultimate disposition of piping embedded in the remaining slab, as well as piping located beneath the slab, will occur during ER activities. Therefore, final RCRA closure of the remaining piping will be completed in accordance with the ER RSOP or other ER decision document. In order to facilitate final disposition, pertinent characterization information will be transferred to the ER program and recorded in the administrative record. The administrative record will describe the location of any remaining piping, applicable characterization information (process knowledge and sampling results), as well as any other information that will aid the ER personnel in appropriately dispositioning the piping.

6.2 Unit Removal Methods

Most RCRA-regulated units will be closed by removal. The following paragraphs provide an overview of the removal methodologies for gloveboxes and tank systems.

6.2.1 General Methodology for RCRA-Regulated Tank Disassembly

The information included in this section is intended to supercede the phase II requirements in the approved CDDs for the 35 RCRA-regulated tank systems located in Building 771. This section includes tank system removal methodology, including piping strip-out, for Building 774 tank systems.

6.2.1.1 Piping Removal

Before starting pipe removal activities, the systems will be vented, purged, drained and then drained again by tapping into low points, as required, until no additional liquid can be removed. The system should then be free of liquids. However, residual liquids may be encountered during piping removal. The removal method employed will include provisions to contain residual liquids and/or sludges, which may contain radioactive contamination. Any resulting liquids or sludges will be characterized and treated for final disposal per the applicable WAC.

If a blockage is encountered that cannot be cleared readily during the tap and drain process, additional taps will be installed to minimize the length of the blocked section. Blocked sections will be removed

with provisions to contain trapped liquids that may be present. These sections will be size reduced in a manner that accommodates the possibility that trapped liquids may be released to containment. A drainage path will be established through any remaining blockages to ensure that liquid can be drained from the section. If significant blockages are encountered during tap and drain activities, piping removal may be conducted in conjunction with those activities to address the blockages.

Piping removal, size reduction and packaging activities are considered to be dynamic processes, in which improvements in technology will be implemented as a result of newly available methods or lessons learned from prior piping removal operations. The piping removal steps described below may be modified in response to actual operating conditions. Possible modifications include pipe section separation method, containment type for pipe removal, vacuum method, and containment for size reduction. In most cases, piping will be removed in the following manner:

- A glovebag or plastic sleeving will be installed around the section of piping to be removed.
- Vacuum will be applied at one or both ends of a pipe section, and removal will proceed toward a vacuum source.
- At a termination point (TP), the flange will be disconnected or the pipe cut and the remaining pipe stub will be contained by two layers of plastic.
- The pipe sections will be separated by the best available method (e.g., disconnecting at the flanged joint, four-wheel cutter, pipe-crimping tool).
- After the pipe section ends are separated from the rest of the pipeline, the ends of the glovebag/sleeving will be twisted into a “pigtail” formation, from which the ends of the bag can be cut and taped. The pipe section will be removed with taped plastic containment at both ends.
- If any residual liquid or sludge is observed at either end of the removed pipe section, that section will be bagged immediately and taken to a size reduction containment, for size reduction and inspection. The recovered residual liquid and/or sludge will be collected. If no residual liquid or sludge is observed at either end of the pipe section, it will be taken to the size reduction area at an appropriate time.
- Piping sections will be size reduced, as necessary, using an approved cutting method. Crimped pipe sections will be size reduced.
- Pipe sections will be allowed to drain, in a vertical position, as required.
- Pipe section ends will be inspected visually to determine whether a blockage is present within the section.
- Blockages in pipe sections will be penetrated by mechanical means to drain any trapped liquid.
- Pipe sections will be drained of any remaining liquids or sludges, then placed into waste containers. Residual materials will be sampled and immobilized.

The contents and condition of the interior of the pipe section will dictate its disposition as waste. Four typical cases may be encountered:

- The interior surface is dry and contains no visible sign of hazardous waste holdup, so that the pipe section can be disposed as non-hazardous waste (for tanks previously storing only characteristic wastes).
- The pipe section contains solid residual material adhering to the interior walls, which cannot be removed readily. The pipe section will be managed as hazardous or non-hazardous waste, based on process knowledge and/or analytical results for a representative sample of the material.
- A removable blockage or mobile sludge is found, and is removed from the pipe section and sampled. EPA waste codes are assigned to the sludge based on process knowledge or analytical results, and the sludge is treated to meet applicable WAC. The pipe section will be disposed as hazardous or non-hazardous waste, after a hazardous waste determination has been made.
- Piping from listed waste tanks will be disposed of as hazardous waste.

Each IWCP work package, which will be prepared prior to the start of closure activities, will include more specific and detailed instructions for the sequence of piping removal steps, removal and size reduction methodology, characterization process and hold points, and removal of residual materials from pipe sections.

6.2.1.2 Tank Removal

Tanks will be removed and/or size reduced in place after process piping has been removed, and the tanks have been drained. However, some residual solid and/or liquid holdup may be present in the tanks. The descriptions below contain specific provisions to address this possibility, incorporating applicable regulatory requirements and precautions to prevent worker exposure or release of holdup material to the environment.

Tanks may be packaged in one piece or size reduced. Typical waste streams to be generated include light metal, plastic-lined metal, solid lead, combustibles, glass and plastic.

Removal of the tanks is described in the following subsections, according to tank type and relative size. The following disassembly steps are typical and may be altered based on field conditions or lessons learned.

6.2.1.3 Pencil Tank Removal

Pencil tanks are handled in a manner similar to that for large diameter piping. In a few cases, the tank may be size reduced in place because of its size or other circumstances; however, for the majority of cases, activities are as follows:

- Containment will be placed around the vacuum/vent line, and the tank will be disconnected from the exhaust header.
- The tank will be disconnected from its supports.
- The tank will be moved to the size reduction glovebox, and introduced into the glovebox via a “bag-in” procedure.
- The tank will be cut to facilitate handling and packaging. The ends will be separated from the tank body to facilitate inspection of the interior, cleaning and removal of residual materials.
- Tanks or tank sections will stand on end in a drip pan to drain residual liquid and mobile sludge. The material will be placed into containers for further characterization and disposal.
- Each tank or tank section, now open at both ends, will be visually inspected. The interior will be wiped dry. Incidental liquids may be immobilized with absorbent or collected in Kim-wipes as wet combustibles.
- Additional tank cleaning, if required, will be conducted during size reduction. The options for disposition of the tank sections as waste are described in Section 6.3.
- The tank sections will be further size reduced as necessary, and then segregated for final waste characterization and packaging. Absorbent will be added to the packaging to absorb any residual dampness. The tank sections will be packaged in accordance with the applicable WGI.

6.2.1.4 Annular Tank Removal

The dual-wall design of annular tanks leads to special considerations and precautions for size reduction and inspection for residual material remaining inside the tank, which are somewhat more complex than for the other types of tanks. The best available technology will be used for the disassembly and removal of tanks. For example, while relatively small annular tanks may not require size reduction to fit into waste crates, some cutting will be necessary to facilitate inspection of the tank interior for the presence of residual material holdup. In some cases, large tanks or those with special circumstances may be size reduced in place. Typical activities for these tanks are as follows:

- Containment will be placed around the vacuum/vent line, and the tank will be disconnected from the exhaust header.
- The tank will be disassembled from the floor mountings and brought to the size reduction facility, where one or more viewing ports are cut to facilitate inspection of the tank interior.
- The tank will be visually inspected.
- If no residual material is found, the tank interior may be sprayed with a fixative before proceeding with size reduction.
- If residual material is discovered inside the tank, the tank may be cut into sections to provide access to the residual material.
- Residual material (solids and/or sludge) will be removed from tank sections and placed into containers for further characterization and disposal. Incidental liquids may be collected in Kim-wipes as wet combustibles. Waste characterization criteria for the tank pieces, based on the content and condition of any residual material found in them, are described in Section 6.3.
- After the residual material has been removed, the tank interior may be sprayed with a fixative before proceeding with size reduction.
- The tank sections will be further size reduced, as necessary, then segregated for final waste characterization and packaging. Absorbent may be added to the packaging to absorb any residual dampness. The tank sections are packaged in accordance with the applicable WGI.

6.2.1.5 Raschig Ring Tank Removal

Raschig ring tanks will be inspected visually and/or by real time radiography (RTR) for the presence of liquid/mobile sludge. Small tanks may be placed directly into a shipping container with the raschig rings in place. Each tank packaged in this manner will be examined by RTR to verify the absence of free liquids and/or mobile sludges. In the event the tank fails RTR, the tank will be returned either to Building 771 or 774, and the raschig rings will be removed. Typical activities for Raschig ring tanks are as follows:

- Containment will be placed around the vacuum/vent line, and the tank is disconnected from the exhaust header.
- The tank will be disconnected from its supports.
- The tank will be brought to the size reduction facility, where the rings will be removed and the interior of the tank inspected.
- If no residual material is found upon inspection, the tank will be size reduced as necessary to fit into a waste container. The interior is wiped dry. Incidental liquids may be immobilized in absorbent or collected in Kim-wipes as wet combustibles. The options for disposition of dry tanks or tank sections as waste are described in Section 6.5.2.5 below.
- If residual material is found in the tank, the methodology for its removal is determined. This is likely to include cutting of the tank into sections in order to isolate the residual material in one or two sections for ease of removal.
- The cut tank sections will stand on end in a drip pan to drain residual liquid and mobile sludge. Non-mobile sludge is removed by mechanical means. Residual material (sludge and/or solids) will be placed into containers for further characterization and disposal.
- After residual materials have been removed, each tank or tank section will be visually inspected. The interior will be wiped dry. Incidental liquids may be immobilized in absorbent or collected in Kim-wipes as wet combustibles.
- Size reduction, as necessary for waste packaging, will be conducted using the best available technology.
- The tank or tank sections are segregated for final waste characterization and packaging under the options listed in Section 6.3. Absorbent may be added to the packaging to absorb any residual dampness. The tank sections will be packaged in accordance with the applicable WGI.

6.2.1.6 Removal of Other Tanks

Three options exist for the removal of tanks that do not contain raschig rings, are not annular, or pencil tanks:

- Package the tank in one piece as a SCO,
- Package the tank in one piece because size reduction is not necessary, or
- Size reduce the tank into sections for packaging.

Selection of an option will be based on the level of radioactive contamination, tank construction and the presence of hazardous constituents. The SCO method is desirable because of a significant reduction in both worker exposure levels and staff-hours required for size reduction and removal activities.

After the vacuum/vent line is disconnected, the tank will be packaged in one piece in place, with containment provided on site as necessary. The tank may be designated as an SCO if it meets the criteria. If the tank cannot be packaged in one piece, it will be size reduced and the waste streams segregated for packaging, either in place or within the size reduction facility.

6.2.1.7 General Conditions for Tank Sections and Residual Materials

The condition of the tank interior and the composition of residual material inside any of the tanks will dictate that tanks disposition as waste. Four typical cases may be encountered:

- The interior surface is dry and contains no visible sign of hazardous waste holdup, so the tank can be disposed as non-hazardous waste (for tanks previously storing only characteristic waste).
- For tanks previously storing listed wastes, the tank sections typically will be decontaminated in accordance with Section 6.1.1.2 and disposed of as non-hazardous debris. If decontamination is not feasible, the tanks will be disposed of as hazardous or mixed waste.
- The tank contains solid residual material adhering to the interior walls, which cannot be removed readily. The tank will be managed as hazardous or non-hazardous waste, after a hazardous waste determination has been made based on the analytical results for a representative sample of the material.
- A mobile sludge is found and is removed from the tank and sampled. EPA waste codes are assigned to the sludge based on process knowledge or analytical results. The sludge will either be treated to meet applicable waste acceptance criteria or stored on-site pending ultimate disposition. The tank will be disposed as hazardous or non-hazardous waste, after a hazardous waste determination has been made.
- Each IWCP work package, which will be prepared prior to the start of tank removal activities, will include more specific and detailed instructions for the sequence and methodology of tank removal, size reduction, waste characterization and hold points, and separation of residual material from tank sections.

6.3 DISPOSITION OF CLOSURE-RELATED WASTES

Metal and other types of waste generated during closure activities will be managed as remediation waste. It is assumed that the Site's waste management and treatment systems will be available to receive wastes generated by these closure activities. If deemed appropriate, Building 771/774 may develop treatment systems for select waste streams.

Glovebox components and pieces that are radioactively contaminated will be managed in accordance with the requirements of the RFETS Radiological Control Manual and Health and Safety Practices Manual, and will be packaged for disposal in accordance with applicable waste acceptance criteria.

Non-SCO glovebox metal waste will be assayed for categorization as either LLW or TRU, depending on the amount of actinide present, and will be characterized in accordance with applicable regulations. Size-reduced glovebox sections likely will be categorized as TRU waste and packaged for disposal at WIPP. The presence of metal pieces with lead shielding will cause that metal waste to be labeled as mixed waste.

A glovebox shell that has met the SCO criteria does not require additional assay. It is a non-hazardous LLW and will be packaged for disposal at NTS.

Other segregated waste types identified in the WGIs will be characterized, placed into waste containers and managed in accordance with applicable regulations and the Site Waste Management Programs. These waste drums and crates will be analyzed by non-destructive assay to categorize them as LLW or TRU waste. They will be placed in appropriate on-Site storage areas before off-Site disposal. If mixed waste is generated for which treatment/disposal options do not currently exist, it will be added to the Site Treatment Plan (e.g., LLW with actinide activity levels between 10 and 100 nCi/g).

6.4 Professional Engineer Certification

Within 60 days of completing closure of the final hazardous waste unit in Building 771/774, an independent, registered Professional Engineer (P.E.) will certify the unit has been closed in accordance with Section 6.1.1.2. Individual unit closures will not require a P.E. certification.

6.5 Closure Documentation

RCRA unit closure activities will be documented in the Pre-Demolition Survey Report, which will be completed before building demolition. Upon final closure of each RCRA-regulated unit, the Site's Master List of RCRA Units will be updated to reflect the new closure status of the unit and the unit will be removed from the RCRA Part A Application and Part B Permit in accordance with the applicable regulations.

7 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Decommissioning and ER activities conducted at RFETS must comply with the ARARs under the CERCLA[35]. ARARs have been identified for the complete scope of decommissioning activities, including demolition, and they are contained within the ***RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities***[36] and the ***RSOP for Facility Disposition***[37]. The additional ARARs for the portions of the building that will remain in place, but will not be decontaminated to the unrestricted release criteria are contained in the ER RSOP for soil remediation.

[35] Certain State of Colorado Radiation Control Regulations pertaining to decommissioning and environmental releases may be relevant and appropriate to building decommissioning and environmental restoration activities, particularly the cleanup of the soils. The RFCA parties are finalizing this list and a subsequent modification to the documents referenced will be required.

[36] The RFCA Standard Operating Protocol for Facility Component Removal, Size Reduction, and Decontamination Activities is currently undergoing public comment and is scheduled for approval in December 2000.

[37] The RFCA Standard Operating Protocol for Facility Disposition, approved October 5, 2000.

8 ENVIRONMENTAL CONSEQUENCES

RFCA mandates incorporation of National Environmental Policy Act (NEPA) values into decision documents (DOE 1996). Accordingly, this section addresses the potential environmental consequences of the activities needed to complete facility disposition (as specified in Section 4.0). This section only addresses the environmental consequences for Alternative 2 of the demolition process alternatives analysis (Section 1.1.1). The environmental consequences associated with the activities to prepare the facility for demolition are contained in the **RSOP for Component Removal, Size Reduction, and Decontamination Activities**. The environmental consequences associated with Alternative 1 of the demolition process alternatives analysis (Section 1.1.1) are contained in the **RSOP for Facility Disposition**.

As a principle topic of concern, and as outlined in the RFCA, waste management is discussed separately in Section 5. Unavoidable impacts, cumulative impacts, and long-term impacts are also considered in this section. As appropriate, guidelines or requirements that minimize or mitigate the impacts of proposed activities are provided in each section, as appropriate.

This section analyzes impacts from disposition activities, and discusses how the impacts of disposition activities may be cumulative with impacts from other actions (e.g., truck traffic associated with building disposition is combined with traffic from nearby gravel pit operations to evaluate the impact on nearby roads).

Some of the analyses in this section are based on bounding analyses taken from the *Cumulative Impacts Document* (CID) (DOE, 1997). The analyses presented in the CID consider impacts from the full scope of activities that are required to close the Site. These activities include, for example, loading, packaging, storing, and transporting waste in all areas of the Site. The CID analysis includes the total impacts of Site closure. The impacts from building disposition are bounded by the total impacts of the closure, as documented in the CID.

The environmental analysis indicates that impacts to environmental resources and human health and safety will be minimal, given implementation of mitigation measures. Results of the impact estimates are summarized below, and discussed in detail in the following subsections. Surface and subsurface soils will be disturbed throughout the developed portion of the Site, but activities will occur in previously disturbed and contaminated areas. Building disposition is a prerequisite to environmental restoration and the cleanup of contaminated soils at building sites. Air quality impacts will be related to particulate emissions, but emissions will be controlled by mitigation measures and will be short-term in duration. Erosion control measures and protection of contaminated concrete will mitigate adverse impacts to water quality. Risks to human health and safety will be greatest for workers; the risks will be reduced by this action.

Public health and safety risks will be a small fraction of worker risk. Ecological resource impacts will vary, with some species increasing and other species declining as a result of the action. Historic resources have been documented and recorded, and no impact will occur to historic resources. The appearance of the Site will change dramatically as buildings are removed; an open space appearance will result. Noise effects will be temporary and insignificant. The impacts of shipping will be temporary and minor.

8.1 Soils and Geology

Soils throughout the Site would be disturbed during demolition activities. Equipment will operate in and around the structure, using paved areas and roads as feasible, but may also traverse or operate from unpaved areas. Most debris will be contained within or near the footprint of the facility, but some debris may be placed in stockpiles on nearby open areas.

Most soils in the developed portion of the Site are identified as Flatirons very cobbly to very stony sandy loams, which have a low permeability, slow runoff potential, and a slight wind and water erosion potential. Less common soils in the developed area include Nederland and Denver-Kutch-Midway. Nederland is a very cobbly, sandy loam, with moderate permeability, rapid runoff and severe water erosion potential (10-15% slopes), and slight wind erosion potential. Denver-Kutch-Midway is a clay loam with a low permeability, rapid runoff and severe water erosion potential (5-25% slopes), and low to moderate wind erosion potential (DOE 1997). Most soils in the project area have been heavily modified or covered with paved surfaces, and do not retain their original soil properties.

Since facility demolition activities will be conducted throughout developed portions of the Site, including areas with potential surface contamination, activities must be managed to avoid disturbing contaminated soils, or managed to contain and prevent further distribution of contaminated soils. Demolition will include the removal of building foundations to three feet below grade. The demolition activities will not include remediation of contaminated soils, which are addressed in Section 4.5.

Uncontaminated soils will not be altered significantly during and following the demolition activities. While soil erosion will not be prevalent, given the generally low erosion potentials and large paved areas, substantial amounts of small debris, dust, and fines may be generated during disposition activities. These materials may remain after the larger pieces of debris have been removed, but the area will be cleaned to prevent wind or water from spreading the dust and to allow for eventual suitable site restoration. Various control measures, such as silt fences, may also be implemented to control runoff from facility locations. These controls will also be used where disturbed soils are prone to water erosion. A listing of potential control measures is provided in the **RSOP for Facility Disposition**.

Although fuels, oils, and other solid or liquid materials used during demolition could be spilled, soils are not highly permeable, paved areas are largely impervious, and a spill control plan would be implemented by the Site. Surface and subsurface soils will not likely be substantially affected by a spill.

The anticipated grade of 8 to 1 horizontal to vertical slope for the bulk of the land surface over the Building 771/774 footprint is very stable as shown by the behavior of existing slopes within and around Rocky Flats, see Section 4.6 for additional information. The accompanying slopes of 4 to 1 horizontal to vertical are very common slopes in the construction of highways and surface water management structures. Much construction is done at steeper slopes (3 to 1 horizontal to vertical or 2 to 1 horizontal to vertical) without long term erosion with a well established stand of vegetation. Vegetation is very important to the control of erosion and vegetation will be planted on all soil surfaces at Building 771/774.

Vegetation will be planted on the fill at Building 771/774 after demolition, as with any surface fill or disturbed surface on the IA. The vegetation will take some time (several years) to fully establish. During that time, routine inspections and repair of erosion areas will be required. This is common to construction at any location across the USA. The details of the monitoring system will be developed after the completion of the groundwater model and during the design of the treatment system, if required. These planned inspections, repair and monitoring systems would be conducted even if the building slab and walls were removed.

8.2 Air Quality

This analysis is primarily concerned with particulate emissions, since these pollutants are most likely to be generated by demolition activities. The Site conducts continuous and extensive monitoring for radionuclide air pollutants. Air emissions from Rocky Flats are within limits for all pollutants for which there are standards (DOE 1998b). Activities conducted during facility demolition will also be monitored on a continual basis, and air pollutant levels are expected to remain within established limits.

The Site standard is a maximum 10 mrem per year effective dose equivalent to any member of the public (as mandated by 40 CFR 61, Subpart H), which is monitored by the RAAMP network. Fourteen of the

network samplers, deployed at the Site perimeter, are used to demonstrate Site compliance with the standard. Filters from the perimeter samplers, and from one sampler near the 903 Pad, are collected and analyzed monthly for uranium, plutonium, and americium isotopes.

Areas with contamination that remain during demolition will need to be protected. The protection may include measures such as covering the areas with gravel and/or soil to prevent damage to the fixatives that prevent contaminants from being dispersed as windborne particles, see Section 4.7.1 for additional information. These and other measures will be used as needed to prevent the release of contaminants.

Demolition activities will include operation of heavy equipment, vehicles, generator sets, and similar equipment. Several pieces of equipment may be used at the facility, with operational hours limited according to the size and type of facility. The emissions from equipment will not generate sufficient criteria emissions to affect NAAQS. Temporary fossil fuel-fired equipment use (or fuel use) will need to be tracked to ensure that emissions remain within regulated amounts, or that appropriate notices or permit modifications are filed. In addition, opacity rules will need to be followed (limiting opacity below a 20 percent standard). Demolition activities will generate dust, including both TSP and PM_{10}, that may be of concern, and each facility will have a control plan that provides for dust control (e.g., covering facilities and stockpiles, spraying water).

Concentrations of TSP and PM_{10} are determined by five air monitoring stations at the Site property boundary operated by the Colorado Department of Public Health and Environment (CDPHE). These stations monitor for TSP and PM_{10} as well as other criteria pollutants. Two of these stations are located just off-site at the northeast and southeast Site boundary along Indiana Street. These samplers are operated for 24-hour periods on a rotating, every-sixth-day schedule to match the national EPA particulate sampling schedule. These sampling locations are downwind of the Site and are representative of Site impacts. Maximum concentrations of PM_{10} and TSP recorded at the CDPHE stations are considered the ambient off-site concentrations of these two criteria pollutants. Monitoring by the stations will provide an ongoing record of ambient air quality, and will alert the Site if cumulative Site activities are impacting air quality (as related to particulates).

Hazardous air pollutants include a wide range of materials or chemicals (e.g. solvents) that are toxic or potentially harmful to human health. Sources of HAPs, including asbestos, are to be removed prior to demolition activities. A demolition notification must be filed with CDPHE certifying that the facility has been examined for asbestos. The certification also provides verification that refrigerants or ozone depleting compounds have been removed.

Details on meteorology, air quality, monitoring, and air emission controls at the Site can be found in the CID.

8.3 Water Quality

Water quality at the Site could be affected by demolition activities. Water quality, during demolition, subsequent stockpiling of facility debris, and due to the final condition of each facility site, could be adversely affected by runoff or seepage to groundwater following rain or snow events.

A work package will be prepared prior to demolition; the package will address potential pollutant sources and the way in which the pollutant could reach surface waters, downstream basins, or ponds. Berms, silt fences, or similar erosion control devices may be used to prevent debris (e.g., silt or contaminated soils) from being washed into surface water drainages. Drains and other subsurface openings will be sealed or plugged prior to demolition, and debris will be loaded into covered roll-off containers, drums, or similar containers to prevent the loss of dust and debris. Street sweepers may be used on roads to collect debris and dust spilled during the on-site transportation of the facility debris.

Areas with contamination that remain during demolition will need to be protected. The protection may include measures such as covering the areas with gravel and/or soil to prevent damage to the fixatives that prevent contaminants from being dispersed as windborne particles, see Section 4.7.1 for additional information. Such measures will be used as necessary to prevent groundwater and surface water impacts.

Demolition will also be restricted according to weather conditions; if high winds or severe rains occur, demolition activities will be postponed. Surface water that is channeled from around facilities is sampled at surface water sampling locations downgradient from the facilities.

After each facility has been demolished and facility debris and other wastes removed, the sites will again be inspected by the project team. The final inspection will ensure that debris, materials, and dust at the site have been removed, and that the potential for future erosion is minimized. Because these measures will prevent or mitigate the release of pollutants to surface waters, impacts to surface waters are likely to be minimal.

Currently, the groundwater level near the building walls is influenced by the existing footer drains. If the footer drains pull or collapse, the groundwater near the building walls will rise. A French drain will be designed to intercept the rising groundwater to route groundwater around the building and to control near-building groundwater levels. The exact dimensions and depth of the French drain will be determined after the groundwater modeling around these buildings is completed.

There is a possibility of a surface seep of groundwater forming on the soil fill of the building; however, the purpose of the French drain is to reduce the flow of groundwater in the fill within the building footprint. The consequences of a surface seep at any location within or around the building is that surface erosion could be more pronounced at the location of the surface seep.

In addition, some groundwater will flow through the fill due to the infiltration of direct rainfall on the surface of the fill. This groundwater will flow vertically and then horizontally (to the North) within the footprint of the building. To reduce the possibility of a surface seep from this groundwater, a permeable layer (like gravel or crushed concrete) will be placed over the top of the concrete slab that remains in place. This will control the groundwater level within the footprint of the building to greatly reduce the possibility of a surface seep. The details of the drainage layer and where the flow from this layer will be directed is still under evaluation and will be addressed as a part of the groundwater modeling at Building 771/774.

The mobility of the fixed contamination that could be dislodged during the demolition process is negligible. Dislodged contamination would become trapped in the interstitial spaces of the soil and not move more than several inches through the soil. Soluble contamination is also not expected since the groundwater would need to be in a reduced state with low pH to leach the plutonium or americium from the fixed contamination.

8.4 Human Health and Safety

Physical hazards to workers involved in facility demolition are similar to the hazards found in comparable commercial demolition activities. The CID reports a projection of 584 worker injury and illness cases in the year of highest closure activity at the Site; cases specifically associated with facility demolition activities would be a fraction of the Site total.

A project-specific Health and Safety Plan (HASP) and Job Hazard Analysis will be prepared on a facility or project-specific basis to identify and control potential hazards. The HASPs will address both the specific hazards to be encountered and applicable guidance and requirements (e.g., OSHA), as well as specific safety equipment (e.g., hard hats, PPE) required for individual tasks. The HASPs will also recognize the special risks and safety requirements associated with heavy equipment used in demolition and will provide procedures for site workers near such machinery. Implementation of the requirements of

these documents will minimize the possibility and potential consequences of accidents, and minimize physical hazards.

Potential threats to health and safety for collocated workers and the general public from the release of airborne materials will be mitigated via implementation of dust suppression techniques. The use of controls and procedures for worker protection will also protect the public, since work control measures are designed to identify potential hazards and prevent (e.g., by using dust controls) releases.

The CID reports the following estimated annual radiological doses from Site closure activities: maximally exposed collocated worker 5.4 mrem; maximally exposed member of the public 0.23 mrem; population dose 23 person-rem. The population dose would be expected to produce 0.012 latent cancer fatalities in the region of interest population of 2.7 million. Since these estimates include **all** Site closure activities, impacts from activities addressed in this document will be a small fraction of those reported above.

8.5 Ecological Resources

Facility disposition will permanently affect local ecosystems. In particular, various bird species (e.g., swallows, finches, etc…) use the facilities for nesting sites; these nesting sites will be permanently lost. Bird densities for certain species, especially barn swallows and cliff swallows, are expected to decline in the industrial area. Mammals such as deer, rabbits, and mice also use the industrial area at times. Although habitat for these mammals will be temporarily impacted by the demolition of the facilities, the long-term effects will be positive once native vegetation is restored in the industrial area. The industrial area and supporting facilities do not currently support or provide habitat for threatened or endangered plant or animal species, or species of concern, nor do they contain unique or unusual biological resources.

Wetlands exist in some portions of the industrial area, and demolition activities that could impact wetlands must be reviewed prior to initiating the action. Downgradient wildlife habitat could also be damaged if soils or other eroded materials are allowed to flow into the habitats. The use of silt fencing or other mitigative measures to prevent siltation will be used. To minimize the possibility of adverse effects, and ensure that regulatory compliance is met, surveys of the potentially disturbed sites by Site ecologists will be conducted before any demolition activities.

The Industrial Area will change from a densely built environment to an open environment with no structures, accompanied by a dramatic decrease in human activities. Animal species will repopulate the area, with some species increasing, and other species declining (e.g., due to a loss of suitable nest sites). Disturbed open areas will be revegetated. Weed species may invade many open areas unless adequate weed control and reseeding of disturbed areas is provided.

8.6 Historic Resources

During the Cold War Era, RFETS was one of only 13 nuclear weapons production sites in the United States. In 1995, DOE conducted a survey of cultural resources in the Industrial Area and evaluated the Cold War Era resources using guidelines set forth by the Department of Interior (DOE 1995). Based on this survey, 64 facilities at the Site were determined highly important to regional, national, and international history for their role in the Cold War Era. These 64 facilities were either primary contributors to the production of weapons or secondary contributors to the central mission of the Site, and functioned together to produce nuclear weapons during the Cold War.

The State Historic Preservation Officer determined these facilities eligible for the National Register of Historic Places as an historic district. The Rocky Flats Plant Historic District (site 5JF1227) was placed on the National Register of Historic Places on May 19, 1997. Documentation and preservation requirements are set forth in a Programmatic Agreement signed by the DOE Rocky Flats Field Office, the Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation.

Facilities to be demolished include those facilities within the Rocky Flats Plant Historic District. Before any alterations, documentation of the historical significance of the buildings is required to comply with the Programmatic Agreement signed by the DOE Rocky Flats Field Office, the Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation. The history of the Rocky Flats Plant, including all 64 buildings within the Historic District, has recently been documented in the *Historic American Engineering Record for the Rocky Flats Plant Historic District* (HAER-CO-83-T) (Kaiser-Hill 1999). Such documentation, consisting of a narrative report, engineering drawings and photographs, meets the requirements of the Programmatic Agreement and has been accepted by all responsible parties. Since this documentation includes facilities that will be demolished, it effectively mitigates any adverse impacts to cultural resources associated with demolition.

Minimal groundwork is anticipated (e.g., installation of silt fences), and most work would occur on previously disturbed land. Therefore, no impact to historic artifacts will occur. Should any historic resource be identified during the project, work will be stopped and Site procedures regarding historic resources will be followed.

8.7 Visual Resources

Project activities will completely change the landscape at the Site. The removal of the facilities will permanently change the visual setting from an industrial setting to an open space setting. The appearance of the Site will be close to the original prairie setting, although roads and paved areas will be left throughout the Site. The change will be visible from public roads and areas around the Site during daylight hours. At night, the existing man-made lighting will be gone; the setting will be congruent with undeveloped open space.

During the demolition activities, equipment may be visible from off-Site locations. Dust generated during demolition may be temporarily visible, but would dissipate before leaving the Site as a visible cloud or plume of dust. Control measures, such as watering, will be used if needed to control dust.

8.8 Noise

Demolition activities will result in a temporary increase in local noise levels. The increased noise will result from the demolition of the facilities, and the loading and hauling of the resultant debris. The noise will generally be consistent with prior site construction and demolition activities (such as other heavy equipment operations). Most noise from the demolition will not include sudden, short, or unexpected noises.

Demolition operations will be conducted during the day, and noise will be attenuated by distance and obstructions. For example, a front-end loader generates about 84 decibels (dB) at 50 feet (the threshold of hearing loss for prolonged exposure). At 1,600 feet, that noise will drop to about 54 dB (below the accepted level for residential land use). Vegetation, facilities, and terrain will further attenuate the noise. Since the nearest public receptor is over 5,000 feet from either project site, noise generated by the project will be effectively confined to the Site. Although public receptors will not be effected by most types of demolition noise. Appropriate hearing protection will be supplied for workers, as specified in the project HASP.

8.9 Transportation

Disposition activities will produce wastes requiring disposal at off-site facilities, and transport to those facilities. One of the most abundant materials resulting from facility disposition will be concrete. Clean concrete may be reused on the project as backfill; minimal off-Site transportation or impact is projected (Concrete Disposition RSOP, 1999). Sanitary waste (e.g., scrap steel, wood, insulation, other

construction debris) will be separated and shipped off-Site; these wastes are currently projected to be about 38 percent of the waste volume to be shipped off-Site during closure (LaHoud, 2000).

The low volume of daily truck traffic is not expected to affect road traffic or safety, and transportation activities will not disproportionately impact minority and low-income populations. However, the volume-to-capacity traffic ratios of Highway 93 and Indiana Avenue during peak traffic hours (both morning and afternoon) are rated as poor (Jefferson County, 2000). Scheduling truck traffic during off-peak hours (mid-morning to mid-afternoon) can reduce traffic impacts.

8.10 Unavoidable And Cumulative Effects

Some temporary, adverse effects will necessarily occur because of the project activities. Some small areas of surface soils will be compacted or otherwise modified. Minor quantities of air pollutants will be released to the atmosphere. Workers will experience health and safety risks that are typical of demolition projects. Noise levels will increase slightly. The facilities are a resource that will be permanently lost for other uses, and fuels and other resources will be consumed during the demolition.

The proposed action is a key element of the overall mission to clean up the Site and make it safe for future uses. The cumulative effects of this broader, Site-wide effort are described in the CID. That document describes the short- and long-term effects from the overall Site clean-up mission. Actions taken during facility disposition will be part of the overall process for closure of the Site, but disposition activities will usually result in discrete, short-term effects that will not be cumulative with effects resulting from other closure activities.

Cumulative effects of the facility demolition activities with other Site projects and projects near the Site will not be notable. Temporary cumulative effects will include air emissions (e.g., fugitive dust; exhaust emissions) and noise (e.g., vehicle noise). The increase in air emissions and noise will minimally add to pollutants and noise from off-Site activities.

8.11 Short-term Uses Versus Long-term Productivity

The project area consists of Building 771/774 and nearby supporting structures. Following demolition, the area will no longer be a fully developed area, but will have the appearance of open space.

8.12 Irreversible and Irretrievable Commitments of Resources

This project will irretrievably consume fuels, small quantities of other materials, water, money, and labor. Resources originally used during the construction of the facilities will be irretrievably lost. If the facilities were preserved or re-used, the consumption of these resources would be considerably increased.

9 IMPLEMENTATION SCHEDULE

The recent Site-wide re-baselining effort has resulted in the development of a detailed schedule and basis of estimate for completion of the 771 Closure Project. A copy of this schedule is provided in Appendix A. The schedule is not an enforceable part of this DOP, and DOE or its contractor may alter the schedule without prior notification to or approval by the LRA. Significant schedule changes will be shared with the LRA as part of the RFCA consultative process.

10 RECORDS DISPOSITION

The 771 Closure Project records consist of the CERCLA AR File, the RCRA Operating Record, the Closure Project Files, and the Decommissioning Closeout Report.

10.1 CERCLA Administrative Record File

This section identifies the documents that constitute the AR File for the 771 Closure Project. Upon completion of the public comment period, comments received from the public will be added to the AR File, along with the responsiveness summary and the LRA approval letter. LRA approval of this DOP and associated major and minor modifications constitutes approval of the AR File.

LRA approval of this modification into the DOP constitutes approval of the documents being added to the 771 AR. The following documents will be added to the 771 Closure Project AR for this modification:

- 771 Closure Project Reconnaissance Level Characterization Report Supplement
- 771 Closure Project DOP modification Responsiveness Summary
- Final 771 Closure Project DOP modifications
- EG&G 1995a, *Geologic Characterization Report for the Rocky Flats Environmental Technology Site*, 1995.
- EG&G 1995b, *Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site*, 1995.

The following information repositories have been established to provide public access to the 771 Closure Project AR:

U.S. Environmental Protection Agency (EPA)
Region VIII
Superfund Records Center
999 18th Street, Suite 500
Denver, Colorado 80202-2466
(303) 293-1807

U.S. Department of Energy Rocky Flats Public Reading Room
Front Range Community College Library
3645 West 112th Avenue, Level B
Westminster, Colorado 80030
(303) 469-4435

Colorado Department of Public Health and Environment (CDPHE)
Information Center, Building A
4300 Cherry Creek Drive South
Denver, Colorado 80220-1530
(303) 692-3312

10.2 RCRA Operating Record

RCRA records, including inspection records, will be maintained with the existing Building 771 RCRA Operating Record. Upon completion of the 771 Closure Project, the RCRA Operating Record will be transferred to Site Records Management for storage.

10.3 Closure Project Files

Project-specific documents will be stored in the 771 Closure Project Files until final closure is complete, at which time the Closure Project Files will be processed through Site Records Management and archived. The Closure Project Files will contain characterization documentation, inventory sheets, project correspondence, comment resolution, IWCP work packages, and additional information that is a direct result of the work involved in the project. Maintenance of the Closure Project Files is a Site requirement.

10.4 Decommissioning Closeout Report

A Decommissioning Closeout Report will be prepared for the 771 Closure Project after decommissioning work has been completed and analytical data received. The report will consist of a brief description of the work completed, including any modifications or variations from the original decision document. The report will also contain analytical results, including the results of confirmatory sampling, as well as a description of the quantity and characteristics of the waste generated and how the waste is stored or disposed. The expected outline for the Closeout Report is shown below. The format may change to meet the needs of the project.

- Introduction
- Remedial action description
- Dates and duration of specific activities (approximate)
- Verification that remedial action goals have been met
- Verification of treatment process (if applicable)
- Radiological analysis (if applicable)
- Waste stream disposition
- The global positioning system location of the Building 771/774 structure remaining underground and a reference to the final characterization report, which details the nature and extent of the contamination remaining on the structure
- Site reclamation
- Significant deviations from the decision document
- Final disposition of wastes (actual or anticipated)
- Next steps (e.g., interim monitoring, transfer to Environmental Restoration Program)

When completed and approved by DOE and the LRA, the Decommissioning Closeout Report will be submitted to the 771 Closure Project AR Post-decisional File.

11 COMMENT RESPONSIVENESS SUMMARY

A responsiveness summary is prepared for a RFCA decision document and each major modification to that document that is subject to formal public comment. If a major modification is made to this DOP, the responsiveness summary for that modification will be included with the final modification, and the responsiveness summary from previous public comment period(s) will be removed, but continue to reside in the appropriate revision in the administrative record.

12 GLOSSARY OF TERMS

Following are terms that are unique to this RFCA decision document. For the definitions of other terms used in this and other RFCA decision documents, refer to the ***RSOP for Recycling Concrete***, the ***RSOP for Facility Disposition***, and the ***RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities***.

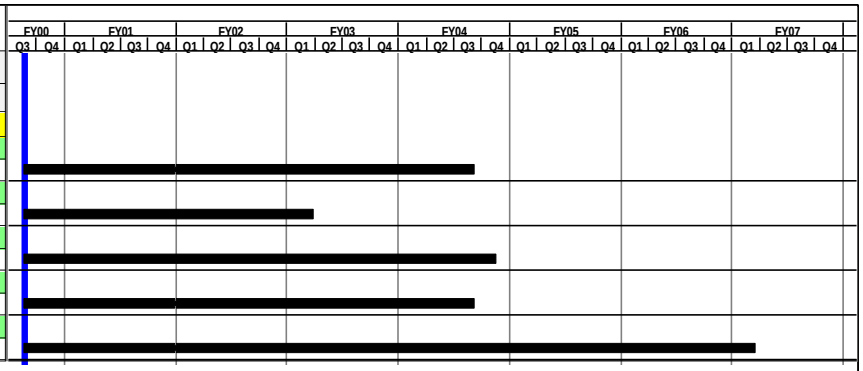
Decommissioning Area. Small, manageable grouping of similar systems, equipment, and areas or rooms that may be worked independently. Dismantlement Sets contain less than 2,000 dpm removable contamination and are decommissioned by Building Trades.

Dismantlement Set. Small, manageable grouping of similar systems, equipment, and areas or rooms that may be worked independently. Dismantlement Sets contain greater than 2,000 dpm removable contamination and are decommissioned by Steelworkers.

APPENDIX A

771 CLOSURE PROJECT IMPLEMENTATION SCHEDULE

Activity ID	Activity Description	Orig Dur	Baseline Start	Baseline Finish
1 Rocky Flats Closure Project				
1.C B771/774 Closure Project				
1.C.A B771/774 Closure				
+ 1.C.A.B B771/774 Facilities Maintenance(Landlord				
		921	22MAY00	07JUN04
+ 1.C.A.C B771/774 Deactivation				
		947	22MAY00	24DEC02
+ 1.C.A.D B771/774 Decommissioning				
		1,550	22MAY00	18AUG04
+ 1.C.A.E B771/774 Support Services				
		1,478	22MAY00	07JUN04
+ 1.C.A.F D&D Program				
		1,495	22MAY00	13DEC06



Start Date	01FEB99
Finish Date	14DEC06
Data Date	22MAY00
Run Date	22JUN00 16:51

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CPBB

ROCKY FLATS
CLOSURE PROJECT BASELINE

Cost Account Summary

Sheet 1 of 1

KAISER•HILL COMPANY

CLOSURE 2006 KAISER-HILL ROCKY FLATS CLOSURE PROJECT