DOCUMENT CHANGE FORM (DCF)

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① DCF Originator: Carolyn Hicks (Print) Carolyn Hicks (Sign) 6/12/01 (Date)

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② (Authorizes processing of request.)

Responsible Manager: Ted Hopkins (Print) Ted A Hopkins (Sign) 6/27/01 (Date)

Organization: B707/776/777 Environmental Compliance

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③ Assigned SME: Carolyn Hicks (Print Name)

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④ Building 776/777 Closure Project Decommissioning Operations Plan
Document Title

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NA
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- ☐ Policy
- ☐ Mgt Directive
- ☐ Manual
- ☐ Procedure (indicate type)
  - ☐ Technical
  - ☐ Alarm
  - ☐ Administrative
  - ☐ Other
- ☐ Instruction
- ☐ Job Aid
- (x) Other

If "Other" is checked, please specify type: RFCA Decision Document

⑥ **Type of Modification**

- ☐ New
  - ☐ One Time Use Only
- ☐ Revision
- (x) Change
  - (x) Minor
  - ☐ Major
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⑧ Proposed Modification	⑨ Justification
Minor Modification #7 to the B776/777 Decommissioning Operations Plan was approved by CDPHE on 6/27/01. This modification includes updates to sections 4.5.2 and 6.3 concerning RCRA closures and CERCLA treatment units, respectively.	Approved by CDPHE pursuant to paragraph 127 of RFCA.

External (Technical) Review:

⑩ Reviewing Organization	⑪ Signature or Name of Reviewer	⑫ Date	⑩ Reviewing Organization	⑪ Signature or Name of Reviewer	⑫ Date
Subject-Matter Expert	Carolyn Hicks	6/12/01			

⑬ **Special Reviews:** *(NOTE: Other Special Reviews may be required, See PRO-815-DM-01 for more information.)*

ISR (Number or "Not Required"): Not required

TI Alignment (signature or N/A): NA
Sign Date

Reviewed for Classification
(If Required, "N/A" if not)
By: /S/ R. H. Essig (UNU)
Date: 6/4/01

⑭ **Approval** *(Completed to approve changes and cancellations only. New documents and revisions are approved by signature on the document cover page.)*

Approval Authority: Ted Hopkins (Print Name) Ted A Hopkins (Sign) 6/27/01 (Date) **Effective Date:** 6/27/01

6/1/2001

PADC-2000-03278

DOCUMENT CHANGE FORM (DCF)

⑦ DCF #: Mod #6

① DCF Originator: Carolyn Hicks (Print) Carolyn Hicks (Sign) 03/15/01 (Date)

Organization: B776/777 Environmental Compliance

Phone/Pager/Location: 5773 / 230-7949 / B776

② (Authorizes processing of request.)
Responsible Manager: Ted Hopkins (Print) Ted A Hopkins (Sign) 03/15/01 (Date)

Organization: B776/777 Environmental Compliance

Phone/Pager/Location: 7652 / 212-6082 / B776

③ Assigned SME: Carolyn Hicks (Print) 03/15/01 (Date)

Organization: B776/777 Environmental Compliance

Phone/Pager/Location: 5773 / 230-7949 / B776

⑮ ISR Number: NA

④ Building 776/777 Closure Project Decommissioning Operations Plan
Document Title

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NA
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⑤ Type of Document

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☐ Tech. Standard ☐ Instruction ☐ Job Aid ☒ Other

⑥ Type of Modification

☐ New ☐ One Time Use Only ☐ Revision
☒ Change ☒ Minor ☐ Major ☐ Cancellation

⑧ Effective Date: ~~02/22/01~~ 3/15/01 KKC Expiration Date: NA

⑨ Proposed Modification	⑩ Justification
Minor Modification #6 to the B776/777 Decommissioning Operations Plan was approved by CDPHE on 02/22/01. This modification includes adding Tank V-747A to Table 6, and adding unit-specific closure information for RCRA equipment and units in Sets 4,5,6,10,11,18,21, 22,27,29,34,35,36, and 52.	Approved by CDPHE pursuant to paragraph 127 of RFCA.

⑪ Reviewing Organization	⑫ Signature or Name of Reviewer	⑬ Date	⑪ Reviewing Organization	⑫ Signature or Name of Reviewer	⑬ Date

⑭ (Completed to approve changes and cancellations only. New Documents and revisions are approved by signature on the document cover page.)

Approval Authority: Ted A. Hopkins (Print Name) Ted A Hopkins (Sign) 03/15/01 (Date)

DOCUMENT CHANGE FORM (DCF)

⑦ DCF #: MOD-5

① DCF Originator: Carolyn Hicks (Print) [signature] (Sign) 9/18/00 (Date)

Organization: B776/777 Env. Compliance

Phone/Pager/Location: 5773 (Phone) 230-7949 (Pager) 776 (Location)

② (Authorizes processing of request.)
Responsible Manager: Ted Hopkins (Print) [signature] (Sign) 9/19/00 (Date)

Organization: B776/777 Env. Compliance

Phone/Pager/Location: 7652 (Phone) 212-6082 (Pager) 776 (Location)

③ Assigned SME: Carolyn Hicks (Print) 9/18/00 (Date)

Organization: B776/777 Env. Compliance

Phone/Pager/Location: 5773 (Phone) 230-7949 (Pager) 776 (Location)

④ Building 776/777 Closure Project Decommissioning Operations Plan
Document Title

PADC-2000-03278, Rev 0
Existing Document Number and Revision

NA
New Document Number and Revision *(if Applicable)*

⑤ Type of Document

☐ Policy ☐ Mgt. Directive ☐ Manual ☐ Procedure
☐ Tech. Standard ☐ Instruction ☐ Job Aid ☒ Other

⑥ Type of Modification

☐ New
☐ One Time Use Only
☐ Revision
☒ Change
☒ Minor
☐ Major
☐ Cancellation

⑧ Effective Date: 9/13/00 Expiration Date: NA

⑨ Proposed Modification	⑩ Justification
Minor Modification #5 to the B776 Decommissioning Operations Plan was approved by CDPHE on 9/13/00. This modification includes updates to Table 6, RCRA-regulated Units, and the addition of unit-specific closure information for set 55 to Appendix H.	Approved by CDPHE pursuant to paragraph 127 of RFCA.

⑪ Reviewing Organization	⑫ Signature or Name of Reviewer	⑬ Date	⑪ Reviewing Organization	⑫ Signature or Name of Reviewer	⑬ Date

⑭ (Completed to approve changes and cancellations only. New Documents and revisions are approved by signature on the document cover page.)

Approval Authority: Ted Hopkins (Print Name) [signature] (Sign) 9/19/00 (Date)

Rocky Flats Environmental Technology Site

BUILDING 776/777 CLOSURE PROJECT DECOMMISSIONING OPERATIONS PLAN

REVISION 0

November 3, 1999

Reviewed for Classification/UCNI

By: /s/ S.G. Mathiasmeier

Date: 06/12/00

PADC-2000-03278

RECORD OF MODIFICATIONS

Modification / Change	Effective Date	Note
Revision 0	11/3/99	Revision 0 contains 271 pages
Modification #1 (minor modification)	12/15/99	Appendix H has been inserted to provide for the addition of RCRA unit-specific closure information for SET #62. List of revised/new pages: 1. Cover page (revised to show total of 279 pages) 2. Page 2 (revised to track modifications to this DOP) 3. Page 8 (revised to show addition of Appendix H) 4. Pages 272-279 (added to provide RCRA unit-specific closure information)
Modification #2 (minor modification)	02/24/00	Section 4 has been revised to provide for the partial closure of a RCRA-regulated unit upon engagement of the consultative process and approval of the LRA. List of revised pages: 1. Page 41, Section 4.5.2 (second paragraph)
Modification #3 (minor modification)	03/03/00	RCRA unit-specific closure information for SETs 7, 11, 26, and 61 has been added to Appendix H. List of revised/new pages: 1. Cover page revised to show total of 290 pages. 2. Closure information sheets and drawings for SETs 7, 11, 26, and 61 added to Appendix H (11 pages)
Modification #4 (minor modification)	05/23/00	This modification to the DOP provides the framework for managing remediation wastes generated during decommissioning List of revised/new pages: 1. Cover page revised to show total of 287 pages. 2. Page 12 of the Executive Summary, third full paragraph - reference to development of site-wide strategy for managing remediation waste deleted (information added to OO-776-374, Management Requirements for Remediation Waste). 3. Page 75, Section 6.1, RCRA/CERLA Transition - reference to development of site-wide strategy for managing remediation waste deleted; reference to OO-776-374 added. 4. Page 84, Section 6.5, Waste Accumulation, Staging, Storage, and Treatment - deleted (information moved to OO-776-374). 5. Page 87, Section 7.2 - reference to development of a "sitewide strategy for managing remediation and to on-site treatment deleted (information moved to OO-776-374).

Modification # and Type	Effective Date	Notes
Modification #5 (minor modification)	09/13/00	Table 6 has been revised to add 7 container storage units, and RCRA unit-specific closure information for SET 55 has been added to Appendix H. List of revised/new pages: 1. Cover page (revised to show total of 290 pages) 2. Page 39, Section 4.5 – Seven container storage units added to Table 6. 3. Pages 288-290 - Closure information sheet and drawing for SET 55 added to Appendix H.
Modification #6 (minor modification)	02/22/01 CDPHE approval. 03/15/01 Document Control effective date	Table 6 has been revised to add mixed residue tank V-747A, and RCRA unit-specific closure information has been added to Appendix H for SETs 4,5,6, 10,11,18,21,22,27,29,34,35,36, and 52. List of revised/new pages: 1. Cover page (revised to show total of 337 pages) 2. Page 39, Section 4.5 – Tank V-747A added to Table 6. 3. Page 271, Appendix H cover sheet – added SETs 4,5,6, 10,11,18,21, 22,27,29,34,35,36, and 52. 4. Pages 291-337 - Closure information sheets and drawings for SETs 4,5,6,10,11,18,21,22,27,29,34,35,36, and 52 added to Appendix H.
Modification #7 (minor modification)	06/27/01	This modification to the DOP includes updates to sections 4.5.2 and 6.3 concerning RCRA closures and CERCLA treatment units, respectively. List of revised pages: 1. Page 3 (revised to track modifications to this DOP) 2. Pages 4-10 (updated Table of Contents) 3. Page 41, Section 4.5.2 (revised language) 4. Page 83, Section 6.3 (revised language) 5. Page 84 (revised typos in section numbers 6.3 and 6.4)

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EXECUTIVE SUMMARY

The Building 776/777 Cluster is comprised of Buildings 701, 702, 703, 710, 712, 712A, 713, 713A, 730, 776/777, and 781, which are located within the Protected Area (PA) of the Rocky Flats Environmental Technology Site (RFETS). Closure of the Building 776/777 Cluster is necessary to meet the goals of the Rocky Flats Cleanup Agreement (RFCA), (Ref. 1), and the RFETS Closure Project Baseline (CPB). Three alternatives were considered for the near-term management of the Building 776/777 Cluster:

- Alternative 1 - Decommissioning
- Alternative 2 - No Action with Safe Shutdown Maintenance
- Alternative 3 - Reuse of the Facilities

The alternatives were evaluated for effectiveness, feasibility, and relative costs. Alternative 1 is the selected alternative. Decommissioning clearly supports the Rocky Flats Vision (Ref. 2) of safe, accelerated, cost-effective closure. This alternative has the lowest life-cycle costs and most rapid risk reduction, and it is integrated with Site operations. This alternative also maintains 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) can be physically and administratively controlled. There are no significant negative aspects to decommissioning the Building 776/777 Cluster at this time.

Currently, the buildings in the B776/777 Cluster are scheduled to be deactivated and decommissioned by the close of fiscal year (FY)06 and remediated by the close of FY07. These dates are subject to change, based on accelerated schedules currently under development. Environmental impacts resulting from the Building 776/777 Closure Project will contribute incrementally to potential site-wide cumulative impacts associated with the overall RFETS Closure Project. Given the existing industrial setting of the Building 776/777 Cluster, environmental impact issues associated with the project are relatively limited.

For planning purposes, the Cluster was divided into small manageable groupings of similar equipment and rooms that could be worked independently and within a one-year estimated time frame. A total of 84 groups, or SETs, were defined for the Cluster. Next, the SETs were prioritized to establish the order in which they would be decommissioned, taking into account such factors as physical constraints, personnel and environmental health and safety (H&S), operational/technical issues, management issues, costs, and waste generation issues. The Decontamination and Decommissioning Characterization Protocol (DDCP), (Ref. 3), was then used in conjunction with process knowledge to complete a reconnaissance level characterization (RLC) for each SET. Results were documented in the Reconnaissance Level Characterization Report (RLCR), (Ref. 4), which identified the presence of radiological and beryllium (Be) contamination, as well as hazards such as lead and other heavy metals, polychlorinated biphenyls (PCBs), special nuclear material (SNM) holdup, radioactive sources, and waste chemicals in many of the SETs located in Building 776/777 and Building 730. Following the RLC, endpoints (i.e., completion criteria) were developed for each SET and size reduction and decontamination methodologies were examined to complete the development of the decommissioning sequence.

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), will be decommissioned in accordance with this Decommissioning Operations Plan (DOP). Buildings within the Cluster that are free of contamination (i.e., Type 1 buildings) will be decommissioned using Site procedures upon notification of the Lead Regulatory Agency (LRA), (i.e., the Colorado Department of Public Health and Environment [CDPHE]). As detailed in the RLCR, Building 776/777 is believed to be a Type 3 building, Building 730 is believed to be a Type 2 building, and the remaining buildings in the Cluster are believed to be Type 1 buildings. Therefore, the scope of this DOP is limited to Buildings 776/777 and 730. It is recognized that additional sampling and analysis will be required to verify the characterization of the Type 1 buildings. In the event sampling results indicate the presence of contamination and/or hazards in one or more of the Type 1 buildings, the building(s) will be re-typed and added to a subsequent decision document(s), which may include a modification to this DOP.

The RFCA definition of decommissioning includes the demolition of building structures and disposition of building slabs. At this time, demolition methods and techniques are still being identified for the Building 776/777 Cluster, along with associated controls and performance specifications necessary to protect worker safety, public health, and the environment. As a result, the demolition stage of decommissioning is not included in Revision 0 of the DOP. This information will be provided in a subsequent decision document(s), which will constitute a major modification to this DOP. In addition to the routine requirements for major modifications, this information on Building 776/777 demolition will be submitted for a public comment period equivalent to that for the initial Building 776/777 DOP.

Work performed under this DOP will be accomplished in conformance with the RFETS Integrated Work Control Program (IWCP), Integrated Safety Management System (ISMS), and applicable quality assurance (QA), radiological control, and waste management requirements. Mod #4

Decommissioning activities will be documented in the Building 776/777 Closure Project Record, RCRA Operating Record, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, Ref. 5) Administrative Record. Upon completion of decommissioning activities and final characterization, a Final Closeout Report will be prepared for review and approval by the LRA.

1.0 INTRODUCTION

Closure of the Building 776/777 Cluster is necessary to meet the goals of RFCA (Ref. 1) and the Closure Project Baseline. The Building 776/777 Closure Project is managed under the RFETS Closure Project Baseline, which contains the life-cycle schedule.

The overall project strategy is to prioritize closure activities, taking into account personnel, public, and environmental H&S; physical constraints; operational and technical issues; management issues; cost; and waste generation issues. As shown in Figure 1, closure activities for the Building 776/777 Cluster are divided into three phases: deactivation, decommissioning (including demolition and disposition of building slabs), and environmental restoration.

Currently, the buildings in the B776/777 Cluster are scheduled to be deactivated and decommissioned by the close of FY06, and remediated by the close of FY07. These dates are subject to change, based on accelerated schedules currently under development.

Deactivation activities are being completed in conformance with the Building 776/777 Closure Project Execution Plan (PEP). Buildings with significant contamination or hazards and buildings without significant contamination or hazards, but in need of decontamination, will be decommissioned in accordance with this DOP. Buildings within the Cluster that are free of contamination will be decommissioned using Site procedures following notification to the LRA.

The RFCA (Ref. 1) definition of decommissioning includes the demolition of building structures. At this time, demolition methods and techniques are still being identified for the Building 776/777 Cluster, along with associated controls and performance specifications necessary to protect worker safety, public health, and the environment. As a result, the demolition stage of decommissioning is not included in Revision 0 of the DOP. This information will be provided in a subsequent decision document(s), which will constitute a major modification to this DOP. In addition to the routine requirements for major modifications, this information on Building 776/777 demolition will be submitted for a public comment period equivalent to that for the initial Building 776/777 DOP.

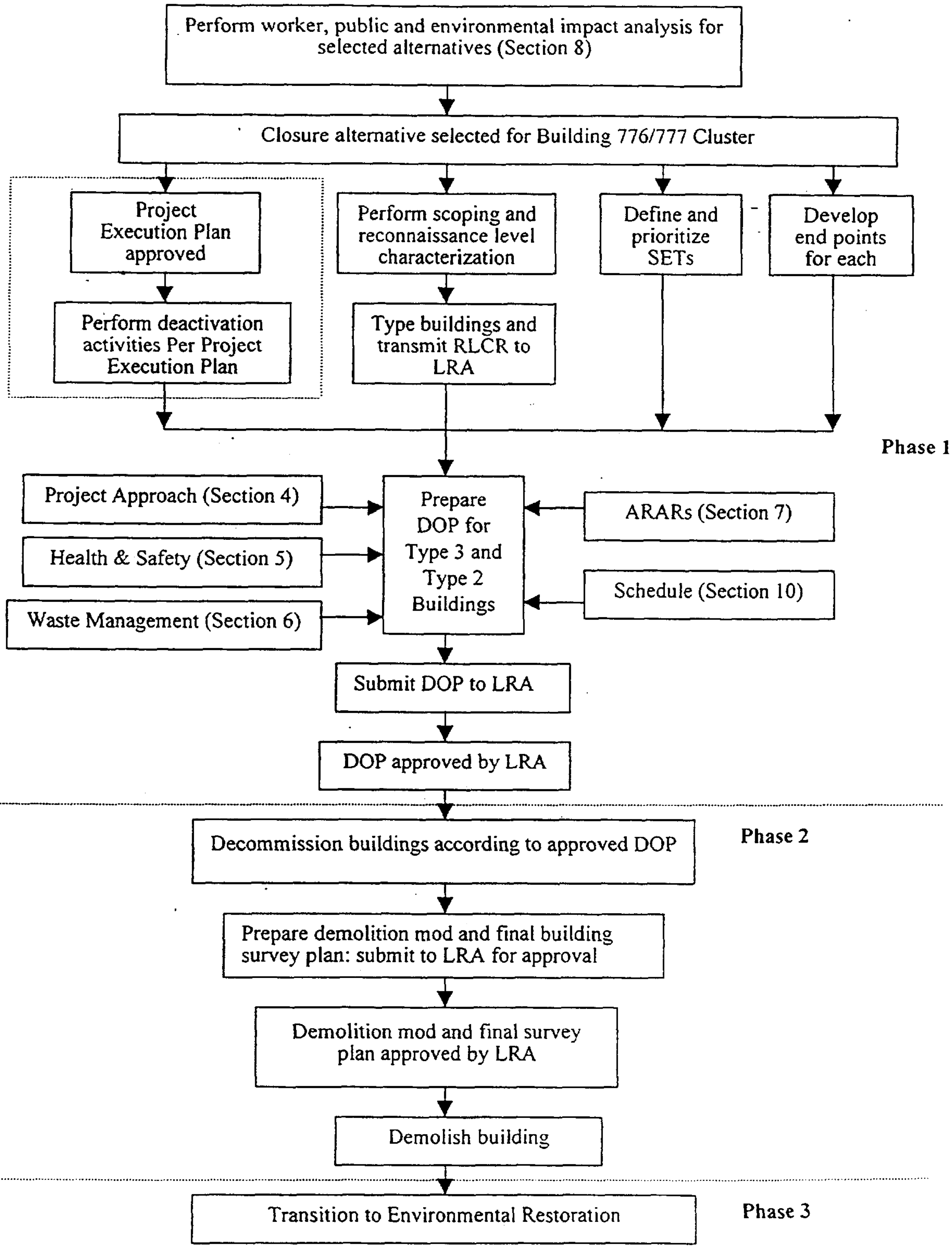

Figure 1. Closure Planning Phases for Type 2 and Type 3 Buildings in the Building 776/777 Cluster

2.0 BUILDING CLUSTER DESCRIPTION

Building 776/777 is a two-story structure with a partial basement and common wall separating Buildings 776 and 777. A tunnel located at the northwest corner of Building 776 connects to Building 771, an above-ground crossover on the east side of Building 777 connects to Building 779, and a hallway on the south side of Building 776 connects to Building 707.

The first floor of Building 776/777 has an area of 135,000 ft^2; the second floor, 88,000 ft^2; and the basement, 1,600 ft^2, for a building total of 224,600 ft^2. Since the building was first constructed, several additions have been made to the original structure (see Figure 2), including the east side of Building 777 (columns [cols.] 21-25, D-L); parts storage (cols. 19-23, L-P); assembly development (cols. 23-35, H-L); dock enclosures (Room 437); radiography, cleaning and plating facility (cols. 23-25, L-P); high pressure gas test facility (southeast corner of Building 777); two-story office addition (southeast side of Building 777); fabrication (cols. 1-3W, A-P); autoclave facility; and the Betatron vault. In addition, a second roof was added to cover the majority of the original roof after a major fire in 1969.

Buildings 776 and 777 share most utilities, including supply and control of potable water, eyewash and emergency body showers, cooling water, sanitary sewage, building heating and air conditioning, glovebox (GB) and vacuum air supply, emergency electrical power, and compressed air.

Buildings 776 and 777 also share some utilities with surrounding buildings. Measures for re-routing connections or providing temporary services will be included in the planning and engineering for Building 776/777 decommissioning activities. Following is a list of the shared utilities:

- Breathing air is provided from Building 707;
- Steam from Building 776/777 heats the water for the Building 778 locker rooms;
- Plant air is shared between Buildings 776/777, 779 and 771;
- Emergency power for the Building 776/777 criticality alarm panel (located in Building 750) is supplied from Building 708, which is also the Building 707 emergency generator;
- The classified telecommunications center for the Site is located in Building 777;
- The chainveyor between Building 707 and Buildings 776/777 is a common line provided with inert gas from both Building 707 and Buildings 776/777; and
- Building 776/777 provides electrical service and ventilation for the Building 771 tunnel and Building 779 crossover.

Support systems are located in the following buildings, which are also included in the Building 776/777 Cluster:

- Building 701 (research and development laboratory, 5,170 ft^2),
- Building 702 (pump house for B712, 924 ft^2),

This page has been left blank due to classification issues.
Personnel with access to UCNI may obtain this information from
the Building 776/777 Cluster Closure Project Manager.

Figure 2. Building 776/777 Additions

- Building 703 (pump house for B713, 1,080 ft^2),
- Building 710 (steam reducing station, 352 ft^2),
- Building 712 (cooling tower, 2,425 ft^2),
- Building 712A (propane valve house, 90 ft^2),
- Building 713 (cooling tower, 2,475 ft^2)
- Building 713A (valve pit, 250 ft^2),
- Building 730 (plenum deluge tank pit, 698 ft^2), and
- Building 781 (helium compressor pit, 440 ft^2).

Figure 3 shows the location of the buildings that comprise the Building 776/777 Cluster.

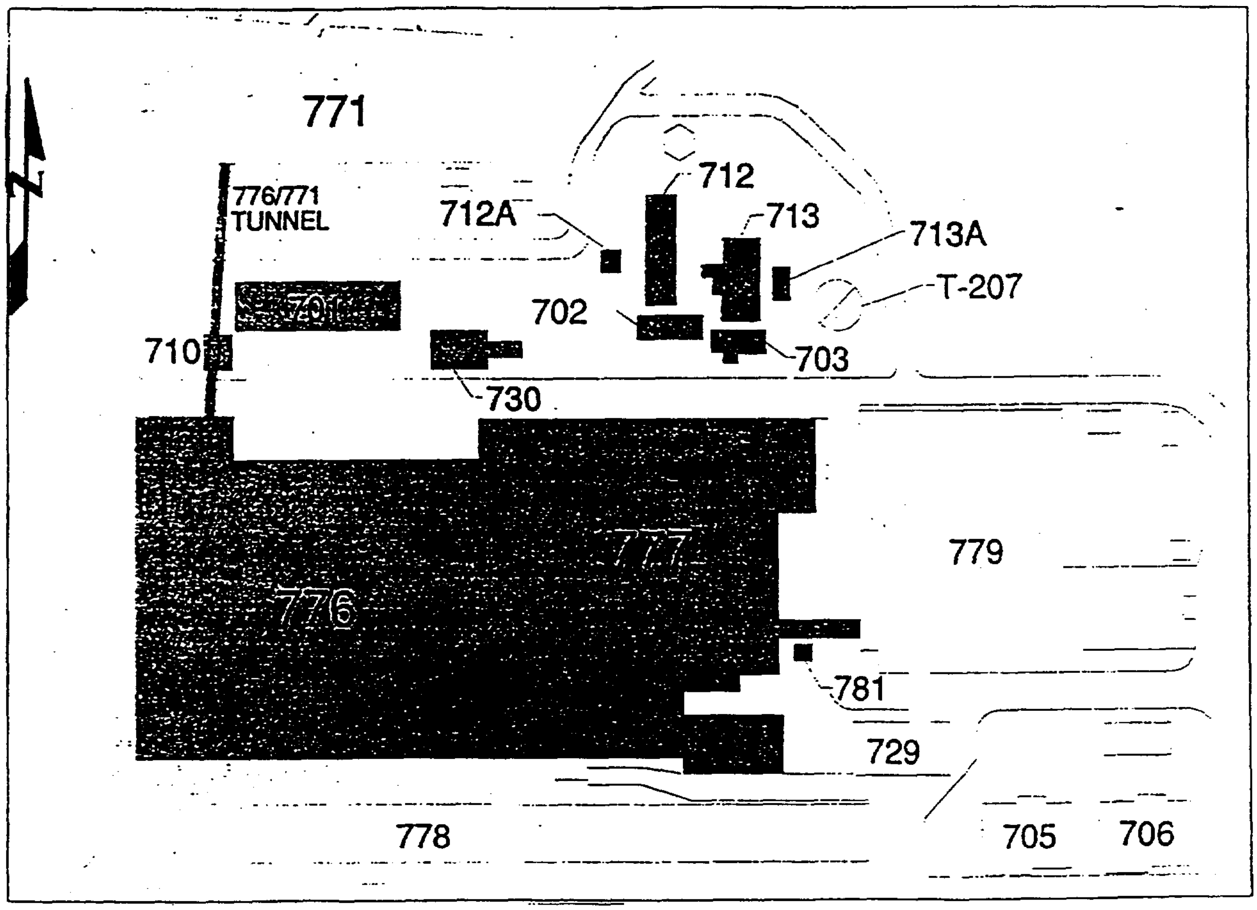

Figure 3. Building 776/777 Cluster Facilities

2.1 Building History

The Building 776/777 Cluster was constructed between 1955 and 1957. Beginning in 1958 and continuing through 1969, Building 776 was the main manufacturing facility for plutonium (Pu) weapons components and it housed a Pu foundry and fabrication operations. The main function of Building 777 was parts assembly. Following a major fire in Building 776/777 in 1969, the majority of the foundry and fabrication operations were transferred to Building 707. Although limited production operations were resumed in Building 776/777 when cleanup activities were completed, at that point, the main focus of the building was shifted to waste and residue handling, disassembly of retired weapons components, and special projects. Processes conducted in Building 776 included size reduction, advanced size reduction, pyrochemistry, coatings operations, and test runs of organic waste and combustibles in a fluidized bed incinerator (FBI). Building 777 operations included machining, product assembly and disassembly, testing and inspection of special weapons projects, and support operations, such as laboratories. Table 1 presents an historical summary of Building 776/777 Cluster operations.

Building 776/777 contained an extensive GB network that supported various Pu production operations. Prior to the 1969 fire, the majority of the building space consisted of one large room. Subsequent to the fire, most GBs were removed from Building 776 and the large room was compartmentalized into several areas separated by physical barriers to confine radioactive material releases. A negative pressure ventilation system is used to prevent areas of least contamination from becoming contaminated by areas of higher contamination. The building is equipped with a series of high efficiency particulate air (HEPA) filters to control air emissions to the environment.

Table 1. Historical Timeline

Year	Event
1957	Construction of Building 776/777 Cluster was completed.
1958	The first significant machining of Pu began.
1964	Pu and carbon tetrachloride exploded during a briquetting operation in Building 776.
1965	The "GB drain line fire" occurred during maintenance on a plugged oil coolant drain line in Building 776/777. The fire was attributed to spontaneous combustion of Pu chips. The fire spread contamination inside the building. Affected areas were decontaminated and painted to fix contamination that was not removed.
1969	Waste operations began in Building 776, originally initiated for disposing of contaminated material from the 1969 fire.
1971	Clean-up activities for the 1969 fire were completed on October 18th.
1972	Pu fabrication operations in Building 776 were transferred to Building 707. Building 776 was converted to a waste storage and size reduction facility.
1989	Pu production operations ceased in November.

2.2 Building 776/777 Fire

On May 11, 1969, a major fire in Building 776/777 resulted in gross radiological contamination of Building 776/777 and portions of Buildings 771 and 779. The fire occurred in Room 134 in the north foundry line and propagated by way of the chainveyor system. The first floor operating areas of Buildings 776 and 777 were highly contaminated. The entire second floor of Building 776 was moderately contaminated from air-borne contamination through the floors and walls. The office areas in Building 776 were moderately contaminated from water-borne material, mainly on the floors. The roof of Building 776 was moderately contaminated in three areas. Two contaminated areas were localized around sanitary vent penetrations; the third, more extensive area extended from the exhaust duct to the edge of the roof.[1] The fire resulted in the relocation of some of the foundry, fabrication, and assembly operations to Building 707. During cleanup, some pieces of contaminated equipment, including presses, a rolling mill, casting furnaces and associated GBs were size reduced and buried under the floors in Building 776 (see Section 4.3.2.1 for further details).

After the fire, the major production operations in the building were reduced to machining operations on the south line in Building 776 and disassembly of retired weapons components and assembly operations in Building 777. In Building 776, the empty spaces resulting from the fire were converted to perform waste-related operations, focusing on waste reduction. Other operations conducted in the Cluster included Pu recovery operations in Building 776 and support operations, such as storage and laboratory work, in both buildings. These operations continued until production was curtailed at Rocky Flats in 1989.

2.3 Current Status

Routine operations are conducted in Building 776/777 16 hours per day, five days per week. However, stationary operating engineers, radiological control technicians, and security personnel staff the building 24 hours a day, seven days a week. The Shift Manager, Configuration Control Authority (CCA), or designee, provides initial emergency response and mitigation actions during off-shift hours and normal administrative functions on the weekends, holidays, and off-normal shifts. With the exception of Buildings 776/777 and 701, buildings and structures within the Cluster are not normally occupied and are usually under lock and key.

The majority of building personnel are involved in maintaining vital safety systems (VSS), performing Limiting Conditions for Operations (LCO) surveillances and RCRA inspections, repackaging special nuclear material (SNM), and managing waste.

The Building 776/777 Cluster contains RCRA regulated tanks systems, treatment units, and container storage areas, including rooms, vaults, and GBs. A complete listing of RCRA units is provided in Section 4.5. In addition, the Cluster contains the following six individual hazardous substance sites (IHSSs):

- 118.1 - Multiple solvent spills west of Building 730,

[1] Details regarding roof contamination and removal will be provided in the demolition modification to this DOP, which will be added as a major modification in compliance with ¶127 of RFCA prior to the initiation of demolition activities. The demolition modification will be submitted for a public comment period equivalent to that for the initial Building 776/777 DOP.

- 118.2 - Radiological contamination in soil,
- 132 - Leaking underground laundry waste tanks,
- 144 - Radiological contaminated laundry waste water line break,
- 150.2 - Radiological contamination in soil (resulting from the 1957 and 1969 fires), and
- 150.7 - Radiological contamination in soil (resulting from the 1969 fire).

Building 776/777 currently stores approximately 3,200 waste containers. Of the 3,200 containers, 100 are sanitary waste, 650 are low-level (LLW)/low-level mixed (LLM) waste, 350 are transuranic (TRU)/transuranic mixed (TRM) waste, and the remaining 2,100 are residues (RES/REM). In addition, the building contains 279 contaminated GBs and B-boxes with interconnecting chainveyor lines, a size reduction vault, advanced size reduction facility (ASRF), FBI pilot unit, FBI production unit, horizontal and vertical accelerator, HEPA low specific activity counter, and a supercompactor.

SNM is being removed from vaults within the building to reduce the amount to below the safeguard termination limits. This activity began in FY98 and is planned for completion in FY99. SNM high holdup areas have been identified. Additional SNM holdup scans are planned and these areas will be remediated, as necessary.

2.4 Building Classification

The Decommissioning Program Plan (DPP), (Ref. 6), defines building types as follows:

- Type 1 buildings are free of contamination,
- Type 2 buildings are without significant contamination or hazards, but in need of decontamination, and
- Type 3 buildings have significant contamination or hazards.

Each building type has its own degree of regulation. The DPP serves as the RFCA (Ref. 1) decision document for Type 1 buildings, thus decommissioning may proceed based on RFETS procedures upon notification of the LRA. Types 2 and 3 buildings require a separate RFCA decision document. Based on the RLC performed in 1997 and 1998 (see Section 4.3.2), Building 776/777 is believed to be a Type 3 building, Building 730 is believed to be a Type 2 building, and the remaining buildings in the Cluster are believed to be Type 1 buildings. As a result, this DOP addresses the decommissioning of Building 776/777 and Building 730, only. However, it is recognized that additional sampling and analysis will be required to verify the characterization of the Type 1 buildings. In the event future survey data indicate that contamination and/or hazards are present in one or more of these buildings, they will be addressed in a subsequent decision document(s), which may include a modification to this DOP.

2.5 Expected Condition of Buildings 776/777 and 730 at Start of Decommissioning

The expected condition of Building 776/777 and Building 730 at the start of decommissioning is discussed in Section 4.11 and 4.12.

3.0 ALTERNATIVES ANALYSIS

Alternatives considered for Buildings 776/777 and 730 support the Rocky Flats Vision (Ref. 2), which requires buildings to be decontaminated for future use or decommissioned, as appropriate. The following three alternatives were examined:

- Alternative 1 - Decommissioning
- Alternative,2 - No Action with Safe Shutdown Maintenance
- Alternative 3 - Reuse of the Facilities

The criteria used to evaluate the alternatives were effectiveness, feasibility, and relative costs. The results of the alternatives analysis are summarized in Table 2.

Alternative 1, Decommissioning, is the selected alternative because it is the best alternative to meet the evaluation criteria. The Rocky Flats Vision of safe, accelerated, and cost-effective closure is clearly supported by the decommissioning of the Building 776/777 Cluster. This alternative results in the lowest life-cycle costs and most rapid risk reduction, and it is integrated with Site operations. This alternative also maintains long-term protection of public health and the environment. Physical and administrative measures can be implemented to control short-term impacts to the environment (i.e., impacts occurring during the interval of the action). At this time, there are no significant negative aspects to decommissioning the Cluster.

Alternative 2, No Action with Safe Shutdown Maintenance, does not achieve RFETS goals. This alternative does not accomplish accelerated closure, and it defers decommissioning to an unspecified date. This results in an increase in the life-cycle cost of closure. Inaction achieves the short-term protection of public health and the environment; however, this protection decreases over time, due to continued degradation of systems and equipment through aging. Furthermore, under this alternative the waste and debris requiring treatment and/or disposal and the risks associated with managing them are also deferred.

Alternative 3, Reuse, is not feasible because it is neither required nor beneficial. As with Alternative 2, implementation of this action will result in deferral, not elimination, of the decommissioning activities necessary for final closure.

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 consist of 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 776/777 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 since landlord costs continue to be incurred until decommissioning begins.
3 – Reuse	*Reuse* of the 776/777 Cluster would maintain the facilities in their current configuration. A new mission for the facilities, in support of the present Site cleanup mission, would be assigned by the Site Utilization Review Board. 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 776/777 Cluster 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 4300.1C, subparagraph (g), Disposal of Government-Owned Land Improvements. 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 as 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.

4.0 PROJECT APPROACH

The decommissioning planning process for the Building 776/777 Cluster has been completed and the costs and schedules are included in the CPB. During the course of the project, there will be cases where circumstances differ from those predicted. The flexibility to revise planned activities is essential to the successful management of this project.

The RFCA definition of decommissioning includes the demolition of building structures and disposition of building slabs. At this time, demolition methods and techniques are still being identified for the Building 776/777 Cluster, along with associated controls and performance specifications necessary to protect worker safety, public health, and the environment. As a result, the demolition stage of decommissioning is not included in Revision 0 of the DOP. This information will be provided in a subsequent decision document(s), which will constitute a major modification to this DOP. In addition to the routine requirements for major modifications, this information on Building 776/777 demolition will be submitted for a public comment period equivalent to that for the initial Building 776/777 DOP.

4.1 SET Descriptions

For planning purposes, the Building 776/777 Cluster has been divided into small, manageable groupings of similar equipment and rooms that can be worked independently. The groupings are referred to as SETs. Eighty-four SETs were developed for the Cluster. The SETs are the foundation for the planning, prioritization, cost estimation, and scheduling of decommissioning activities.

SET descriptions are presented in Appendix A and SET locations are shown in Figure 4 and Figure 5. The SETs are categorized by six types: 1) GB, 2) tank, 3) equipment, 4) room, 5) room/equipment, and 6) building structure. Following is a general description of each SET type:

1) GB SETs include GBs, equipment in the GBs, associated external equipment and instrumentation, and piping from the GBs to the nearest cutoff point. In some cases, GB lines are very long and may be broken into as many as four SETs for that particular line.
2) Tank SETs include the tank, associated external equipment and instrumentation, and piping from the tank to the nearest logical cutoff point.
3) Equipment SETs include specific pieces of equipment, associated external equipment and instrumentation, and piping from the equipment to the nearest cutoff point.
4) Room SETs include all equipment and instrumentation not associated with GBs, tanks, or equipment SETs; tools, miscellaneous items, and piping not removed with GBs, or tanks; equipment SETs below eight feet, and interior walls.
5) Room/equipment SETs include all equipment (GBs, tanks, etc.) and instrumentation, tools, miscellaneous items, utilities below eight feet, and interior walls.
6) The building structure SETs include interior and exterior walls, floors, ceilings, and utilities above eight feet.

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Building 776/777 Closure Project Manager.

Figure 4. Building 776/777 First Floor SET Locations

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Building 776/777 Closure Project Manager.

Figure 5. Building 776/777 Second Floor SET Locations

4.2 SET Prioritization

Once the SETs had been identified, an initial meeting was held to establish the order in which they should be removed. To ensure applicable areas of concern would be identified, representatives from engineering, operations, authorization basis (AB), maintenance, and utilities organizations attended the meeting. An historical subject matter expert (SME), the closure project team members, and representatives from DOE and the CDPHE also attended. The SETs were prioritized using a classical value engineering technique that ranks importance through use of a weighted matrix. The criteria for ranking SETs included physical constraints, safety, operational/technical issues, management, cost, and waste generation. The initial SET prioritization was then re-evaluated, factoring in the amount of funding available each fiscal year, pathways out of the facility, logistics, resources, and the decommissioning learning curve. The final results of the SET prioritization effort are shown in Figure 6.

4.3 Building 776/777 Cluster Characterization

The Building 776/777 Cluster was characterized using a three-step approach:

1) Scoping characterization,
2) Reconnaissance level characterization (RLC), and
3) In-process characterization.

The following paragraphs describe each step in more detail.

4.3.1 Scoping Characterization

During scoping characterization, existing records and documents were collected, then present and former Building 776/777 employees were interviewed to determine the physical, hazardous, radiological, and chemical conditions of the Cluster. Based on the information collected, the B776/777 Closure Project Manager conducted an RLC to document the configuration of equipment, piping, ventilation systems, and types and levels of contamination and hazards within the Cluster.

4.3.2 Reconnaissance Level Characterization

The purpose of the RLC is to establish a preliminary estimate of the types of contamination and hazards that are present. The RLC identifies the location and extent of radiological and Be contamination, and documents the presence of asbestos, lead and heavy metals, PCBs, SNM holdup, waste chemicals, radioactive sources, and physical hazards. The RLC for the Building 776/777 Cluster was performed from November 1997 through June 1998. During that time, process knowledge and detailed walkdowns were used to identify:

- Capital equipment,
- GBs and hoods,
- Tanks and their respective sizes,

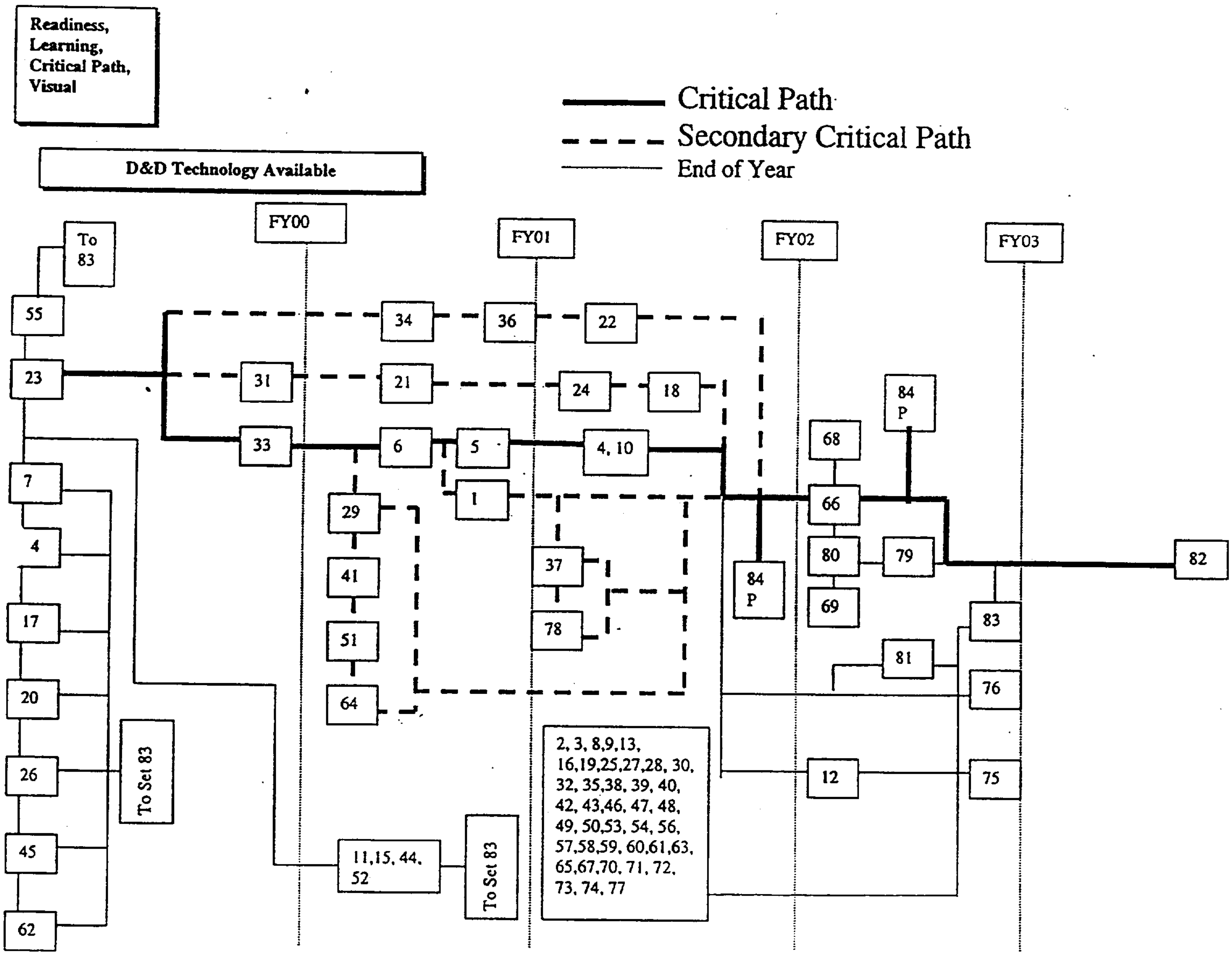

Figure 6. SET Prioritization

- Other equipment,
- Classified matter,
- Contamination areas and approximate contaminant levels,
- Locations of chemicals,
- Utility and process service connections including water, electrical, steam, and ventilation, and
- Documentation regarding building construction materials.

Results from the RLC for the Building 776/777 Cluster are documented in the RLCR, which was transmitted to the LRA in December of 1998. A summary of the contaminants and hazards found in Buildings 776/777 and 730 is presented in Table 3.

4.3.2.1 Equipment Buried Under Building 776/777

In February 1998, ground-penetrating radar was used in designated areas of Building 776/777 to confirm the presence of material cemented in original stairwells, under GBs, and buried under the floors after the 1969 fire. The radar images are on file with the Project Record. These areas are included in SET 84. Planning and engineering for this SET will be completed prior to decommissioning the SET. In-process characterization will be performed during the planning and engineering effort and detailed information concerning the methods that will be used to remove the buried equipment before the building is demolished will be identified. Due to the sensitivity of this work, in-process characterization of buried equipment within the Building 776/777 structure will be provided to the LRA for review. Work packages, currently undeveloped, for removal of equipment buried or cemented within the building structure will be shared with the regulators per the consultative process. Under-building contamination will be addressed during environmental restoration. The decommissioning of this SET is not scheduled to begin until FY03.

Testimony from the 1969 fire indicated that some of the original stairwells under GBs were filled with contaminated debris, such as personal protective equipment (PPE), plastic, and other combustibles, then filled with concrete. Because ground-penetrating radar only identifies density changes, these stairwells were not investigated.

Fire testimony documentation also indicated that contaminated debris may have been buried in equipment pits in Building 776. In addition, the original construction drawings for the foundation showed numerous below-grade areas (i.e., equipment pits, underpasses, and sumps) that are no longer visible or accessible. Based on the construction drawings, the original below-grade areas were mapped to determine where equipment might be buried.

Ground-penetrating radar was used in Rooms 118 (SET 63), 134 (SET 67), 127 (SET 68), and the Carpenter Shop (SET 54). These areas are shown in Figure 7. A detailed characterization of these areas may be found in Appendix A of the RLCR. The floor under the FBI in Room 118 (Area C) was confirmed to have a definite change in density that is believed to be the rollers from the rolling mill and the saw used to cut the rollers. The results of the ground penetrating radar in Room 134 adjacent to the manual disassembly area on the ASRF (Area D) were inconclusive. This area will remain as a suspect area of concern for planning purposes during

Table 3. Extent of Contamination and Hazards in Buildings 776/777 and 730

CONTAMINANT	HAZARDS
Radiological Contamination*	B776/777 - *Building Structure*: The building floors, walls, roof, and ceilings are assumed to be contaminated to the levels that existed after the May 1969 Pu fire. *Equipment*: Pu production equipment surface contamination levels are stated in the RLCR. Equipment internal contamination levels are assumed to be >10^6 counts per minute (cpm). *Process Piping*: Process piping is contaminated to levels of the May 1969 fire. *Electrical Panels & Conduit*: Electrical panels and conduit on the first and second floors are posted as "Contamination Areas" due to the 1969 Pu fire. *Soil Contamination*: Soil contamination under the building is expected from two sources: Fire water used to extinguish the 1969 fire and ground water fluctuations resulting in seepage of contaminated ground water from surrounding IHSSs into the soil. *Ventilation*: Zone IA ventilation system contamination levels are assumed to be >10^6. *Buried Equipment*: Contaminated equipment was buried in various locations under the floor after the 1969 fire; contamination levels are assumed to be > 10^6 cpm. B730 - Radiological contamination remains from radioactive solutions previously stored in the B730 Pit.
Be Contamination*	B776/777 - Be contamination is present due to machining, welding, handling and storage of Be parts. B730 - None identified.
ACM**	B776/777 - Present or potentially present in floor and ceiling tiles, mastic under floor tiles and carpet, walls, piping and equipment insulation, and roof tar. B730 - None identified.
Lead & Other Heavy Metals	B776/777 - Lead is present or potentially present throughout the facility in the following items: lead aprons, lead tape, leaded glass, solder in printed circuit boards, lead shielding, leaded gloves, tank sludge, incandescent lights, and paint. Paint may contain other heavy metals in addition to lead. Mercury is present in sodium vapor lights, fluorescent lights, incandescent lights, thermostats, switches, magnahelics and other instrumentation. Barium is present in leaded glass and tank sludge. Chrome is present in FBI equipment and oil. Cadmium is present in sludge and oil in FBI tanks. Silver is present in tank sludge. B730 - None identified.
PCBs	B776/777 - PCBs are present or potentially present in fluorescent light fixtures, capacitors, oils, chlorinated solvents, and paint. B730 - None identified.
SNM Holdup	B776/777 - SNM holdup is present in Zone I and IA ventilation systems and GBs. B730 - None identified.
Chemicals	B776/777 - Waste chemicals will be removed during deactivation. The exceptions are excluded chemicals and chemicals that will be used for decommissioning. Chemical solutions in tanks and piping will be sampled or characterized based on process knowledge during deactivation. B730 - None identified.
Radioactive Sources	B776/777 - Selective Alpha Air Monitors, Continuous Air Monitors, and radiological instrumentation needed on a daily basis are the sources that will be in the building during decommissioning. B730 - None identified.

Source: Table 2 of the Building 776/777 Cluster Reconnaissance Level Characterization Report

* Survey results and maps identifying contamination locations are presented in the RLCR.

** Sample results are presented in the RLCR.

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Figure 7. Ground-Penetrating Radar Survey Locations (Building 776/777)

future Site remediation. The area adjacent to the existing basement in Room 127 (Area E) was the largest equipment pit, which appears to be sealed (approximately 1,600 ft^2). Based on the radar images, it appears no equipment or other material is buried in the area. The radar images also indicate that autoclaves are present beneath the Maintenance Carpenter Shop on the west side of Building 776 (Area F). Based on the drawings of this room, it appears the autoclaves are buried approximately 30 feet below grade.

It is believed the paint and solvent pit in Room 125 (SET 1), (Area G), and Room 133 (SET 2), (Area H), were filled to cover contamination. Since the pit in Room 125 is only eight inches deep and the pit in Room 133 is only 12 inches deep, it is believed equipment is not buried in these locations.

Another area in Room 127 (SET 68), (Area B), was investigated due to ongoing problems with the floor. During a maintenance job to repair the floor in late 1994, the concrete appeared soft. As the floor was scraped to remove paint, high levels of contamination developed along with a "puff" of air, and the maintenance crews encountered what they believed were metal plates. Based on the radar images of this area, there does not appear to be anything buried under the floor. However, the radar cannot penetrate a metal plate, so this area will be left as a suspect area of concern for planning purposes for future Site remediation.

4.3.3 In-Process Characterization

In-process characterization is required to prepare appropriate work authorization (WA) documents such as Radiological Work Permits (RWPs) required by the Site Radiological Control Manual (Ref. 7), and Activity Hazard Analyses (AHAs) required by the Integrated Work Control Program (IWCP) Manual (Ref. 8). Information collected for this purpose may also be used to further characterize the facility and provide background information for final building surveys.

In-process characterization is typically completed shortly before a work activity is initiated to ensure conditions have not changed since the planning stage. As work progresses and contaminants and hazards are eliminated, further characterization is completed to verify that contaminants and hazards have been removed to acceptable levels.

In-process characterization is based on process knowledge and field sampling and/or radiological surveys. Sampling and analysis activities are initiated through work packages for each SET prepared under the IWCP (see Section 5). Radiological surveys are routinely performed in radiological areas. Information collected during the RLC and pre-job walkdowns will be used to determine sampling and/or surveys requirements for each SET.

Recommended in-process characterization activities for Buildings 776/777 and 730 are presented in Table 4. The following paragraphs provide an overview of how in-process characterization will be performed for lead and other heavy metals, liquids, PCBs, asbestos, radiological contamination, and Be. Appendix A describes the specific characterization required for each SET, as well as the unique hazards that may be present in each SET.

Table 4. In-Process Characterization Required for Contamination and Hazards in Buildings 776/777 and 730

CONTAMINANT	HAZARDS
Radiological Contamination	B776/777 - *Building Structure*: In-process surveys are required to confirm the contamination levels. *Equipment*: In-process surveys and final equipment assays are required to determine if equipment will generate LLW or TRU waste, or if it can be free-released. *Process Tanks and Piping*: Process knowledge and in-process samples from solutions being drained from tanks and building systems during deactivation will confirm contamination levels within the piping and will be used to determine if additional information is needed to support decommissioning activities. *Electrical Panels & Conduit*: In-process characterization is required to confirm internal contamination levels. *Soil Contamination*: Environmental restoration personnel will assume responsibility for developing characterization plans for soil contamination. *Ventilation*: SNM holdup scans will be used to select decontamination/waste disposal methods for Zone I and IA ventilation systems. *Buried Equipment*: Contaminated equipment was buried in various locations under the floor after the 1969 fire; contamination levels are assumed to be > 10^6 cpm. B730 - In-process surveys are required to confirm contamination levels.
Be Contamination	B776/777 - In-process surveys are required to confirm Be contamination levels in storage, handling, and production areas. B730 - In-process surveys are required to confirm Be contamination levels.
ACM	B776/777 - In-process sampling may be required to determine if asbestos is present in roof tar and cement block insulation. Mapping will be used to determine if asbestos is present in ceiling and floor tiles. If materials cannot be mapped to known asbestos containing material, material will be sampled. Pipe and equipment insulation are assumed to contain asbestos; no additional sampling is required to determine if insulation contains asbestos. B730 - No in-process surveys will be required.
Lead & Other Heavy Metals	B776/777 - In-process sampling may be required to determine the presence of lead and other heavy metals in incinerator equipment and insulation. Sampling for lead and other heavy metals in paint may be required per guidance in Section 4.3.3.1. Sodium vapor, incandescent and fluorescent lights containing heavy metals will be managed as hazardous waste and do not require further sampling. Items known to contain lead and other heavy metals (i.e. leaded gloves) will be managed as hazardous waste, and no additional sampling is required. B730 - No in-process surveys will be required.
PCBs	B776/777 - Characterization may be required to determine if PCBs are present. If equipment is painted and is destined for distribution in commerce (for recycling or reuse) characterization for PCBs in the paint will be required. PCB liquids, PCB items, or others waste known to contain PCBs at greater than 50 parts per million (ppm) will be managed as PCB waste. B730 - No in-process surveys will be required.
SNM Holdup	B776/777 - No in-process sampling required in addition to the scans already planned to meet safeguards and security requirements for SNM removal. B730 - No in-process surveys will be required.
Chemicals	B776/777 - No in-process sampling is required. Most containerized chemicals will be removed during deactivation. Chemical solutions will be drained from tanks during deactivation. Newly discovered waste chemicals and/or those chemicals removed from excluded areas will be managed under the waste chemical program or as process waste, whichever is applicable. B730 - No in-process surveys required.
Radioactive Sources	B776/777 and B730 - No in-process characterization will be required.

Source: Table 6 of the Building 776/777 Reconnaissance Level Characterization Report

4.3.3.1 *Lead and Other Heavy Metals*

Lead and other heavy metals are present or potentially present throughout Building 776/777 in paint and in various equipment and insulation. Analysis for lead and other heavy metals in paint is not required in some cases. Available data from RFETS allows characterization of the non-radioactive lead based paint (LBP) debris generated in Building 776/777 as non-hazardous under RCRA, and amenable to disposal as sanitary waste per RFETS guidelines. However, as a best management practice, workers in the Building 776/777 Cluster will assume the debris contains lead unless either process knowledge (e.g., paint color) or analytical data (e.g., X-ray fluorescence, lead paint detector swabs) establish it is not a hazard to worker health.

Similarly, LBP debris in radioactive areas may be managed as LLW or TRU waste (i.e., non-mixed waste), except for high contamination areas where lead paint may have been liberally used as a fixative for radiological contamination. Paint debris from thickly painted high contamination areas will be managed RCRA hazardous LBP debris (i.e., LLM or TRM waste) unless total lead or Toxicity Characteristic Leaching Procedure (TCLP) measurements on a representative core of material establish the material is not RCRA hazardous waste.

Equipment known to contain lead or other heavy metals will be managed as hazardous waste and not sampled. The FBI insulation and equipment will be sampled for chromium. A chromium-based catalyst that was used in the FBI process has been removed, but there are visible stains from the catalyst on the insulation.

4.3.3.2 *Liquids*

Organic liquids drained from process systems will be characterized by process knowledge or sampled and analyzed for RCRA D-codes and F-listed solvents, TCLP organic constituents, pH, heavy metals, flashpoint, and PCBs, as appropriate. This data will generally be collected during deactivation in preparation for decommissioning.

Aqueous liquids drained from process and utility systems will be sampled in accordance with the requirements of the approved disposal facility. Liquids will be managed in accordance with RCRA/CHWA and associated implementing regulations.

4.3.3.3 *Polychlorinated Biphenyls*

In most cases, the location of PCBs was documented during the RLC. However, during decommissioning, PCBs may be found in fluorescent light fixture ballasts, capacitors, and paint. Ballasts and capacitors will be managed as PCBs if they are not specifically marked with the label "No PCBs." Intact ballasts that contain PCBs will be managed as "PCB bulk product waste" as defined by Toxic Substances Control Act (TSCA), (Ref. 9), and capacitors containing PCBs will be managed as "PCB items" as defined by TSCA.

PCBs in applied dried paint are considered PCB bulk product waste as defined by TSCA. Generally, under TSCA regulations, characterization for PCBs in applied dried paint is not required to enable disposal. The regulations permit the disposal of certain PCB bulk product waste, including applied dried paints, in a permitted solid waste landfill regardless of the PCB concentration, provided proper notification is given to the facility.

However, painted equipment that is destined for recycle or reuse and has a significant recovery value must be characterized for PCBs to meet TSCA requirements for distribution into commerce. If the PCB concentration in the paint on the equipment exceeds 50 ppm, the equipment must be decontaminated before being reintroduced into commerce. The decision to reintroduce the equipment into commerce or to dispose of the equipment is based primarily on a comparison of the cost to decontaminate the equipment versus the recovery value of the equipment. If the cost of decontamination exceeds the recovery value of the equipment, the equipment will be disposed of in a solid waste landfill in accordance with TSCA requirements, without the need to characterize the PCB concentration in the paint. Additional details on decontamination requirements related to the management of PCB bulk product waste are provided in the Environmental Leadership Team Environmental/Waste Compliance Guidance No. 25, entitled "Management of Polychlorinated Biphenyls (PCBs) in Paint and Other Bulk Product Waste During Facility Disposition" (Ref. 10).

4.3.3.4 Sampling and Analysis Methodology for Lead and Other Heavy Metals, PCBs, and Solvents

A request for sampling and analysis is made to the Analytical Projects organization using a sampling and analysis request form. Sampling and analysis methodologies are determined by the Analytical Projects organization and based on the most recent Occupational Safety & Health Administration (OSHA), National Institute of Occupational Safety and Health (NIOSH), and EPA procedures, as appropriate.

4.3.3.5 Asbestos Containing Material

Whenever possible, flooring, ceiling tiles, mastic under tile and carpet, and roof tar will be characterized by a "mapping" process, which consists of an examination of asbestos sample results of material from one area, and the application of those results to similar material in another area. Additional samples will be collected if mapping cannot provide sufficient information.

The pipe insulation in Building 776/777 was burned during the 1969 fire or removed during decontamination and replaced with asbestos insulation. Therefore, insulation in the facility will be managed as asbestos waste. No further sampling is required to determine if the insulation contains asbestos.

Most walls in the facility have been characterized based on construction drawings and physical walkdowns to verify materials. Transite walls will be managed as asbestos waste. In addition, asbestos has been found in the cement brick insulation in other buildings across the Site. Samples of cement brick insulation in Building 776/777 will be analyzed to determine if asbestos is present in the insulation.

In-process characterization for asbestos will be conducted using approved Site procedures based on CDPHE requirements.

4.3.3.6 Radiological Contamination

Radiological surveys will be conducted on equipment, waste, and structures throughout the decommissioning process. These in-process surveys will be performed in accordance with approved radiological safety procedures based on the current version of the RFETS Radiological Control Manual (Ref. 7). Radiological surveys on equipment and waste are required to determine disposal paths. Structures will be surveyed for removable and total contamination. In addition, volumetric and/or surface media samples may be obtained to further characterize the structures.

4.3.3.7 Beryllium Contamination

Areas where Be operations were performed have been documented in the RLCR. In-process characterization will be conducted in accordance with the Chronic Beryllium Disease Prevention Program (CBDPP), (Ref. 11).

4.4 Building and Equipment Cleanup Levels

The following paragraphs identify the cleanup criteria that will be used to determine when materials, media, equipment, floors, walls, and ceilings within the Building 776/777 Cluster may be considered non-radioactive, non-hazardous, non-Be contaminated, non-TSCA, and non-ACM, then either free-released or managed as sanitary waste. These release criteria are taken from the DDCP (Ref. 3), which describes the requirements for characterizing the radiological and chemical hazards associated with buildings and facilities. The release criteria are summarized in Table 5. Except where pre-empted by new statutory, regulatory, and/or Site requirements, the release criteria will be used to disposition waste during decommissioning.

4.4.1 Radionuclides

When radiological contamination is identified, 10 CFR 835 (Ref. 12) and DOE Order 5400.5 (Ref. 13) will be followed to ensure protection of workers, the public, and the environment. Radiological characterization measurements will be collected and interpreted in accordance with the DDCP and associated Pre-Demolition Survey Plan (Ref. 14). If all radiological characterization measurements are below the Allowable Total Residual Surface Contamination (ATRSC) thresholds provided in Figure IV-1 of DOE Order 5400.5 (and summarized in Table 5), the related area or volume of material is considered sanitary waste and may be free-released.

4.4.2 Hazardous Waste

If waste is mixed with or contains a listed hazardous waste, or if the waste exhibits a characteristic of a hazardous waste, it is considered hazardous waste in accordance with 6 CCR 1007-3, Part 261, Identification and Listing of Hazardous Waste (Ref. 15). Otherwise, the waste is considered non-hazardous.

If the waste is hazardous waste, it will be disposed of in compliance with 40 CFR Part 268, Land Disposal Restrictions (LDRs), (Ref. 16), and in conformance with the disposal facility's WAC.

Table 5. Release Criteria

Contaminant	Regulatory Driver	Free-Release Threshold		
Radionuclides[a] - values are above background concentrations in dpm/100 cm^2 [b]		Total Average [c, d]	Total Maximum [d,e]	Removable [d,f]
Transuranics	DOE Order 5400.5, Figure IV-1	100	300	20
Th-Natural		1000	3000	200
U-Natural		5000	15000	1000
Beta-Gamma emitters [g]		5000	15000	1000
Tritium		N/A	N/A	10000
RCRA Waste	6 CCR 1007-3, Part 261	No listed hazardous waste or characteristic hazardous waste is present		
Beryllium	RFETS Chronic Beryllium Disease Prevention Program (CBDPP)	Loose surface contamination concentrations are less than 0.2ug/100 cm^2		
PCB Bulk Remediation Waste	40 CFR 761.61 (Federal Register, Vol. 63, No. 124, June 29, 1998)	$\leq$1 ppm (high occupancy areas)		
ACM	5 CCR-1001-10, Regulation No. 8	No sample in a sample set representing a homogeneous medium results in a positive detection (i.e., > 12% by volume)		

Notes:

a Where surface contamination by both alpha- and beta-gamma emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background efficiency, and geometric factors associated with the instrumentation.

c Measurements of average contamination should not be averaged over an area of more than 1 m^2. For objects of less surface area, the average should be derived for each such object.

d The average and maximum does rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hour and 1.0 mrad/hour, respectively, at 1 cm.

e The maximum contamination level applies to an area of not more than 100 cm^2.

f The amount of removable material per 100 cm^2 of surface area should be determined by wiping an area of that size with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wiping with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less that 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.

g This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

4.4.3 Beryllium Contamination

If Be contamination is detected in the form Be powder, the contaminated material will be handled as a hazardous waste (EPA Code P015), subject to treatment standards under 40 CFR 268.40 or alternate release criteria will be proposed based on surveys and available information.

If loose surface contamination concentrations of Be exceed the action level for equipment release defined in Section 28 of the RFETS Occupational Safety & Industrial Hygiene Program Manual, the contaminated material will be managed under the RFETS Chronic Beryllium Disease Prevention Program (CBDPP), (Ref. 11).

4.4.4 Polychlorinated Biphenyls

If a material meets the definition of "PCB bulk product waste," it may be disposed of as TSCA waste at a permitted solid waste disposal facility without further characterization. If the disposal facility is not an approved commercial PCB storage or disposal facility, the generator must provide written notification to the facility in accordance with 40 CFR 762.62.

If a material meets the definition of "PCB remediation waste" (i.e., potentially containing PCBs from historical releases), the free-release concentration is 1 ppm PCBs for high-occupancy areas, as determined in accordance with the requirements of 40 CFR 761.61, Subpart G. Higher release levels for PCB remediation waste are permissible, but carry specific restrictions on how the material may be dispositioned.

4.4.5 Asbestos Containing Material

ACM will be managed in compliance with 5 CCR-1001-10, Regulation No. 8. If any one sample of a sample set representing a homogeneous medium results in a positive detection (i.e., > 1% by volume), the material is considered ACM; otherwise the material is considered non-ACM.

ACM that is friable or will be made friable during demolition activities will be removed prior to demolition. An asbestos removal action will be considered complete when, based on five air samples (≥1,199 liters/sample for a 25 millimeter filter or ≥2,799 liters/sample for a 37 millimeter filter), the average concentration of asbestos, as analyzed by transmission electron microscopy, does not exceed 70 asbestos fibers/mm^2.

4.5 Closure of RCRA-Regulated Units

RCRA-regulated units located within the Building 776/777 Cluster will be closed in compliance with the closure performance standards described in this section. Table 6 presents a list of the RCRA-regulated units in the Building 776/777 Cluster, including unit number and associated SET number, location, permit status, the type of closure currently planned for each unit. Closure activities for RCRA-regulated units located in the basement of Building 776/777 will begin during deactivation and continue through decommissioning. Details concerning the disposition of the basement foundation/slab(s) will be provided in the demolition modification to this DOP, which will be submitted for a public comment period equivalent to that for the initial Building 776/777 DOP.

4.5.1 Closure Options

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

Table 6. Building 776/777 RCRA-Regulated Units

Room#	RCRA Unit	SET	Description	Status	Proposed Closure ∅
134	776.1	67	Container Storage Area	Permitted	RCRA Stable/Removal
134 (ASRF)	776.1	66	Container Storage Area (ASRF)	Permitted	RCRA Stable/Removal
154	776.1	54	Container Storage Area	Permitted	RCRA Stable/Removal
159	776.1	57	Container Storage Area	Permitted	RCRA Stable/Removal
237	776.1	70	Container Storage Area	Permitted	RCRA Stable/ Removal
208	776.1	70	Container Storage Area	Permitted	RCRA Stable/ Removal
127	776.1	68	Container Storage Area	Permitted	RCRA Stable/Removal
127	776.2C	69	Process Waste Tank T-2A	Permitted	RCRA Stable/Removal
127	776.2D	69	Process Waste Tank T-2B	Permitted	RCRA Stable/Removal
127	776.2A	69	Process Waste Tank T-1A	Permitted	RCRA Stable/Removal
127	776.2B	69	Process Waste Tank T-1B	Permitted	RCRA Stable/Removal
134	776.3	66	ASRF (Treatment)	Permitted	RCRA Stable/Removal
118	44.01	62	Oil Storage Tank T-2	Interim Status*	RCRA Stable/Removal
118	44.02	62	Oil Storage Tank T-1	Interim Status *	RCRA Stable/ Removal
118	49.01	63	FBI Production Unit (Treatment)	Interim Status	RCRA Stable/ Removal
135	49.02	61	FBI Pilot Unit (Treatment), including Tanks T-1 & T-2	Interim Status*	RCRA Stable/ Removal
146	61	60	SRV (Storage)	Interim Status	RCRA Stable/ Removal
146	61	60	SRV (Treatment)	Interim Status	RCRA Stable/ Removal
134	74	64	SARF	Interim Status	RCRA Stable/ Removal
152	90.85	53	Container Storage (Vault)	Mixed Residue	RCRA Stable/ Removal
1	90.99	68	Container Storage (Basement)	Mixed Residue ⊕	RCRA Stable/ Removal
134	94.001	55	Tank SRV-3	Mixed Residue ⊕	Physically Empty/ Removal
134	94.002	55	Tank SRV-4	Mixed Residue ⊕	Physically Empty/ Removal
134	94.003	55	Tank SRV-5	Mixed Residue ⊕	Physically Empty/ Removal
134	94.005	66	Tank T-344	Mixed Residue ⊕	Physically Empty/ Removal
134	94.006	66	Tank T-345	Mixed Residue ⊕	Physically Empty/ Removal
134	94.007	52	Tank T-360	Mixed Residue ⊕	Physically Empty/ Removal
134	94.008	52	Tank T-370	Mixed Residue ⊕	Physically Empty/ Removal
146	94.009	60	Ball Mill Washer (Treatment)	Mixed Residue ⊕	Physically Empty/Removal
146	94.010	60	Collection Pan	Mixed Residue ⊕	Physically Empty/Removal
146	94.011	60	Annular Tank	Mixed Residue ⊕	Physically Empty/ Removal
432C	777.1	27	Container Storage	Permitted	RCRA Stable/Removal
430 (3)	777.1	25	Container Storage	Permitted	RCRA Stable/Removal
430 (2)	777.1	25	Container Storage	Permitted	RCRA Stable/Removal
483 (8)	777.1	47	Container Storage	Permitted	RCRA Stable/Removal
433	777.1	31	Container Storage	Permitted	RCRA Stable/Removal
208	777.1	70	Container Storage	Permitted	RCRA Stable/ Removal
448	777.1	32	Container Storage (NDT)	Permitted	RCRA Stable/Removal
416	777.1	13	Container Storage	Permitted (added in RCRA Permit Mod #00-02)	Clean Closure (documenting absence of contamination)

Mod #5

[illegible]	RCRA Unit	[illegible]	Description	Status	Proposed Closure
416B	777.1	13	Container Storage	Permitted (added in RCRA Permit Mod #00-02)	Clean Closure (documenting absence of contamination)
427	777.1	16	Container Storage	Permitted (added in RCRA Permit Mod #00-02)	Clean Closure (documenting absence of contamination)
442	777.1	30	Container Storage	Permitted (added in RCRA Permit Mod #00-02)	Clean Closure (documenting absence of contamination)
462	777.1	40	Container Storage	Permitted (added in RCRA Permit Mod #00-02)	Clean Closure (documenting absence of contamination)
477/477A	777.1	42	Container Storage	Permitted (added in RCRA Permit Mod #00-02)	Clean Closure (documenting absence of contamination)
443	777.1	31	Container Storage	Permitted	RCRA Stable/Removal
430	95.015	26	Tank T-1	Mixed Residue ⊕	Physically Empty/ Removal
430	95.016	26	Tank T-2	Mixed Residue ⊕	Physically Empty/ Removal
131	90.49	8	Container Storage	Mixed Residue ⊕	RCRA Stable/ Removal
131	95.006	7	Tank 1103	Mixed Residue ⊕	RCRA Stable/Removal
131	95.007	7	Tank 1104	Mixed Residue ⊕	RCRA Stable/ Removal
131	95.008	7	Tank 1106	Mixed Residue ⊕	RCRA Stable/ Removal
134E	95.014	11	Tank T-7	Mixed Residue ⊕	RCRA Stable/ Removal
131	95.019	4	Tank DL-776	Mixed Residue ⊕	Physically Empty/ Removal
131	N/A	4	Tanks V-605 (2)	Mixed Residue ⊕	Physically Empty/ Removal
131	N/A	5	Tank V-614	Mixed Residue ⊕	Physically Empty/ Removal
131	N/A	5	Tank V-616	Mixed Residue ⊕	Physically Empty/ Removal
131	N/A	5	Tank V-618	Mixed Residue ⊕	Physically Empty/ Removal
131	N/A	5	Tank V-620	Mixed Residue ⊕	Physically Empty/ Removal
131	N/A	6	Tank V-626	Mixed Residue ⊕	Physically Empty/ Removal
131	N/A	6	Tank V-627	Mixed Residue ⊕	Physically Empty/ Removal
452	N/A	34	Tank V-022	Mixed Residue ⊕	Physically Empty/ Removal
452	N/A	36	Tank V-543	Mixed Residue ⊕	Physically Empty/ Removal
134E	N/A	11	Tank V-746	Mixed Residue ⊕	Physically Empty/ Removal
134E	N/A	11	Tank V-747	Mixed Residue ⊕	Physically Empty/ Removal
134E	N/A	11	Tank V-747A	Mixed Residue (identified 12/05/00)	Physically Empty/ Removal
134E	N/A	11	Tank V-748	Mixed Residue ⊕	Physically Empty/ Removal
134E	N/A	11	Tank V-749	Mixed Residue ⊕	Physically Empty/ Removal
134E	N/A	10	Tank V-752	Mixed Residue ⊕	Physically Empty/ Removal

Mod #5

Mod #6

* Interim status tank Units 44.01, 44.02, and 49.02 are governed by the terms and conditions of a Compliance Order on Consent and the Hazardous Waste Tank Management Plan (HWTMP), which required the tanks to be taken to a RCRA Stable status by March 31, 1998. This commitment was met.

⊕ Mixed residue tanks managed in accordance with the Mixed Residue Tank Plan (see Section 6.2.4).

∅ The type of closure for a unit may change from the type of closure listed; however, all closures will be conducted in accordance with this DOP.

N/A Mixed residue tank does not have a RCRA unit number.

4.5.1.1 Clean Closure

RCRA-regulated units may be "clean closed" either by documenting the absence of contamination or by decontaminating the unit. For units having a complete, detailed operating history, clean closure will be demonstrated when the following criteria are met:

- An administrative review of the RCRA Operating Record indicates hazardous or mixed waste was never spilled in the unit, or if a spill did occur, it was cleaned up and the spill area was decontaminated; and
- A visual inspection of the unit and associated ancillary equipment notes an absence of hazardous or mixed waste stains and/or residuals.

Units to be "clean closed" by decontamination will be flushed and washed with a suitable decontamination solution to remove visible waste residuals and contaminants of concern, then 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 and heavy metals identified as being managed in the unit are below the Tier II action levels for ground water defined in Attachment 5 of RFCA [Ref. 1], and listed in Appendix B). Rinsate meeting the Tier II 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 LLW.

For external surfaces, the final rinsate will not exceed a volume of two gallons per 100 ft^2 of surface area rinsed, and for internal surfaces, the final rinsate will not exceed a volume of 5% of the capacity of the tank system. If test results indicate the standard has been met, the unit equipment will be considered "clean closed." In the event the standard is not met, the LRA will be consulted to determine whether the results are protective of human health and the environment.

4.5.1.2 Unit Removal in Conjunction with "Debris Rule" Treatment

Alternatively, RCRA-regulated units may be closed by removal and treatment under 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 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).

If, after "debris rule" treatment, the equipment or structure meets the standard for a "clean debris surface," and it does not exhibit a hazardous waste characteristic, it will no longer be considered a hazardous waste and 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 units in the Building 777/776 Cluster (including rinsates) will be characterized in compliance with 6 CCR 1007-3, Part 262.11, and managed accordingly. Treatment residuals do not meet the definition of debris.

4.5.1.3 Unit Removal without Onsite Treatment

Unit equipment or structures that are not decontaminated to meet either the "clean closure by decontamination" or "debris rule" 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 this waste cannot be shipped directly to a disposal facility, it will be stored in an approved on-Site storage unit until shipment can be scheduled.

4.5.2 Closure Documentation

Prior to the decommissioning of each SET, RCRA unit-specific closure information will be submitted to the LRA for review and approval as a minor modification to this DOP under ¶127 of RFCA. The unit-specific information will include drawings and/or photographs of the RCRA-regulated unit or units in the SET, applicable EPA Waste Codes, the selected closure option(s), and closure requirements. For clean closure of container storage units by documenting the absence of contamination in accordance with Section 4.5.1.1, a letter may be submitted to the LRA, in lieu of a minor modification to the DOP, detailing the results of the operating record review and visual inspection, and requesting concurrence that the unit has been closed. Mod #7

Consistent with Section 1.1.4 of the DPP, portions of a RCRA-regulated unit may be removed prior to submittal of the required unit-specific closure information upon engagement of the consultative process and concurrence of the LRA. In such cases, LRA concurrence will be documented in an RFETS Regulatory Contact Record, which will be filed in the Project Record. Mod #2

A description of the closure activities completed for each RCRA-regulated unit will be included in the Final Closeout Report, which will be prepared for the Building 776/777 Closure Project upon completion of decommissioning activities. All RCRA units will be closed prior to building demolition.

4.6 Pre-Demolition Survey

A pre-demolition survey will be conducted to identify areas requiring additional decontamination before the building is demolished. The pre-demolition survey will be performed on an on-going basis in areas that have been stripped out and released for final survey to verify the waste disposal path for building rubble. Per ¶60(a) of RFCA, the LRA may take samples and obtain duplicate, split, or sub-samples of any DOE samples.

The pre-demolition survey will be conducted in accordance with the Pre-Demolition Survey Plan, which will be prepared in conformance with the DDCP (Ref. 3) prior to the initiation of demolition activities. The Pre-Demolition Survey Plan will be submitted to the LRA for review and approval. A Pre-Demolition Survey Report will be prepared to document the results of the pre-demolition survey and included in the Project's administrative record (AR). Per Sections 3.3.10 through 3.3.13 of the DPP, the Pre-Demolition Survey Report will be forwarded to the LRA for review.

4.7 Independent Verification

An independent party, selected by DOE, will perform a verification assessment of the final survey methodology. This assessment will include a review of survey procedures, survey instrument calibration and operation procedures, and the Pre-Demolition Survey Plan. Also, the independent party may obtain additional survey measurements for comparison with the RFETS measurements to ensure proper correlation of survey data.

4.8 Endpoints

Once the characterization walkdowns were completed, detailed endpoints were developed for each SET. The endpoints determine the completion criteria for the SETs. Distinct activities required to deactivate, isolate and contain, dismantle, size reduce, and package waste for off-site shipment are included as endpoints. Although the endpoints were developed based on walkdowns, it is expected additional work will be discovered during decommissioning. The scope of work and associated endpoints will be adjusted as items are identified. The endpoints are intended to provide the basis for the activities and activity line items in the Work Breakdown Structure (WBS) and milestones on the project schedules. The endpoints are divided into three categories: deactivation, decommissioning, and project management. Appendix A contains a master list of decommissioning endpoints for each SET. Documentation of the endpoints ensures all parties understand what is involved in the decommissioning phase of the SET, and activities are signed off as they are completed as part of the IWCP process (see Section 5) to document that applicable criteria have been met. The endpoints or milestones listed in this DOP are provided for information only.

4.9 Size Reduction Methodologies

In Building 776/777, size reduction activities will involve 279 GBs, connecting stations, and centerlines, along with 44 tanks. The GBs and tanks are connected to the Zone I ventilation systems totaling several miles of ductwork and piping. The GBs are stainless steel enclosures with window mountings, glove port rings, bolted flanges, and various penetrations attached to the walls. The tanks range from five inches to a few feet in diameter and up to a few feet long. These vessels were fabricated in both single-wall and double-wall configurations. Zone I exhaust systems are made up of 6-inch to 36-inch diameter stainless steel ductwork and walk-in plenums containing HEPA filters.

For disposal, the GBs, tanks, and ventilation system hardware must be reduced in size to fit into waste containers for disposal. The primary containers for TRU waste are Waste Isolation Pilot Plant (WIPP) standard waste boxes (SWBs) and 55-gallon drums. During size reduction, items are cut into pieces that can be stacked efficiently in the waste containers.

A value engineering study performed by the Technology Steering Committee in July of 1998 evaluated a variety of size reduction techniques that may be used on equipment and GB systems in the Building 776/777 Cluster (Ref. 17). Results of this study are summarized in Table 7. The selected methods will depend on the individual areas and the type and location of equipment to be size reduced. In some cases, the preferred method may not be used due to safety constraints, such as criticality evaluations or area specific limitations in the Building 776/77 AB. Cutting methods will be finalized for each SET as the detailed IWCP work packages are developed. Due to the requirement to operate within a controlled work environment at Rocky Flats, changes in the methods to accomplish size reduction goals will be implemented using a phased approach. Certain methods (e.g., thermal cutting) have been recommended for use inside hard-sided containment. The following types of hard-sided containment are being considered for use: a new system in Room 121, the existing ASRF in Room 134, portable containment (i.e., bolt together) and a centralized size reduction facility. The graded approach to size reduction is summarized as follows:

Table 7. Proposed Size Reduction Techniques

Methods	Small Tools	Plasma Arc	Oxy-torch	Laser Cutter	Diamond Wire Saw	Wachs Cutter	Hydraulic Shears	Shear Baler	Water with Abrasives	Upgrade ASRF	ASRF	Arc Saw	Arc Air Slice	Arbor Press
Footnotes	I	A,R,H,F	A,R,H,F	A,H	C,R,S	P	R		A,C,S,H			A,H,F	A,H,F	
GBs							1	1	1	1				
Stainless with lead shielding	3	1		2	3		1	1	1	1	1	1	1	1
Stainless without lead shielding	2	1		2	3		3			1	1	1	1	1
Plexiglas with lead shielding	1						3							
Plexiglas with lead shielding	1									1	1			
Glass	1									1	1			
Lead	1									1	1			1
Gloves	1									1	1			
Filters	1									1	1			
GB supports	2	1	1	1		1	2		2			3	1	
Shielding														
Benelex	1													
Plexiglas	1													
Machinery														
Tool Steel														
<½"	3	1	1	2	3				1	1	1	1	1	
> ½" but < 3"	3	1	1		3				1	1	1	1	1	
> 3"	3	1	1		3				3	1	1	1	1	
Cast iron		1		2	3				2	1	1	1	1	
Carbon steel equipment bases		1	1	2	3				2	1	1	1	1	
Aluminum	2	2		1	3		1	1	1	1	1	1	1	1
Stainless steel > 3/8" but < 1"	3	1		3	3				1	1	1	1	1	
Granite	2		2		1				1				2	

LEGEND:
Blank = Not applicable
1 = Most preferred method
2 = Medium preferred method
3 = Least preferred method

Footnotes
A = Can be automated
R = Can utilize remote control
H = Needs hard-sided containment
F = Fumes need to be dealt with
C = Possible criticality issue
S = Secondary waste issue
I = Includes use for disassembly
P = Applies to pipe only

- Develop a hard-side/soft-side containment that does not require supplied breathing air on a continuous basis and tooling that reduces handling fatigue.
- Develop a remotely operated size reduction system within hard-sided containment to remove the operator from the actual size reduction activities (e.g., cutting, packaging) and improve throughput of a single size reduction system. The safety goal is to completely remove the human operator from actual size reduction activities.

Both these approaches to size reduction in the Building 776/777 Cluster will incorporate technology improvements associated with an enhanced walk-in hard-sided containment system to reduce or eliminate Class "A" PPE. Technology improvements are primarily limited to currently proven and available equipment and processes. This will provide technology that will be available to meet existing goals for size reduction tasks in Building 776/777. The Technology Steering Committee will continue to work on the identified needs and define future improvements for RFETS decommissioning activities. In addition, the committee will provide guidance on integrating currently funded activities into Site closure projects and program.

4.10 Decontamination Approach

Material and equipment located in the Building 776/777 Cluster must be dispositioned into various categories of excess equipment and waste. During FY00 an Economic Disposal Plan will be developed in accordance with 1-MAN-009-PMM, Property Management Manual (Ref. 18). As illustrated in Figure 8, this logic is used to determine if a material is waste or property, and if it may be readily free-released as uncontaminated and non-hazardous material. If it is radioactive and/or hazardous waste, the material must be evaluated for whether, after packaging, it is TRU, TRM, LLW, or LLM waste. If it is TRU or TRM waste, the effort to be expended for decontamination and volume reduction to optimize its final configuration must be determined and documented. Once segregated, characterized, and packaged, the waste will be disposed of based on RFETS waste management requirements.

A recent study, entitled "Evaluation of Potential Cost Impacts from Volume Reduction and Decontamination for TRU Contaminated Systems and Equipment," (Ref. 19), provided the following conclusions on the economics of volume reduction and decontamination. First, for most systems, volume reducing to increase the average density of the filled waste containers provides insufficient waste management cost savings to justify the additional labor needed to cut items into smaller pieces to achieve the higher density. Second, decontaminating TRU-contaminated systems and equipment to LLW also does not appear to be cost effective for most systems. Finally, schedule delay costs add to the cost of decontamination or additional volume reduction and can be much larger than any other factor. An analysis of Building 779 Closure Project revealed the cost impacts due to schedule delays. A schedule slip of one day resulted in a cost increase of up to $85,000, which is the current rate of spending for the Building 776/777 Closure Project. Schedule delays in the decommissioning of other Pu buildings could run two to three times this amount. Schedule delay costs can dominate the economics of decommissioning for those systems on the critical path to a building's closure. For these systems, the most straightforward method of removal and disposition will be chosen.

The following paragraphs describe the techniques most likely to be used if equipment and surfaces must be decontaminated. These techniques are listed in the Building 776/777 Complex Basis for Interim Operation (BIO), (Ref. 20). Techniques not currently authorized by the BIO may be introduced through an IWCP work package (Ref. 8), then evaluated by the Unreviewed Safety Question Determination (USQD) process (Ref. 21) prior to implementation.

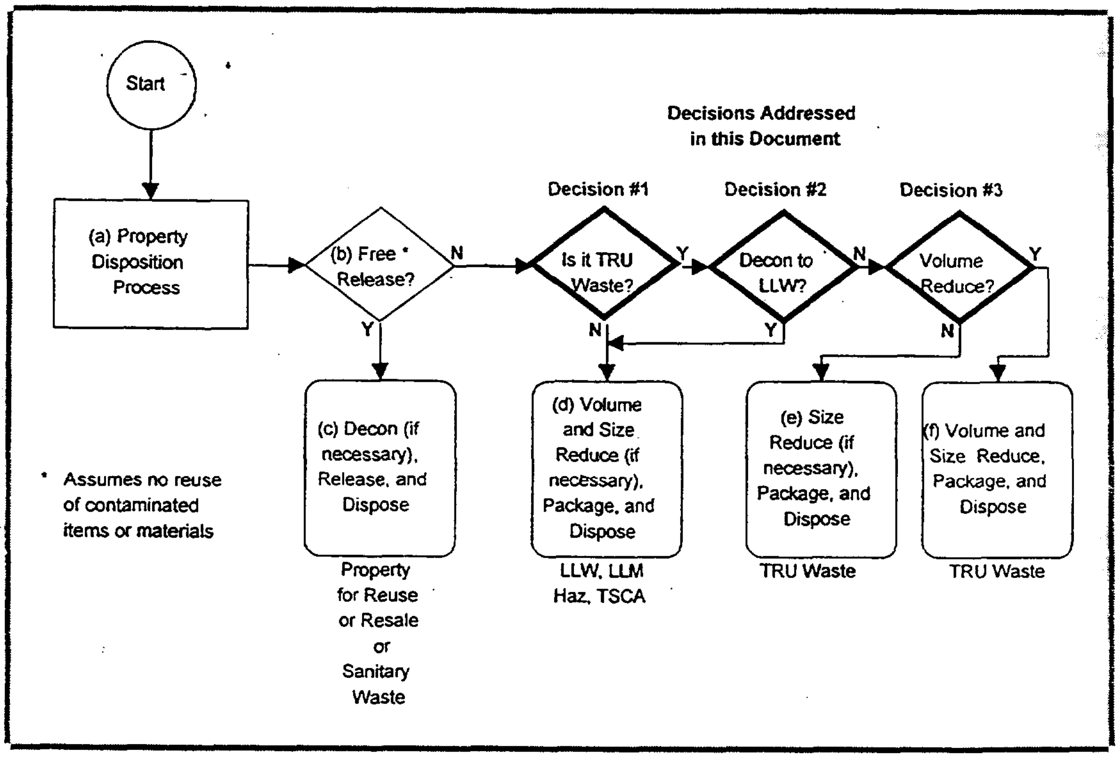

Figure 8. Waste Decision Logic

4.10.1 Dusting, Wiping, and Scrubbing

Dusting, wiping, and scrubbing involve the physical removal of dust and fine particles from building and equipment surfaces using common cleaning techniques. Typically, dusting is a dry technique where a dry cloth is used. Wiping involves the use of a damp cloth, which may be soaked with water, detergent, or solvent to assist in removing particulates. Scrubbing is similar to dusting and wiping except that pressure is applied to assist in removing the contamination.

4.10.2 Vacuuming

Vacuuming involves the physical removal of dust, particulates, and liquids with a suction device. Dust and particulates are removed using a commercial or industrial grade vacuum equipped with a HEPA filter. Liquids are removed using a "wet vacuum" equipped with an alternate filter system. because HEPA filters do not function properly with liquids.

4.10.3 Strippable Coatings

Strippable coatings may be applied to contaminated surfaces, then removed along with some of the contamination. Various agents can be used as strippable coatings for contaminated surfaces. Decontamination factors for the strippable coatings vary with the type of coating used. In general, strippable coating decontamination is only effective on smooth, non-porous surfaces.

Strippable coatings are applied using a mixture of two polymers that chemically react to form the coating. Usually, the contaminated layer is pulled off, containerized, and disposed of as contaminated waste. The polymers used in the mixture are often hazardous materials. Care must be taken when collecting the coatings to assure the quantities of radioactive material do not exceed the packaging requirements. The two strippable coatings being considered are identified in Table 8.

Table 8. Strippable Coatings

Coating Mixture	Coating Reaction
Polymer mixture	In the polymer mixture, contaminants are entrained in the mixture as the polymer reacts then stabilizes. The contaminated layer of polymer is pulled off, containerized, and disposed of as radioactive waste.
Nontoxic, water-based copolymer	The nontoxic, water-based copolymer is considered self-stripping because as the formula polymerizes, it cracks, flakes, and falls off, taking the loose surface material with it. The loose flakes are containerized with no additional processing prior to disposal.
Note: Combustible strippable coatings have not been considered.	

4.10.4 Fixative Coatings

Various agents may be used as coatings on contaminated surfaces to fix the contaminants in place and decrease or eliminate exposure hazards. The fixed contaminants are left in place to reduce potential spreading during other phases of closure. Fixatives will be used on a case-by-case basis, as identified during preparation of individual IWCP work packages.

One fixative coating technique that may be used involves a two-step process. An initial capture coating is applied using a misting technique. The capture-coating mist is similar to a gas and removes airborne contamination from the application area. The capture coating eventually settles onto exposed surfaces and becomes tacky. A second, durable coating is then applied using a mixture of two compounds that chemically react to form the coating. The two compounds have hazardous material classifications. One compound reacts violently with water and the other reacts violently with acids. Upon decomposition, either may emit noxious gases.

4.10.5 Scarifiers

Scarifiers physically abrade both coated and uncoated concrete and steel surfaces. The scarification process removes the top layers of contaminated surfaces to reach the sound, uncontaminated surfaces. For steel surfaces, scarifiers can completely remove contaminated coating systems, including mill scale. This leaves a surface of bare metal. A scabbling scarification process may be used to achieve the desired profile and results for contaminated concrete. A needle-scaling scarification process may be used for steel decontamination. Vacuum attachments may be used to reduce the spread of contamination associated with the scarification process.

4.10.6 Paving Breakers and Chipping Hammers

Paving breakers and chipping hammers are used to physically remove contamination and surface material by mechanical impact. Although paving breakers and chipping hammers are primarily used in demolition activities, they may also be used to remove surface contamination up to six inches thick, resulting in a rough remaining surface.

4.10.7 Grit Blasting

Grit blasting, also referred to as sand blasting or abrasive jetting, uses abrasive materials suspended in a medium (e.g., compressed air, water, or a combination of air and water) to pulverize and grind out surface contaminants. Typically, blasting results in a uniform abrasion of the surface. Typical abrasives include minerals, steel pellets, glass beads, glass frit, plastic pellets, and natural products, such as sand. A grit blasting system consists of a blast gun, pressure lines, abrasives, and an air compressor. Grit blasting systems are usually hand-held; however, remotely operated units are available.

4.10.8 Carbon Dioxide Blasting

Carbon dioxide (CO_2) blasting is a variation of grit blasting in which CO_2 pellets are used as the abrasive medium. Small CO_2 pellets accelerate through a nozzle using compressed air, shattering when they impact the surface. The resulting kinetic energy causes the shattered pellets to penetrate the base material and release the contaminant(s). The CO_2 fragments immediately sublimate, which adds a lifting force that aids in removal of the contaminant(s). Abraded debris falls to the ground, and the CO_2 (now a gas) returns to the atmosphere. The CO_2 blasting is effective with plastics, ceramics, composites, and stainless steel. This technique may not be effective on hard coatings that are firmly bonded to the base material.

4.10.9 Chemical Decontamination

Chemical reagents are widely used in the nuclear industry for decontamination. A major advantage of chemical decontamination is the production of few airborne hazards. Other advantages of chemical decontamination include:

- Use on inaccessible surfaces,
- Fewer work hours required,

- Process equipment and piping may be decontaminated in place, and
- Decontamination may be performed remotely.

Disadvantages include:

- Generation of large volumes of radioactive mixed waste, and
- Storage and collection concerns.

4.11 Building 776/777 Decommissioning

Building 776/777 will be decommissioned using a phased approach. The following paragraphs summarize the decommissioning activities that will be conducted to prepare the building for demolition. Demolition will proceed in accordance with a subsequent decision document(s), which may include a modification to this DOP.

4.11.1 Expected Condition of Building 776/777 at Beginning of Decommissioning

By the time decommissioning begins in Building 776/777, the majority of SETs will be deactivated and a few SETs will still be in a normal operating mode. Typically, in a deactivated SET, all classified material, loose combustibles, and hazardous materials have been removed and dispositioned; solutions in tanks, machines, pumps, and associated piping have been drained and dispositioned; and radioactive and chemical contamination has been controlled or fixed. Deactivation activities do not include draining utility and fire systems, disconnecting old electrical and ventilation systems, or deactivating alarms that are still in operation. This status is provided as general information only and is subject to change.

4.11.2 Building 776/777 Decommissioning Sequence

In general, the decommissioning sequence of the SETs in Building 776/777 will be as follows: GBs and B-boxes will be removed first so that Zone I ventilation can be removed. Process tanks will be removed during the same time frame as the GBs and used as "fill-in" work. After the GBs, B-boxes, process tanks, and Zone I ventilation systems have been removed, the remaining room decommissioning activities will take place. These include removal of interior walls, piping, ventilation, and electrical systems to approximately the eight-foot level or to the first tie point. At that time, samples may be taken beneath the paint on the floors and walls, between corrugated wall panels, and on the concrete decking on the first floor ceiling to identify the magnitude of fixed contamination. Depending on the sample results, additional decontamination may be required. Once the rooms have been emptied and sampling and/or decontamination has been completed, final radiological surveys will be performed on the floors and walls in preparation for building demolition. Engineering and administrative controls will be used to prevent the spread of contamination to uncontaminated and/or decontaminated areas. At this time, demolition methods and techniques are still being identified for the Building 776/777 Cluster, along with associated controls and performance specifications necessary to protect worker safety, public health, and the environment. This information will be provided in a major modification to this DOP, which will be subjected to a 45-day public comment period.

4.11.3 Building 776/777 Gloveboxes, B-Boxes and Hoods

Internal surfaces of GBs, B-boxes and hoods will be wiped down using materials such as disposable wipes and non-toxic cleaning solutions. Loose materials will be swept up, and a light abrasive material will be used, as required. More aggressive techniques, such as grit blasting, may be used depending on the levels and location of contamination.

Based on radiological survey measurements, a strippable coating may be applied to fix surface contamination during size reduction operations. Where appropriate, the strippable coating may be applied and removed several times to reduce surface contamination levels.

In some cases, lead shielding affixed to the exterior surfaces of the GBs will be removed to minimize the generation of mixed waste. However, on GB lines where wet cutting or machining operations were conducted using organic solvents, and where the interior metal cannot be decontaminated to meet "clean debris surface" standard, lead may be left in place.

Internal equipment and components will be removed before the size reduction of GBs, B-boxes, or hoods. Depending on the layout of the SET, the size of the components being size reduced, and their contamination levels, containment may be erected around the SET or equipment, or the equipment may be moved to a designated size reduction containment area.

The containment structure will be equipped with HEPA filtration to prevent the spread of contamination and to minimize worker exposure. Tie-ins to the existing building Zone I ventilation system may be used if the airflow is adequate. If not, a portable air mover fitted with HEPA filters will be employed.

Working inside a containment structure, workers will reduce the size of the component using a variety of pre-approved cutting techniques, including small hand tools, nibblers, and saws. Size reduction will minimize waste volume and allow packaging in approved shipping containers.

Contamination surveys will be performed in the work area as SETs are removed. Areas with contamination above acceptable levels will be decontaminated or fixatives will be applied to fix contamination. The choice to decontaminate or fix contamination will be made on a case-by-case basis during the development of individual IWCP work packages.

4.11.4 Building 776/777 Large Equipment

Several large pieces of equipment, including the supercompactor, horizontal accelerator, rolling mills, metal presses, and various tanks, will also be size reduced to allow packaging in approved shipping containers. Successful techniques used to size reduce GBs will be adapted when appropriate. In some instances, equipment may be size reduced in place, then transferred to another containment structure for further size reduction.

4.11.5 Building 776/777 Ventilation Systems

The ventilation systems will be removed after their services have been disconnected. Each portion of ductwork to be removed will be sleeved in plastic and cut or unbolted. Alternatively, the area may be enclosed in a containment structure. If the internal surface contamination is below packaging limits, the internal surfaces of the ductwork will be coated with a fixative. If the internal surfaces are above the packaging limits, the internal surfaces will be decontaminated using wipes and abrasive cleaners.

The ductwork for each system will be removed starting at the point most remote from the HEPA filtration unit and fans for each leg of the system. The building ventilation fans will remain in service and throttled down to the maximum extent possible during removal of the systems. Temporary air movers with HEPA filters will be used when necessary.

4.11.6 Equipment Buried Under Building 776/777

Buried equipment (SET 84) will be removed prior to demolition of the building structure. Planning and engineering for this SET will be completed prior to decommissioning the SET. The individual IWCP work package(s) will describe additional confirmation methods and removal methods. This SET is not scheduled for decommissioning until FY03.

4.12 Building 730 Decommissioning

Building 730 is an underground process waste pit containing four Zone II plenum deluge tanks. Two of the four tanks have been filled with foam. These tanks were previously used to store solvents. During decommissioning, it may be necessary to remove one of the tanks and install a temporary tank to support closure activities. When the pit is no longer needed to support the Building 776/777 ventilation system, all four tanks and entryway to the pit will be removed.

4.13 Waste Management

The waste management strategy for the Building 776/777 Closure Project is summarized in Section 6.

4.14 Work Controls

Work Controls are established through the Integrated Safety Management System (ISMS), as discussed in Section 5.

4.15 Effluent Controls

Specific air effluent controls are discussed in Sections 7.1 and 8.4. Water effluent controls are discussed in Sections 7.4. Spill response controls are discussed in Sections 5.5.1 and 5.10.

4.16 Authorization Basis

The Building 776/777 BIO (Ref. 20) will be the AB for closure activities. Specific operations to be covered by the BIO are decontamination of equipment and surfaces, dismantling and size reduction, demolition, and waste management. The BIO contains accident analyses and facility controls for deactivation activities that will be expanded in the next revision of the BIO. Revision 1 of the BIO is currently being implemented; Revision 2 (July 1999) will incorporate administrative control requirements; and Revision 3 or appropriate page changes (September 1999) will incorporate decommissioning activities. Future revisions will incorporate size reduction technologies, including robotics.

4.17 Performance Standard

The performance standard for the Building 776/777 Closure Project is to conduct work in a manner that protects the worker, the public, and the environment. This will be accomplished by following established work practices and procedures described in Section 5 of this DOP, and by complying with the ARARs described in Section 7.

4.18 Records Disposition

Building 776/777 Closure Project records consist of the CERCLA Administrative Record, the RCRA Operating Record, the Project Record, and the Project Closeout Report.

4.18.1 CERCLA Administrative Record

Appendix C identifies the documents that constitute the Administrative Record (AR) for the Building 776/777 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 constitutes approval of the AR file.

The following information repositories have been established to provide public access to the Building 776/777 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

Citizens Advisory Board (CAB)
9035 Wadsworth Parkway
Suite 2250
Westminster, Colorado 80021
(303) 420-7855

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

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

4.18.2 RCRA Operating Record

RCRA records and closure documents will be maintained with the existing Building 776/777 RCRA Operating Record. Upon completion of the Building 776/777 Closure Project, the RCRA Operating Record will be transferred to Site Records Management for storage.

4.18.3 Project Record

Project-specific documents will be filed in the Project Record until final closure is complete, at which time the Project Record will be processed through Site Records Management and archived. The Project Record 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. Maintaining the Project Record is a Site requirement.

4.18.4 Closeout Report

A Closeout Report will be prepared for the Building 776/777 Closure Project after 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
- Site reclamation
- Deviations from the decision document
- Demarcation of waste(s) left in place
- Final disposition of wastes (actual or anticipated)
- Next steps (e.g., interim monitoring, transfer to Environmental Restoration Program)

5.0 HEALTH AND SAFETY

This section describes the work controls that will be implemented to assure worker H&S during decommissioning. The information in this section is intended to provide a general overview of work controls. DOE is the lead agency responsible for enforcement of H&S provisions.

As prescribed by DOE Order 440.1, Worker Protection Management for DOE Federal and Contractor Employees (Ref. 22), the Building 776/777 Closure Project must comply with the OSHA construction standards for Hazardous Waste Operations and Emergency Response, 29 CFR 1910, (Ref. 23) and 1926 (Ref. 24). Under these standards, a project-specific H&S Plan (HASP), (Ref. 25), has been prepared to address the safety and health hazards of each phase of operations. The HASP will be used in conjunction with the RFETS HSP Manual (Ref. 26) in planning and performing decommissioning activities. The HASP is not intended to be a stand-alone document, but as guidance to be used during the IWCP process and generation of the activity hazards analysis (AHA).

The DOE Order for Construction Project Safety and Health Management, 5480.9A (Ref. 27), also applies to this project. This order requires the preparation of Job Hazards Analysis (JHA) to identify each task, the hazards associated with each task, and the precautions necessary to mitigate the hazards. Finally, procedures for control of lead, Be, and toxic chemicals contained in the RFETS HSP Manual also apply.

To comply with the H&S standards specified, an Integrated Safety Management (ISM) process has been initiated and will be continuously implemented. As shown in Figure 9, the ISM process is structured around five core principles:

- Define the work scope,
- Identify and analyze the hazards,
- Identify and implement controls,
- Perform the work, and
- Provide feedback.

The objectives of the ISM and HSP are to:

- Protect employees, co-located workers, the public and environment from hazards during decommissioning.
- Ensure appropriate safety management is administered throughout decommissioning.
- Develop and maintain a high level of H&S awareness that is practiced by all levels of management, supervision, and employees.
- Meet the goal of zero lost time accidents for the entire decommissioning process.
- Foster excellent safety communications between all Site work groups that are affected by the decommissioning of the Building 776/777 Cluster to ensure the intent and goals of RFCA (Ref. 1) are met.
- Train project personnel to ensure they are capable of completing assigned tasks safely and in compliance with applicable environmental and safety regulations.

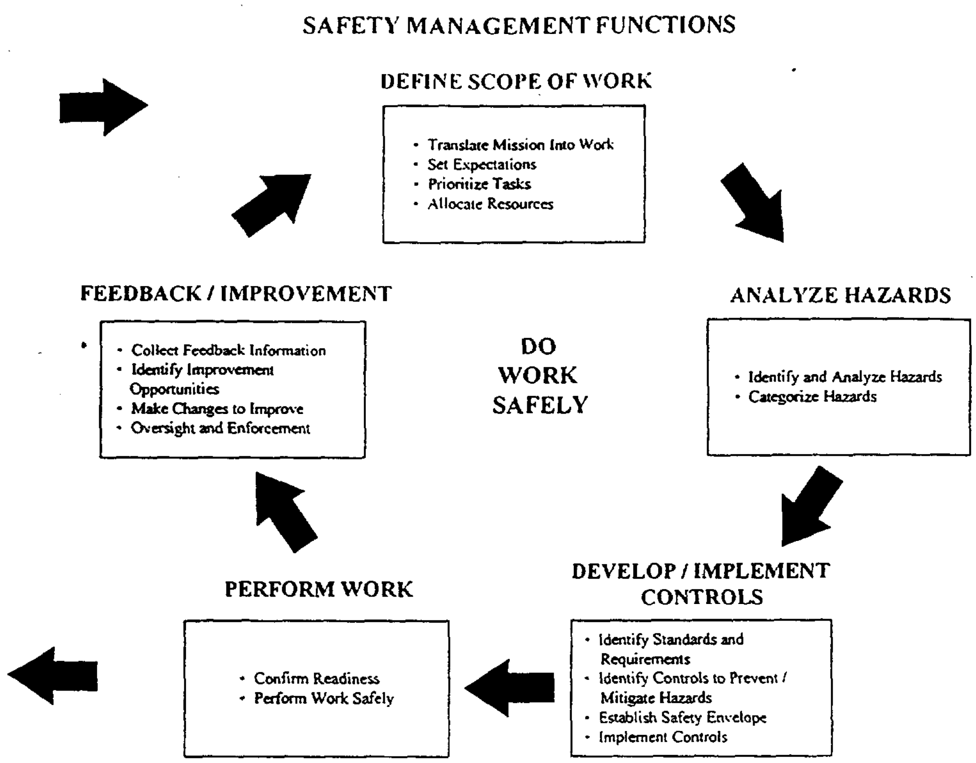

Figure 9. Integrated Safety Management Process

5.1 Integrated Safety Management System

Integrated Safety Management (ISM) is implemented through the Integrated Safety Management System (ISMS) Manual (Ref. 28). The IWCP incorporates ISM principles to prevent and/or mitigate identified work hazards.

Work will be executed following graded readiness demonstrations, which may range from pre-job briefings to Operational Readiness Reviews (ORRs). Safety Systems and Engineering will be consulted to establish the initial activity safety assessment and readiness demonstration scope.

ISM is accomplished by the commitment to the following seven guiding principles:

1) Line management is responsible for safety,
2) Clear roles and responsibilities,
3) Competence commensurate with responsibilities,
4) Balanced priorities,
5) Identification of safety standards and requirements,
6) Hazard controls tailored to the work being performed, and
7) Operations authorized.

Table 9 lists the programs and documents that will be used to apply the ISM process to the Building 776/777 Closure Project.

The work process consists of four major activities: defining the work scope, integrated work control, work planning, and work authorization. The work process is shown in Figure 10 and summarized in the following paragraphs.

5.1.1 Defining the Scope of Work

The work scope is initially identified in the Project Baseline Summary (PBS), then a schedule of activities and the duration are developed along with a basis of estimate (BOE) that establishes the cost and resources required. Once that is completed, an integrated building schedule is developed tying in the PBS and schedule.

5.1.1.1 Project Baseline Summary

The PBS is a formal document that defines a project at RFETS. Items included in the PBS are the authorized scope by FY, budget values for this work scope, milestones associated with work to be accomplished, ISM processes related to implementing the work scope, and the project WBS.

5.1.1.2 Primavera Project Planner

Primavera Project Planner (P3) is the standard scheduling tool used at RFETS. The lifecycle summary baseline schedule for each project (and the Site in totality) is administratively controlled through a formal configuration management system (change control) to ensure that completion dates for milestones and activities are changed only after the proper level of authorization has been obtained.

5.1.1.3 Basis of Estimate

The BOE identifies the resource requirements to complete an activity work scope. Also included in the BOE is the method used to derive the estimate (historical costs, estimator experience or vendor quote), and the quantity of items estimated (such as cubic meters of rubble, volume of liquids treated and number of surveillances). In addition, the calculations used to develop the estimates are included along with the specific basis (such as the method used to determined that three hours of mechanical engineering are required to perform a specific action). The database containing these BOEs (i.e., the Basis of Estimate Software Tool [BEST]) is also under the change control system.

5.1.1.4 Project Execution Plan and Decommissioning Operations Plan

The Project Execution Plan (PEP) is developed to describe the entire project, including landlord, SNM holdup removal, deactivation, decommissioning, and interfaces with other programs. The PEP includes details on project scope, technical approach, risk, methods of accomplishment, environmental requirements, stakeholder interface, organization structure, and financial information.

Table 9. Integrated Safety Management System

Five ISM Functions	Seven Guiding Principles						
	Line Management Responsibility	Clear Roles and Responsibilities	Commensurate with Responsibilities	Balanced Priorities	Identification of Safety Standards and	Hazard Controls Tailored to Work Being Performed	Operations Authorization
Define the Scope of Work	IWCP Site Documents Requirements Manual Activity Definition Process Baseline Change Control Process	IWCP Site Documents Requirements Manual Activity Definition Process Baseline Change Control Process	IWCP Site Documents Requirements Manual Activity Definition Process Baseline Change Control Process	Performance Measures Work Activity Definition RFETS CPB/ 10- Year Plan DOP Building 776/777 Priority List Building 776/777 Maintenance Priority Meeting Work Control Procedure	Activity Definition Process Activity Control Envelope JHA IWCP As low as reasonably achievable (ALARA) Review Criticality Safety Evaluation Transportation Safety Manual	Activity Definition Process Activity Control Envelope JHA IWCP ALARA Review Criticality Safety Evaluation Transportation Safety Manual	Authorization Agreement/ Facility Safety Analysis Report (FSAR)/ BIO Conduct of Operations (COOP) (Ref. 29) IWCP WA Procedure
Identify and Analyze the Hazards	IWCP Radiation Protection (RP) Manual Nuclear Criticality Safety Manual HSP Manual Nuclear Safety Manual Conduct of Engineering Manual (COEM) (Ref. 30)	IWCP RP Manual Nuclear Criticality Safety Manual HSP Manual Nuclear Safety Manual COEM	IWCP RP Manual Nuclear Criticality Safety Manual HSP Manual Nuclear Safety Manual COEM	Performance Measures Work Planning Process 776/777 Integrated Schedule	Activity Definition Process Activity Control Envelope JHA IWCP ALARA Review Criticality Safety Evaluation Transportation Safety Manual	Activity Definition Process Activity Control Envelope JHA IWCP ALARA Review Criticality Safety Evaluation Transportation Safety Manual	Authorization Agreement/FSAR /BIO COOP IWCP WA Procedure Pre-evolution Brief Plant Review Committee RWP

Five ISM Functions	Seven Guiding Principles						
	Line Management Responsibility	**Clear Roles and Responsibilities**	**Commensurate with Responsibilities**	**Balanced Priorities**	**Identification of Safety Standards and**	**Hazard Controls Tailored to Work Being Performed**	**Operations Authorization**
Identify and Implement Controls	IWCP Nuclear Criticality Safety Manual HS P Manual COOP Site Documents Requirements Manual Training Users Manual	IWCP Nuclear Criticality Safety Manual HSP Manual COOP Site Documents Requirements Manual Training Users Manual	IWCP Nuclear Criticality Safety Manual HSP Manual COOP Site Documents Requirements Manual Training Users Manual	Performance Measures Work Planning Process 776/777 Integrated Schedule	Craft Knowledge Walkdowns Engineering Standards Operational Safety Requirements/Technical Safety Requirements Dry Runs Procedure Verification and Validation	Activity Definition Process Activity Control Envelope JHA IWCP ALARA Review Criticality Safety Evaluation Transportation Safety Manual	Authorization Agreement/ FSAR/ BIO COOP IWCP WA Procedure Pre-evolution Brief Plant Review Committee RWP Readiness Demonstration
Perform the Work	IWCP RP Manual Nuclear Criticality Safety Manual HSP Manual Nuclear Safety Manual COOP	IWCP RP Manual Nuclear Criticality Safety Manual HSP Manual Nuclear Safety Manual COOP	IWCP RP Manual Nuclear Criticality Safety Manual HSP Manual Nuclear Safety Manual COOP	Plan of the Week (POW)/ Plan of the Day (POD)	Pre-evolution Briefing Work Control Process POW/ POD	Pre-evolution Briefing Procedures IWCP Operations Orders Training & Qualification	Shift Manager Process Management Assessment Program
Provide Feedback	Independent Assessment Program Occurrence Reporting Program Quality Assurance (QA) Program Management Assessment Program	Independent Assessment Program Occurrence Reporting Program QA Program Management Assessment Program	Independent Assessment Program Occurrence Reporting Program QA Program Management Assessment Program		Training Lessons Learned Fact Findings		

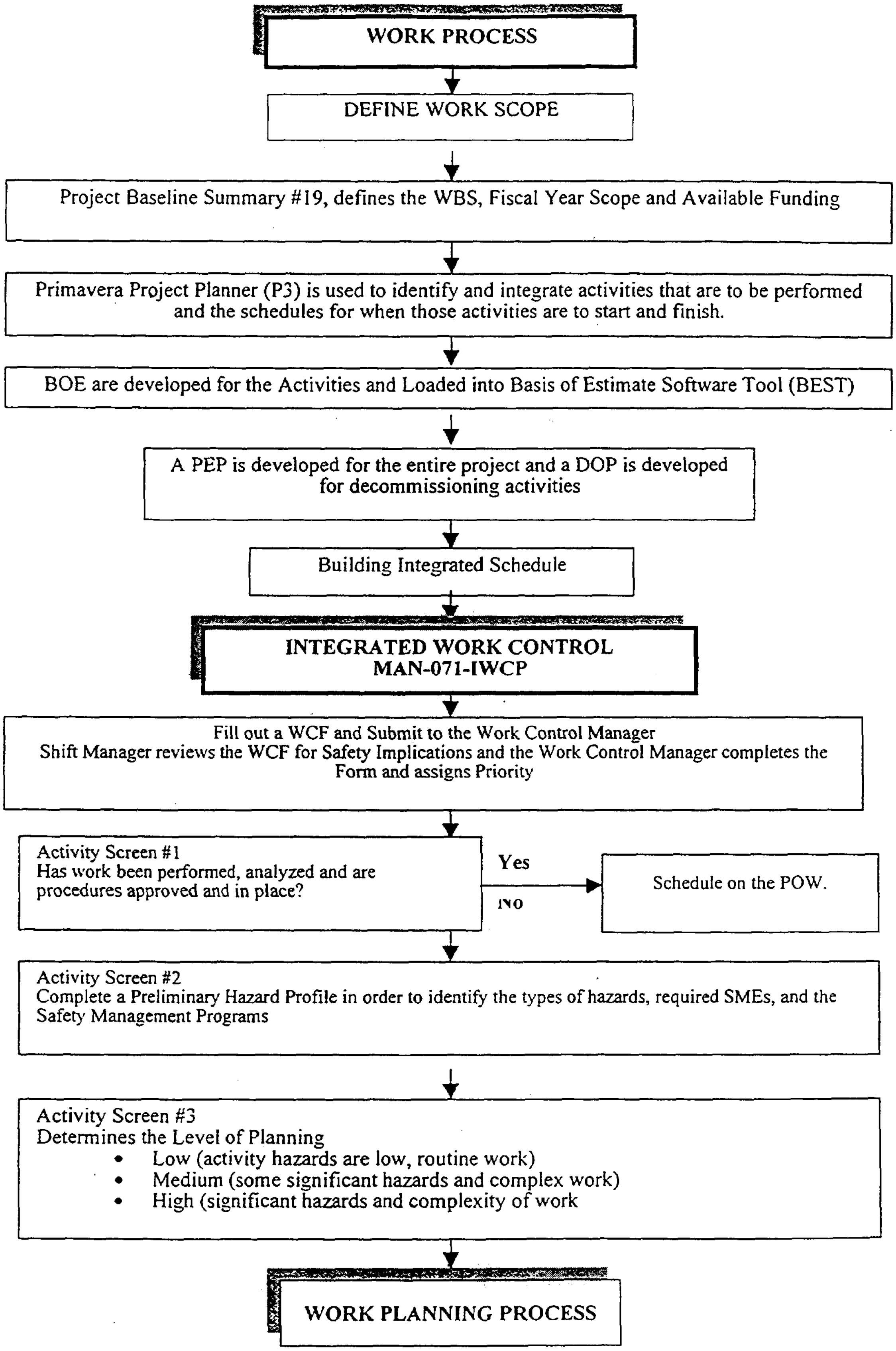

Figure 10. Work Planning Process

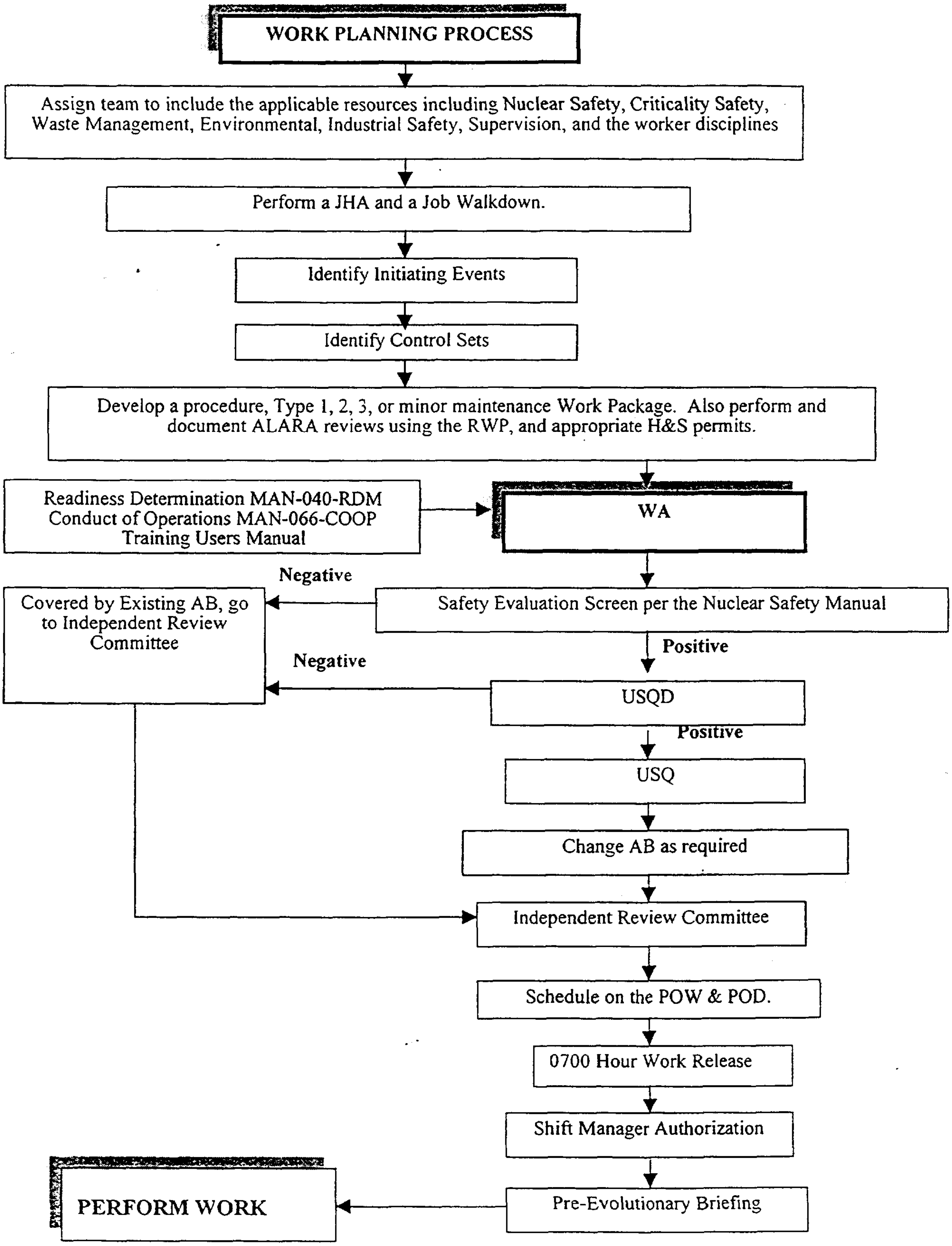

Figure 10. Work Planning Process (cont'd)

The Decommissioning Operations Plan (DOP) describes the requirements that must be met to complete decommissioning. The DOP includes a project description, alternatives analysis, project approach, waste management, health and safety, ARARs, environmental consequences, quality assurance, schedules, and organization.

5.1.1.5 Integrated Building Schedule

The integrated building schedule is a detailed schedule containing the actions that must be taken to meet the scheduled activities and milestones in the P3 lifecycle baseline schedule. This schedule is a current working schedule that is updated weekly (at a minimum) to reflect the completion of activities and to include or delete activities that were omitted or no longer required. The detailed activities in the integrated building schedule roll up to a summary activity in the P3 lifecycle baseline schedule.

5.1.2 Integrated Work Control

The IWCP Manual (Ref. 8) defines the method by which ISM is implemented on the job. It provides a single process through which all work on the Site is performed. It ensures the work is screened consistently against uniform criteria and hazards are appropriately analyzed and controlled.

5.1.2.1 Work Control Form

Work is identified and documented on a Work Control Form (WCF). All WCFs are tracked in a site-wide database. The WCF undergoes significant review and prioritization. A determination is made whether the work scope is minor maintenance, preventive maintenance, repair, or an emergency.

5.1.2.2 Activity Screening

An activity screening form (ASF) is used for the following activities: (1) new projects, activities, or subcontractor services, and (2) activities for which the hazards, processes, equipment, or controls have changed since the last time they were performed or for which the work control and planning documents require development or revision. The ASF is divided into three main parts: Screen 1, Activity Prescreen; Screen 2, Preliminary Hazards Profile; and Screen 3, Planning Process Screen.

Prior to starting Screen 1, the Activity Prescreen process, the responsible manager collects all available information related to the activity being planned. Once this information is collected, the responsible manger begins the ASF by documenting the project/activity title, description, and specific work location on the first page of the ASF. The responsible manager then completes the prescreen for the activity. The questions answered for Screen 1 on the ASF are used to determine if the activity can be performed using existing work execution documents with no further screens required. If additional screens are required, both Screens 2 and 3 are completed.

Screen 2, the Preliminary Hazards Profile, is used to determine the types of hazards involved with the work activity by answering questions relevant to the number of potential hazards associated with the work activity. The overall number of hazards associated with the work activity are used as data input for scoring and answering Screen 3, the Planning Process Screen. In addition, the recommended safety management plans and relevant SMEs identified in Screen 2 may assist the responsible manager in completing the screens and in implementing the selected level of planning.

Screen 3, the Planning Process Screen, is used to select the required level of planning to be performed. This is graded to the hazards, uncertainty, and complexity of the work activity so the appropriate hazards assessment and controls development tools and techniques may be selected. The expectation is that implementation of those controls will result in the work activity being performed safely. After the appropriate level of planning has been selected using the ASF, the responsible manager and SMEs conduct the work planning activity.

5.1.3 Work Planning

The level of work planning required is determined by the results of the ASF. The ASF results are expected to be available for use before planning begins. Three options are available to the responsible manager for planning the work:

- A low planning level approach is used when activity hazards and complexity are low and the work is either routine or simple, and there is some experience at performing most, if not all, of the work.
- A medium planning level approach is used when the activity is somewhat complex, or the activity has not been performed by the project team in the past, and there are some significant hazards associated with the work or some uncertainty about the hazards.
- A high planning level approach is used when there are significant hazards associated with the activity (or significant uncertainty exists about the hazards) and there is significant activity complexity or the activity has not been performed by the project team in the past.

5.1.3.1 Planning Team

The makeup of the planning team depends on the uncertainty of the work activity, the hazards expected to be encountered during the performance of work, and the complexity of the work activity. The ASF provides the responsible manager with a first cut of SMEs who should be considered for membership on the planning team.

The responsible manager generally selects a team of no less than two and typically no more than 12 people. still These people will have a combination of individual and collective experience and education to:

- Provide a detailed analysis of the hazards inherent in the work activity;
- Use the appropriate level of work planning (e.g., low, medium, high) to establish an adequate set of controls for the safe performance of work; and
- Based on the results of the hazards analyses, determine and express the controls in a way that can be communicated to those performing the work.

The team may be comprised of personnel from the primary and principal subcontractors, including floor-level workers and SMEs, where appropriate. Depending on the rigor required for planning, the team may need to work together to take advantage of the synergism of the team (i.e., the deliberations and decisions about the hazards, the analyses, and the selection of controls take place while the team is together in one location). The LRA may participate in the planning process per Section 11.1.3 of this DOP. Upon completion of the planning process, the team membership, deliberations, and decisions will be documented and included in the Project Record.

5.1.3.2 Job Hazard Analysis

The planning team reviews the results from the Hazards Profile Screen from the ASF as a starting point for identifying all the hazards associated with the activity. The JHA identifies the hazards associated with each first- and second-level tasks, and document the results. A decision is then made to determine if this information is sufficient. If not, the team conducts an integrated hazards assessment, graded to the activity.

During performance of the hazards analysis, both normal and reasonably anticipated abnormal events are considered along with any pre-existing hazards analyses or safety (e.g., AB, HSP, nuclear safety analysis, auditable safety analysis).

5.1.3.3 Initiating Events

Initiating events and potential mitigating systems failures (i.e., "what-if" scenarios) that could cause a hazard to produce undesirable consequences are identified during the JHA. Some of the scenarios determined by the "what-if" technique may not be included in existing hazards or safety analyses, and may require additional analyses to determine the consequences and required controls (e.g., nuclear safety analyses, criticality safety analyses, chemical safety thresholds). The planning team engages the appropriate qualified personnel to perform these analyses. The team determines the proper controls from their consideration of the analyses and circumstances of performing the tasks.

5.1.3.4 Control Set Identification

The planning team identifies the controls for the hazards associated with each particular task from the hazard analysis. This includes identifying documents that implement the controls for each task. Some examples are procedures, operations orders, RWPs, and H&S plans. If an existing document can not be found, the team recommends a higher level standard or reference that can be used as a basis for implementing the control.

5.1.3.5 Work Control Documents

After identifying the hazard controls, initiating events, and control sets, the project team prepares an IWCP work package or procedure that contains the results from all the steps performed. Procedures are developed generally for long-term, continuous activities in accordance with 1-MAN-001-SDRM, Site Document Control Manual, (Ref. 31).

Type 1 IWCP work packages are used for activities that do not require engineering design. These activities are typically repairs, deactivation of equipment, or simple environmental remediation.

Type 2 work packages provide an interim step that simplifies that work that requires design by eliminating the need for developing another until the design phase is complete. This type of work package incorporates the elements of the Type 1 work package into the text.

Type 3 work packages provide the final method used to perform work requiring engineering design. They are phased in from a Type 2 work package after the applicable training and process development has been completed. This format incorporates the elements of the Type 1 and Type 2 work packages.

Minor maintenance, which is defined as minor and routine in nature is an accepted approach to performing maintenance in a more efficient manner without compromising safety. Minor maintenance activities require the ISMS approach, but in a graded and tailored manner.

The responsible manager convenes a team to perform an independent/peer review of the work control document using personnel who were not involved in the document preparation. The cross-table review team prepares a review report and submits it for review and approval by the responsible manager and program chief engineer. The responsible manager resolves and incorporates the cross-table review comments, and indicates his or her approval by signing the work package.

5.1.4 Work Authorization

Work is authorized after planned activities have been screened to ensure public, environment, and worker safety.

5.1.4.1 Readiness Determination

Activities are reviewed against a screening process that evaluates the work in terms of complexity, hazards, and scope. Work that is routine (i.e., where the facility has an established track record of successful accomplishment) may be performed without any readiness determination. However, work that is new or complex may require a review by facility or Site management to ensure it can be performed safely. RFFO delegates authority for readiness determinations to facility management or the Site integrating contractor, or retains the authority based on the level of significance of the activity. The LRA will be advised of the dates and times of readiness determination activities and may participate in the readiness determination process per Section 11.1.3 of this DOP.

5.1.4.2 Conduct of Operations

Conduct of Operations (COOP) is the Site core culture of formality and discipline, where individuals seek and accept ownership of assigned systems and equipment. Formality and discipline provide uniformity and excellence in accomplishing work. COOP is identified in MAN-066-COOP (Ref. 29). The purpose of the manual is to define the RFETS COOP program and to comply with DOE Order 5480.19, COOP Requirements for DOE Facilities.

5.1.4.3 Training

Training is one form of work control that must be considered and requirements determined during the work planning process. Training falls in one of two categories: regulatory required training and job-specific training. Site employees may obtain necessary training in several ways. Resources Management is responsible for ensuring that personnel who engage in any job have the required training prior to the onset of that work. Not only do workers need the required training before commencing work, but also for nuclear facilities, access will be denied to anyone who does not meet area access training requirements. Individual companies are responsible for determining qualifications for staff that plan work using the IWCP. Qualification packages, if needed, are developed and documented in accordance with 96- RF/T&Q-0005, Training and Qualification Program, in the Training Users Manual (Ref. 32). The Training User's Manual provides guidelines for developing a Training Implementation Matrix, which lists specific training requirements for the work to be performed. Additional details regarding worker training are presented in Section 9.2. Table 10 shows the Training Implementation Matrix for decommissioning work.

5.1.4.4 Safety Evaluation Screen

All work packages and procedures are reviewed against the facility AB to ensure the established control set is adequate to protect the workers and the public. The safety evaluation screen is a checklist used to identify activities that might be outside the AB and therefore might present an Unreviewed Safety Question (USQ).

5.1.4.5 Unreviewed Safety Question

Per DOE Order 5480.21 (Ref. 21), a USQD is performed to evaluate activities with the potential to challenge the limits of the AB. It is a more in-depth review of the activity than the safety evaluation screen. Activities determined to be USQs must be approved by RFFO before work can proceed. If it is determined that additional work and facility safety controls are required to manage the hazards, these are documented in a Justification for Continued Operation (JCO), which must also be approved by RFFO before the work is initiated.

5.1.4.6 Authorization Basis Revision

If a proposed new activity is substantial, the facility's AB may be revised to provide a clear documentation of the activity, related hazards, and necessary safety controls. The AB document will also be revised on an annual basis to incorporate any USQs and JCOs that have been established during the previous year.

Table 10. Training Implementation Matrix for Decommissioning Work

JOB TITLE	MANAGER	MTCE COORD	MTCE PLAN	MAC COORD	ADMIN ASST	MTCE SUPVSR	PIPEFITTER	ELECTRICIAN	PAINTER	D & D WORKER	MACHINIST	PROC SUPVSR	PROC SPEC	UTIL WORKER	CARPENTER	SHEET METAL	COMMENTS
TRAINING																	
Aerial Lift Training						x	x	x	x	x	x				x	x	
Alarms, Sounds, and Responses	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Asbestos Awareness Briefing	x		x			x	x	x	x	x	x	x	x	x	x	x	
Asbestos Worker Initial Training / 32 hrs, #056-354-02						x	*	*	x						x	x	
Asbestos Worker Refresher Training / 8 hrs., #056-351-02						x	*	*	x								
Be Operations						x	x	x	x	x	x	x	x	x	x	x	
BIT-OJT						x						x					
Bldg Tours: 776/777	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Building a Plastic House						x			x	x	x				x	x	
Computer Training: Unclassified	x	x	x	x	x							x					
Confined Space Entry						x	x	x	x	x	x				x	x	
Controller/Evaluator Training	x	x	x			x						x					
Crane and Hoist Inspection										*							
CTR Training and Reference		x															
DOT Awareness						x	x	x	x	x	x	x	x		x	x	
Electrical Safety - CPR qual						x		x		*							
Electrical Safety for Electrical Workers						x		x									
Electrical Safety for Non Elec Workers			x				x		x	x	x	x	x	x	x	x	
Emergency Response Organization (ERO)	x																
Environmental Laws and Regs Workshop	x																
Fall Protection						x	x	x	x	x	x	x	x		x	x	
General Employee Rad Training (GERT)				x	x												
General Employee Training	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
GERT/Rad Wkr Off Yr Brochure	x	x	x			x	x	x	x	x	x	x	x	x	x	x	
GBs						x	x	x	x	x	x				x	x	
GB Casual User						x	x	x	x	x	x	x	x		x	x	
GB Support Activities						x	x	x	x	x	x	x	x		x	x	
Hazard Communication Work Area Indoctrination	x	x				x	x	x	x	x	x	x	x	x	x	x	
Hazard Communications	x	x				x	x	x	x	x	x	x	x	x	x	x	
Hazardous Materials Awareness for First Responders	x																
Hazardous Waste Operations-24 hr		x															
Hazardous Waste Operations 40 hr	x					x	x	x	x	x	x	x	x	x	x	x	
Hazardous Waste Ops Refresher-8 hr	x	x				x	x	x	x	x	x	x	x	x	x	x	
Hazardous Waste Ops Supervisor	x					x						x					
Hearing Conservation	x	x	x			x	x	x	x	x	x	x	x	x	x	x	
Hoist Apparatus						x	x	x	x	x	x	x	x		x	x	
Incident Command	x																
Industrial Truck Safety Training							x	x		x	x	x	x		x	x	

JOB TITLE	MANAGER	MTCE COORD	MTCE PLAN	MAC COORD	ADMIN ASST	MTCE SUPVSR	PIPE FITTER	ELECTRICIAN	PAINTER	D&D WORKER	MACHINIST	PROC SUPVSR	PROC SPEC	UTIL WRKR	CARPENTER	SHEET METAL	COMMENTS
TRAINING																	
IWGP	x	x	x	x		x						x					
Ladder Safety			x														
Lead Awareness						x	x	x	x	x	x	x	x		x	x	
Lead in the Workplace						x	x	x	x	x	x						
Lockout/Tagout	x		x			x	x	x	x	x	x	x	x		x	x	
Medical/Physical	x	x	x			x	x	x	x	x	x	x	x	x	x	x	
Nuclear Criticality Safety for Fissile Material Handler													x				
Nuclear Criticality Safety OJT		x	x				x	x	x	x	x		x		x	x	
Nuclear Criticality Safety Support		x	x				x	x	x	x	x				x	x	
Nuclear Criticality Safety Supervisor	x					x						x					
Occurrence Reporting Workshop	x																
Painting a Plastic House									x	x							
Personnel Security Assurance Program												x	x				
Pu Facilities Training for Pu Handlers												x	x				
Pressure Safety Awareness	x		x			x	x	x	x	x	x	x	x		x	x	
Rad Con for Managers	x					x						x					
Radiological Glovebag Containment	x					x	x	x	x	x	x				x	x	
Rad Glovebag Containment JPM	x					x	x	x	x	x	x				x	x	
Radiological Worker II	x	x	x			x	x	x	x	x	x	x	x	x	x	x	
RCRA Compliance	x	x	x			x	x	x	x	x	x	x	x	x	x	x	
RCRA Tank Custodian Class	x											x	x				
RCRA Waste Management Class	x											x	x				
Radioactive Source Control Knowledge Exam	x																
Rad Safety Training for Uranium												x	x				
RCRA/Waste Generator Annual Trng Cklst	x					x	x	x	x	x	x	x	x	x	x	x	
RCRA/Waste Gen Annual Trng (Train the Trainer Workshop)						x											
Respiratory Protection: PremAire						x	x	x	x	x	x	x	x		x	x	
Respiratory Protection: Respirator Indoctrination User		x	x				x	x	x	x	x		x		x	x	
Respiratory Protection: Respirator Indoctrination Manager	x					x						x					
Respirator Fit	x	x	x			x	x	x	x	x	x	x	x		x	x	
Rocky FlatsQual Process Brochure	x					x						x					
Scaffolding Safety for Builders/Erectors						x				x					x		
Scaffolding Safety for Competent Persons						x											
TID												x	x				
Waste Generator All Areas Class	x					x	x	x	x	x	x	x	x	x	x	x	
Welding Safety						x	x									x	

5.1.4.7 Independent Safety Review

An independent safety review is a comprehensive safety review performed by technically competent individual(s) or multidisciplinary independent committees to enhance the safety of nuclear facility operations and activities. The individual(s) or majority of committee members involved in the review shall be independent of the operation or item being reviewed. Requirements for an independent safety review are outlined in 1-52000-ADM-02.01, Rocky Flats Administrative Procedures Manual Operations Review Requirement, (Ref. 33).

5.1.4.8 Plan of Week

The POW is used to identify work that will be performed during the next week. A regularly scheduled meeting is held weekly to discuss those planned activities.

5.1.4.9 Plan of the Day

The POD is used to schedule, authorize, and control activities in the facility. It is an important forum for resolving conflicts in scheduling work and providing for discussion about planned activities. Each facility plans and schedules work activities with about a three-month horizon, then refines the planning about a week in advance and translates detail into the POD. The POD includes operations, maintenance, surveillances, inspections, and other activities.

5.1.4.10 Work Release

Once the POD has been established and approved by facility management, a meeting is held early in the shift to release work for the day. The Shift Manager chairs this meeting, during which he or she explains terminations in the facility, identifies radiological areas, and ensures the work to be performed is fully supported.

5.1.4.11 Pre-Evolutionary Briefing and Job Task Briefing

Pre-evolution briefings and job task briefings are performed to ensure that personnel preparing to conduct operations and other work understand what is to be performed, understand the hazards and controls, and have an opportunity to ask questions or raise concerns. The pre-evolution briefing is more formal than the job task briefing. It is a forum for accomplishing ISMS safety functions at the floor level. The pre-evolution briefing provides for feedback as well as for reviewing the scope of work, and reviewing the hazards and the controls to do the work safely. It is also a point in the work process where the required prerequisites are confirmed. A job task briefing is less formal than a pre-evolution briefing. It is conducted by the job foreman and serves as one method by which the ISMS process is implemented on the floor for non-complex, routine, and low hazard work activities. A pre-evolution briefing is documented; a job task briefing is not.

5.2 Criticality Safety

The criticality safety program establishes controls for building activities involving fissionable material. This program includes developing engineered and/or administrative criticality safety controls, monitoring compliance status with established controls that include occurrence investigation and reporting, and maintaining and controlling distribution of technical documents. The program ensures that the criticality safety organization must approve criticality safety controls either through new evaluations or through the Criticality Safety Limit Examination Programs for all activities involving the storage, relocation, and/or processing of fissionable material. The Criticality Safety Program will be implemented in accordance with the DOE's approved RFETS Implementation Plan for the Nuclear Criticality Safety Manual (Ref. 34).

5.3 Radiation Protection

The radiation protection program implements standards, limits, and program requirements for protecting individuals from exposure to radioactive materials. The program is based on the principle of ALARA (i.e., as low as reasonably achievable). Personnel are protected from radioactive materials through radiological surveillance, contamination control, and minimization of exposure. The program provides for personnel dosimetry, surveillance and maintenance of engineered radiation protection systems, the RWP, and area surveillance and posting. Radiological protection for planned activities is ensured through reviews of work control documents, pre-job surveys, and the use of PPE. Personnel exposures are formally tracked, recorded, and reported back to individuals. Radiological monitoring will be performed in accordance with the RFETS HSP Manual, Radiological Control Manual, and Radiological Safety Procedures (RSPs).

5.4 Hazardous Material Protection

Hazardous material protection is accomplished through the H&S Program. This program provides for industrial hygiene and safety (IH&S), which ensures personnel exposures to physical, chemical, and biological hazards in the work environment are controlled. The H&S Program philosophy fosters management accountability and worker involvement. It ensures that supervisors and safety professionals are required to review work areas and the building in general to identify H&S hazards. Program safety and technical reviews are integrated with work control processes to ensure non-radiological H&S hazards (i.e., physical, chemical, biological) are identified and appropriate measures are instituted to protect the worker, such as engineered systems, PPE, and monitoring equipment.

Standards for the hazardous material protection program are defined in 29 CFR Part 1910 (Ref. 23), the HSP Manual, and the Potentially Shock Sensitive/Explosive Chemical Characterization, Management, and Disposal Plan.

5.5 Radioactive and Hazardous Waste Management

The waste management, environmental protection, and transportation programs are responsible for radioactive and hazardous waste management at RFETS.

5.5.1 Waste Management and Environmental Protection

The waste management and environmental protection programs provide for managing radioactive and hazardous waste inventories; controlling building effluents; and managing waste generation, storage, treatment, and packaging. These programs, in complying with the standards set by waste management and environmental protection regulations, prevent hazardous and radioactive material spills by ensuring appropriate packaging, inspection, and storage of those materials. These programs aid in the detection of confinement degradation through leak detection practices and routine surveillance and inspection, and assist with appropriate response planning and preparation for events such as hazardous material spills.

5.5.2 Transportation

The transportation program specifies safe and compliant packaging requirements for both onsite and offsite transportation of radioactive and hazardous materials to prevent radioactive and hazardous material release, and to minimize accident consequences. Facility management is ultimately responsible for the safe and compliant packaging of material that is released for transport. The transportation program describes a process for the incorporation of packaging and labeling requirements into work control documents and defines training requirements for personnel involved in packaging and shipment of hazardous materials. Specific to the safe packaging of hazardous materials for shipment, the U.S. Department of Transportation (DOT) regulations define the minimum standards for protecting workers, the public, and the environment from a release of containerized hazardous materials. The RFETS transportation program is implemented through the Rocky Flats Transportation Safety Manuals (Ref. 35).

5.6 Conduct of Operations

The COOP Program (Ref. 29) provides an accurate, disciplined, and formal method for conducting facility operations. It promotes implementation of a set of standards that establish safe operations. Provisions of the program specify that all work is performed by appropriately trained personnel using adequate and controlled procedures, that work is properly supervised, that prior approval of all work is obtained from the Shift Manager or Configuration Control Authority (CCA), and that accountability exists for work performance. The program also provides processes for monitoring facility operations through functions such as log keeping, conduct of rounds, and internal surveillances.

5.7 Fire Protection

The fire protection program provides fire protection engineering, fire hazards analysis, fire prevention requirements (e.g., ignition sources, inspections, training, control of combustibles, transient fire loads, and hot work), and fire response. Fire response plans, training drills, as well as inspection, testing, and maintenance of both engineered fire protection and notification systems ensure personnel safety, fire fighting capability and property loss minimization if a fire should occur. The fire protection program is implemented by the relevant sections of the HSP Manual (Ref. 26).

5.8 Industrial Safety

The industrial safety program contains provisions that implement federal regulations addressing standard industrial hazards. Precedents for controlling standard industrial hazards are well established through institutionalized standards, guidelines, and good practices. In addition, DOE has established its own standards that are identified in DOE Orders. Industrial safety is generally implemented in concert with the hazardous material protection and work control program requirements.

Standards for industrial safety are found in 29 CFR Part 1910 (Ref. 23), portions of 29 CFR 1926 (Ref. 24), and DOE Orders and implemented by the relevant procedures of the HSP Manual (Ref. 26).

5.9 Quality Assurance

The Quality Assurance Program (QAP) assures consistent and appropriate application of quality requirements to the performance of activities using a graded approach. Quality assurance is discussed in Section 10.

5.10 Emergency Preparedness

The emergency preparedness program provides the plans, procedures, and resources necessary to respond to Site emergencies. The program is based on a comprehensive understanding of the hazards and potential radioactive material and hazardous chemical release mechanisms present in the facility.

The program protects facility personnel through management planning, designation of an emergency response organization, and training and drills (site-wide and building-specific) for possible abnormal events including fires, hazardous material spills, inadvertent criticalities, and personnel accountability during facility evacuation. The program provides the necessary trained emergency response personnel to ensure worker and public safety during an abnormal event. Emergency preparedness program elements also include pre-planned actions, prompt and accurate emergency classifications, and timely notifications of the emergency preparedness organization.

The emergency preparedness program is implemented through the RFETS Emergency Plan (Ref. 36), as augmented by the Building 776/777 Emergency Response Operations procedure (Ref. 37).

5.11 Preliminary Hazards Analysis

A Preliminary Hazards Analysis (PHA) has been developed based on the generic activities that are planned decommissioning. The PHA is summarized in Table 11. The PHA documents the hazard identification process for operational activities anticipated to be performed during closure. This PHA will be used with the RLCR to generate detailed AHAs for individual job tasks.

Table 11. Preliminary Hazards Analysis

Major Work Task	Hazard	Cause	Preventive Measures (Evaluated on Case-by-Case Basis)
Perform asbestos and lead abatement and clean up activities	Exposure to asbestos airborne and surface contamination fibers that are lung hazards. Exposure to lead materials is hazardous to internal organs of the body.	Improper clean up techniques including: improper tent decontamination or PPE usage. Improper ventilation usage. Improper waste handling and disposal. Lack of adequate engineering controls. Improper characterization.	Obtain services of certified state abatement inspector to plan and supervise the abatement project Ensure all workers are trained as asbestos workers. Ensure all RFETS asbestos/lead prerequisites are met before job commencing. Develop and implement an AHA(s) for the job. Ensure all medical, training and PPE prerequisites are met. Ensure IH&S personnel perform the proper air monitoring sampling during the course of the job. Ensure all posting and clearance sampling is performed. Ensure that all areas are evaluated and properly characterized by SME or competent person.
Perform Be decontamination and cleanup activities	Exposure to Be contamination is a lung hazard. Improper use of equipment can cause extremity or limb damage to workers.	Improper clean up techniques including: Improper tent, decontamination or PPE usage. Improper ventilation usage. Improper waste handling and disposal Lack of adequate engineering controls	Ensure all workers are trained as Be workers Ensure all RFETS Be prerequisites are met prior to job's commencing. Develop and implement an AHA(s) for the job. Ensure all medical, equipment training and PPE prerequisites are met. Ensure the proper air monitoring sampling is performed during the course of the job by IH&S personnel. Ensure all posting and clearance sampling is performed.
Perform radiological decontamination operations	Exposure to radioactive materials internally and externally. Cell damage and damage to internal body organs may occur with over exposures to radioactive materials. Improper use of scabbling or other decontamination equipment can injure extremities or limbs of workers by causing gash or cutting wounds.	Improper cleanup techniques including: Improper tent, decontamination or PPE usage. Improper ventilation usage. Improper waste disposal and handling. Improper training in the use of decontamination equipment.	Ensure all workers are trained as Rad workers. Ensure all RFETS Rad worker prerequisites are met prior to job commencing. Develop and implement an AHA(s) for the job. Ensure all medical, equipment training and PPE prerequisites are met. Ensure the proper air monitoring sampling is performed during the course of the job by radiological operations personnel. Ensure all posting and clearance sampling is performed.

Major Work Task	Hazard	Cause	Preventive Measures (Evaluated on Case-by-Case Basis)
De-energize work areas and remove cables and wiring	Electrical shock to body, cutting of extremities of body parts using wire strippers or other hand tools, fall off ladder or scaffolding if used.	Lockout/Tagout (LO/TO) not used properly, all workers not informed of LO/TO status. Improper use of hand tools, ladders or scaffolding. Improper lighting in room may result in improper use of equipment Lack of As-Built drawings	Utilize LO/TO procedures properly (including verification that energy source has been isolated). Inspect all hand tools before use. Ensure all workers are trained in ladder, scaffolding and fall protection measures before using this equipment Develop and use task specific AHAs. Perform work area walkdown and conduct proper planning meetings and briefings. Follow all IWCP instructions. Ensure all worker training is current.
Move equipment out of rooms to work areas and transport using forklifts, pallet jacks or pick-up trucks.	Back injuries, pinching, and extremity damage by dropping or falling objects. Internal and external body injuries by vehicle impact. Eye injuries by poking or dust particles in eye hazards. Be exposure from contaminated surfaces under equipment.	Improper lifting techniques, job flow not planned properly, pre-job walkdowns not performed, vehicle alarm systems not working, buddy system not used, lack of attention to detail, worker fatigue, no use or improper use of PPE.	Perform pre-job walkdowns. Develop AHA for job tasks. Use buddy system. Ensure vehicle alarm and braking systems are working properly. Utilize PPE properly. Perform proper lifting techniques. Ensure proper job flow is used and job is not rushed. Do not attempt o move items that are stacked too high. Cover all sharp edges. Perform Be pre-job swipe sampling. Use of material handling equipment.
Cut out piping systems in rooms or work areas	Cutting of body limbs or body parts with mechanical equipment. Piping falling on feet, pinch points of rolling pipe, liquid splashes if piping is not drained. Rebound of pipe can cause body injuries. Radiological/chemical exposures.	Improper use of mechanical equipment including no training on specific equipment being used, piping not rigged or restrained properly, piping not drained prior to cutting. Improper engineering controls.	Proper training with cutting equipment. Develop and utilize AHA for job tasks. Rig and restrain piping properly. Utilize pipe caps after cutting to keep debris from falling out and cover sharp edges of pipes after cutting. Ensure piping has been properly taken out of service. Utilize proper PPE as described in the AHA and RWP.

Major Work Task	Hazard	Cause	Preventive Measures (Evaluated on Case-by-Case Basis)
Hoist, rigging and lifting forklift operation	Bodily injuries due to falling objects or pinching of workers due to space limitations.	No rigging plan, improper rigging techniques, improper worker body positioning.	Develop rigging plan. Comply with all RFETS standards for rigging. Develop AHA and implement. Perform pre-job walkdown and conduct pre-evolution briefing. Walkdown rigging path during all phases. Perform pre and post job inspections on all rigging equipment. Ensure all workers are properly trained. Follow all required steps in the IWCP.
Package waste into containers for storage and shipment. Segregate waste to meet WAC.	Pinching of extremities on container lids, barrels rolling on feet, back strains, foot injuries as vehicle wheels impact or roll onto extremities, cuts/gashes of hands by tooling.	Improper lifting and handling techniques, wrong tooling used to put lids on containers, pallet jack or forklift ramming into workers, job rushed or not planned properly. Package does not meet WAC.	Use of trained and certified waste generator as appropriate. Develop AHA and implement. Review lessons learned from previous waste handling operations. Develop proper tool list before starting job. Ensure all waste containers are properly staged before starting job. Ensure all building notifications are made before moving and handling waste. Follow appropriate RFETS requirements for waste handling and movement. Follow all IWCP requirements.
Cut out and remove GBs in rooms or work areas	Pinch points, foot and hand injuries, cutting of hands/arms, eye and head injuries, burning of skin or extremities. Release of radioactive/chemical contamination and inhalation.	Improper use of grinders or no guards on grinders, cramped working conditions, bad lighting, limited vision, breaking of leaded glass, plasma slag burns through clothing, improper use of PPE Improper use of fixatives. Improper use of respirator Improper engineering controls	Proper training with cutting equipment. Develop and utilize AHA for job tasks. Rig and restrain GBs properly. Use pipe caps on GB piping after cutting. Ensure GBs have been properly taken out of service before work starts. Use proper PPE as described in the AHA. Perform tooling and respirator inspections before each use. Follow all IWCP requirements.
Construct and use scaffolding to perform job tasks	Fall hazards, workers struck by falling objects, hand injuries.	No use of fall protections, improper training, no use of PPE, improper use of tooling, improper rigging and transport of scaffolding pieces, no scaffold inspections, scaffold collapse.	Proper training for scaffold erection and use. Fall protection and rigging training. Proper use of PPE. Develop AHA. Perform and document scaffolding inspections. Ensure all scaffolding is tagged properly. Ensure all toeboards and side rails or compensatory measures are in place.

Major Work Task	Hazard	Cause	Preventive Measures (Evaluated on Case-by-Case Basis)
Perform radiological decontamination operations using scabbling machines, hydrolyzing techniques, hand wiping methods or by applying stripcoat decontamination paint	Injuries to hands and feet by gouging, cutting or impact; inhalation, ingestion or skin exposure to radioactive materials and ammonia vapors; electrocution; falls.	Improper or no training on equipment used for decontamination, improper work are ventilation, improper use of PPE, no job planning. No LO/TO of work area No fall protection	Conduct mock up training on decontamination equipment and stripcoat operations. Develop AHA for job tasks. Ensure work area is properly ventilated before apply stripcoat. Ensure LO/TO operations have been performed. Wear prescribed PPE as determined by IH&S and Radiological Protection. Utilize fall protection, when required. Follow all IWCP, AHA and RWP requirements.
Remove HVAC ductwork	Pinch points, cutting hands, fall from scaffold, release of contamination. Exposure to radiological/chemical contamination.	Improper use of cutting equipment. Non-existent of loose guard rail. Improper use of fixatives. Improper use of respirator. Improper use of ventilation	Proper training in us of tools and PPE. Scaffold inspection before use. Develop AHA for job tasks. Training in use of fixatives. Ensure all toeboards and side rails or compensatory measures are in place.
Perform final cleanup of building/structure	Trips, falls, head wounds, pinch points, punctures, contusions, skin contamination, inhalation of radioactive materials.	Housekeeping, falling objects, non-use of PPE, improper use of PPE, sharp edges or sharp objects not protected, no fall protection, improper ladder use.	Perform weekly housekeeping inspections. Utilize fall protection when applicable. Develop AHA for job task. Utilize PPE property and as described by IH&S and Radiological Protection. Follow all ALARA reviews, AHAs, RWP and IWCP requirements. Obtain confined space permits and training when required.
Perform final survey of building	Falls, head wounds, electric shock, abrasions, cuts, pinches.	No fall protections, improper use of instrumentation, working in tight spaces, tripping hazards, bad housekeeping, improper termination of wiring.	Develop AHA for job task. Perform pre-job walkdowns. Utilize fall protection when required. Complete ladder training as required. Utilize two-person rule when working in elevated locations (above 6 feet). Obtain confined space permits and training when required. Follow all AHA and RWP requirements.