22102

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. . . protecting the environment

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CORRES. CONTROL
OUTGOING LTR. NO.

October 11, 1996

96-RM-EC-00074-KH

DOE ORDER #

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DIST.	LTR	ENC
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FINDLEY, M. E.		
GUINN, L. A.	✓	
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CORRES.CONTROL	X	X
RMRS CC	X	X
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DECOMMISSIONING PROGRAM PLAN — PRB-107-96

PURPOSE

The purpose of this memorandum is to initiate the review/approval cycle for the Decommissioning Program Plan (DPP).

DISCUSSION

The DPP is one of two key documents that must be approved prior to executing field decommissioning work in Building 779, which is scheduled to begin January 1, 1997. Because of the duration of the review period required by the Interim Measure/Interim Remediation Action process, it is important that the Rocky Flats Environmental Technology Site review/approval process be completed by October 31, 1996, otherwise the scheduled start date will be in jeopardy and work for the Decontamination and Decommissioning Steelworkers will be delayed. Revision A is enclosed for Kaiser-Hill's review and comment.

RESPONSE REQUIREMENTS

RMRS is fully prepared to support Kaiser-Hill during this review and approval process. Please advise me as to how RMRS can best support you in accomplishing this effort.

Paul R. Bengel, Vice President
Engineering/Construction/Decommissioning

JAC:alk

Enclosure:
As Stated

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DRAFT

DECOMMISSIONING PROGRAM PLAN

(DPP)

October 11, 1996

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DECOMMISSIONING PROGRAM PLAN

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ACRONYMS

The following is a partial listing of acronyms and abbreviations that are commonly used in the Decommissioning Program.

ALARA	As Low as Reasonably Achievable A standard applied to regulate radiation exposure limits at nuclear facilities. The principle takes into account the state of technology, the economics of improvements in relation to benefits to the public health and safety, other societal and socioeconomic considerations, and the utilization of atomic energy in the public interest.
ARAR	Applicable or Relevant and Appropriate Requirement A requirement that applies or pertains to the handling or disposition of waste at an identified site.
ASAP	Accelerated Site Action Project (referred to as the Vision)
BAT	Best Available Technology Treatment technologies that have been shown through actual use to yield the greatest environmental benefit among competing technologies that are practically available.
CDPHE	Colorado Department of Public Health and the Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act A federal law passed in 1980, and modified in 1986 by the Superfund Amendments and Reauthorization Act. The Acts created a special tax that goes into a Trust Fund, commonly known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites.
CWA	Clean Water Act Controls waste emissions into surface water bodies or publicly owned treatment systems. Requires best conventional technology and best available demonstrated controls to limit the impact of the contaminants.
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DOE/HQ	U.S. Department of Energy, Headquarters
DOP	Decommissioning Operations Plan
DPP	Decommissioning Program Plan
DQO	Data Quality Objectives Statements that specify the data needed to support decisions regarding remedial response activities.

EPA	U.S. Environmental Protection Agency A federal agency that develops standards for acceptable limits of water, air, and environmental contaminants, and oversees adherence to those standards. Region VIII of the EPA will have oversight responsibilities for RFETS.
ER	Environmental Restoration The process of environmental cleanup designed to ensure that risks to the environment and to human health and safety from waste sites are either eliminated or reduced to prescribed, safe levels.
FFCA	Federal Facility Compliance Agreement
FONSI	Finding of no significant import
FY	Fiscal Year
HASP	Health and Safety Plan Prepared during the scoping phase of a Superfund remediation, this plan describes the measures that will be taken to ensure health and safety at the site.
IAG	Interagency Agreement
LLW	Low-Level Waste Typically, discarded radioactive material such as rags, construction rubble, glass, etc., that is only slightly or moderately contaminated. Most such waste is short-lived and of low radioactivity.
NEPA	National Environmental Policy Act Requires federal agencies to consider environmental factors when making decisions and to evaluate environmental impacts prior to making major federal actions. Environmental assessments and environmental impact statements are NEPA documents.
NPL	National Priorities List The Environmental Protection Agency's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response under CERCLA. Based primarily on the score a site receives on the Hazard Ranking System.
NRC	U.S. Nuclear Regulatory Commission Regulates nuclear safety aspects of nuclear facilities.
OSHA	Occupational Safety and Health Administration
OU	Operable Unit Term for each of a number of separate activities undertaken as part of a Superfund site cleanup. A typical operable unit would be removing drums and tanks from the surface of a site.
PAM	Proposed Action Memorandum The decision document that describes an accelerated cleanup activity which DOE expects can be completed during a six-month period.

PCB	Polychlorinated Biphenyl A synthetic, organic chemical once widely used in electrical equipment, specialized hydraulic systems, heat transfer systems, and other industrial products. Highly toxic and carcinogenic. Any hazardous wastes that contain more than 50 parts per million of PCBs are subject to regulation under the Toxic Substances Control Act.
PRP	Potentially Responsible Party An individual(s) or company(ies) (such as owners, operators, transporters, or generators) potentially responsible for, or contributing to, the contamination problems at a Superfund site. Whenever possible, EPA requires PRPs, through administrative and legal actions, to clean up hazardous waste sites they have contaminated.
QA	Quality Assurance
QAPP	Quality Assurance Project Plan A plan that describes the protocols necessary to achieve the data quality objectives defined for a remedial investigation.
RCRA	Resource Conservation and Recovery Act A federal law that established a regulatory system to track hazardous substances from the time of generation to disposal. The law requires safe and secure procedures to be used in treating, transporting, storing and disposing of hazardous substances.
RFCA	Rocky Flats Cleanup Agreement The legally binding agreement between the DOE, the EPA, and the CDPHE to accomplish the cleanup of radioactive and other hazardous substances contamination at RFETS.
RFETS	Rocky Flats Environmental Technology Site
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act.
SDWA	Safe Drinking Water Act A law that establishes regulations designed to protect drinking water resources. Incorporated both into RCRA and CERCLA under provisions dealing with groundwater protection.
S&M	Surveillance and Maintenance
SEIS	Sitewide Environmental Impact Statement Document which serves as an action-forcing device to insure that the policies and goals defined in NEPA are included in the ongoing restoration programs. Provides full discussions of significant environmental impacts and informs the public of alternatives which would avoid or minimize adverse impacts.
SNM	Special Nuclear Material

TSCA	Toxic Substances Control Act A law which gave the EPA the authority to regulate the manufacture, distribution, use, and disposal of chemical substances. Special emphasis was placed on the regulation of PCBs, or polychlorinated biphenyls (see PCB).
UST	Underground Storage Tank

GLOSSARY

alpha radiation - The most energetic but least penetrating form of radiation. It can be stopped by a sheet of paper and cannot penetrate human skin. If an alpha-emitting isotope enters the body, however, through inhalation, on food, or through a cut in the skin, it will cause highly concentrated local damage. (See also beta radiation and gamma radiation.)

asbestos - Asbestos form; varieties of chrysotile, amosite, aocidolite, anthophyllite, tremolite, and actinolite. A strong and incombustible fiber widely used in the past for fireproofing and insulation. The small, bouyant fibers are easily inhaled or swallowed, causing a number of serious diseases including: asbestosis, a chronic disease of the lungs that makes breathing more and more difficult; cancer; and mesothelioma, a cancer of the membranes that line the chest and abdomen, specific to asbestos exposure.

background radiation - The natural radioactivity in the environment. Natural radiation consists of cosmic rays, filtered through the atmosphere from outer space, and radiation from the naturally radioactive elements in the earth (primarily uranium, thorium, radium, and potassium). Also known as natural radiation.

best available technology (BAT) - Treatment technologies that have been shown through actual use to yield the greatest environmental benefit among competing technologies that are practically available.

beta radiation - High-energy electrons (beta particles) emitted from certain radioactive material. Can pass through 1 to 2 centimeters of water or human flesh and can be shielded by a thin sheet of aluminum. Beta particles are more deeply penetrating than alpha particles but, due to their smaller size, cause less localized damage.

characterization - Facility or site sampling, monitoring, and analysis activities to determine the extent and nature of a contamination. Characterization provides the basis for acquiring the necessary technical information to develop, screen, analyze, and select appropriate cleanup techniques.

contamination - The presence of foreign materials, chemicals, or radioactive substances in the environment (facilities, soil, sediment, water, or air) in significant concentrations.

curie - A unit of radioactivity that represents the amount of radioactivity associated with one gram of radium. To say that a sample of radioactive material exhibits one curie of radioactivity means that the element is emitting radiation at the rate of 3.7×10^{10} disintergrations per second. Named after Marie Curie, an early nuclear scientist.

decay - The process whereby radioactive particles undergo a change from one form, or isotope, to another, releasing radioactive particles and/or energy.

deactivation - The process of placing a facility in a safe and stable condition to minimize the long-term cost of a surveillance and maintenance program that is protective of workers, the public, and the environment until decommissioning is complete. Actions include the removal of fuel, draining and/or de-energizing of nonessential systems, removal of stored radioactive and hazardous materials and related actions. As the bridge between operations and decommissioning, based upon facility-specific considerations and final disposition plans, deactivation can accomplish operations-like activities such as final process runs, and also decontamination activities aimed at placing the facility in a safe and stable condition.

decommissioning - Takes place after deactivation and includes surveillance and maintenance, decontamination, and/or dismantlement. These actions are taken at the end of the life of the facility to retire it from service with adequate regard for the health and safety of workers and the public and protection of the environment.

decontamination - The removal or reduction of radioactive or hazardous contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical action, mechanical cleaning or other techniques to achieve a stated objective or end condition.

dismantlement - The disassembly or demolition and removal of any structure, system, or component during decommissioning and satisfactory interim or long-term disposal of the residue from all or portions of the facility.

disposal - Waste emplacement designed to ensure isolation of waste from the biosphere, with no intention of retrieval for the foreseeable future, and that requires deliberate action to regain access to the waste.

dose - Quantity of radiation or energy absorbed; measured in rads.

dose equivalent - A term used to express the amount of effective radiation received by an individual. A dose equivalent considers the type of radiation, the amount of body exposed, and the risk of exposure. Measured in rems.

friable asbestos - Asbestos, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure and non-friable asbestos containing material, that when damaged, may be crumbled, pulverized, or reduced to powder by hand pressure.

gamma rays - Penetrating electromagnetic waves or rays emitted from nuclei during radioactive decay, similar to x-rays. Dense materials such as concrete and lead are used to provide shielding against gamma radiation.

half-life - The time required for a radioactive substance to lose 50 percent of its activity by decay. The half-life of the radioisotope plutonium-239, for example, is about 24,000 years. Starting with a pound of plutonium-239, in 24,000 years there will be one-half pound of plutonium-239, in another 24,000 years there will be one-fourth pound, and so on. (A pound of material remains, but it gradually becomes a stable element.)

hazard - A source of danger (i. e., material, energy source, or operation) with the potential to cause illness, injury, or death to personnel or damage to a facility or to the environment (without regard for the likelihood or credibility of accident scenarios or consequence mitigation).

hazard categories - The consequences of unmitigated releases of radioactive or hazardous material as evaluated in accordance with DOE Order 5480.23, Nuclear Safety Analysis Reports, and classified by the following hazard categories:

- Hazard Category 1. The hazard analysis shows the potential for significant off site consequences. (No Hazard Category 1 facilities are designated at Rocky Flats).
- Hazard Category 2. The hazard analysis shows the potential for significant on site consequences.
- Hazard Category 3. The hazard analysis shows the potential for only significant localized consequences.

hazardous materials - Any solid, liquid, or gaseous material that is toxic, explosive, flammable, corrosive, or otherwise physically or biologically threatening to health.

hazardous waste - A solid waste or combination of solid wastes, that because of quantity, concentration, or physical, chemical, or infectious characteristics, may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness or pose a substantial hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

isotopes - Atoms of the same element that have equal numbers of protons, but different numbers of neutrons. Isotopes of an element have the same atomic number but different atomic mass. For example, uranium-238 and uranium-235.

low-level waste - Discarded radioactive material such as rags, construction rubble, glass, etc., that is only slightly or moderately contaminated. They pose few health hazards and are usually disposed of by shallow land burial.

mixed waste - Contains both radioactive and hazardous components.

nuclear facility - A facility whose operations involve radioactive materials in such form and quantity that a significant nuclear hazard potentially exists to the employees or the general public. Included are facilities that:

(a) produce, process, or store radioactive liquid or solid waste, fissionable materials, or tritium;

(b) conduct separations operations;

(c) conduct irradiated materials inspection, fuel fabrication, decontamination, or recovery operations;

(d) conduct fuel enrichment operations. Incidental use of radioactive materials in a facility operation (e.g., check sources, radioactive sources, and X-ray machines) does not necessarily require the facility to be included in this definition.

natural radiation - Radiation that is always present in the environment from such sources as cosmic rays and radioactive materials in rocks and soil. Also known as background radiation.

nuclear radiation - Ionizing radiation originating in the nuclei of atoms; alpha, beta, and gamma radiation.

pathways - The means by which contaminants move. Possible pathways include air, surface water, groundwater, plants, and animals.

Polychlorinated Biphenyl (PCB) - A synthetic, organic chemical once widely used in electrical equipment, specialized hydraulic systems, heat transfer systems, and other industrial products. Highly toxic and a suspect carcinogen. Any wastes that contain more than 50 parts per million of PCBs are subject to regulation under the Toxic Substances Control Act.

plutonium - An artificially produced element that is fissile and radioactive. It is created when an atom of uranium-238 captures a slow neutron in its nucleus.

radiation - Fast particles and electromagnetic waves emitted from the nucleus of an atom during radioactive disintegration.

radioactive - Giving off, or capable of giving off, radiant energy in the form of particles (alpha or beta radiation) or rays (gamma radiation) by the spontaneous disintegration of the nuclei of atoms. Radioisotopes of elements lose particles and energy through the process of radioactive decay. Elements may decay into different atoms or a different state of the same atom.

radioactive waste - A solid, liquid, or gaseous material of negligible economic value that contains radionuclides in excess of threshold quantities except for radioactive material from post-weapons-test activities.

radioisotope - An unstable isotope of an element that will eventually undergo radioactive decay (i.e., disintegration). Radioisotopes with special properties are produced routinely for use in medical treatment and diagnosis, industrial tracers, and for general research.

radiological facility - A facility containing measurable amounts of radioactive materials in quantities less than the thresholds for Hazard Category 3 established in DOE-STD-1027-92 but more than the thresholds established in 40 CFR 302, Appendix B, RQs.

radionuclide - A radioactive species of an atom.

radon - A radioactive gas produced by the decay of one of the daughters of radium. Radon is hazardous in unventilated areas because it can build up to high concentrations and, if inhaled for long periods of time, may cause lung cancer.

risk - The quantitative or qualitative expression of possible loss that considers both the probability that a hazard will cause harm and the consequences of that event.

risk assessment - The study and estimation of risk from a current or proposed activity. Involves estimates of both the probability and consequence of an action.

safety analysis - A documented process to (1) provide systematic identification of hazards within a given DOE operation; (2) describe and analyze the adequacy of measures taken to eliminate, control, or mitigate identified hazards; and (3) analyze and evaluate potential accidents and their associated risks. For the purposes of this document, the term "analysis" and "assessment" are used interchangeably.

safety analysis report (SAR) - A report that documents the adequacy of safety analysis for a nuclear facility to ensure that the facility can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations.

safety basis - The combination of information relating to the control of hazards at a nuclear facility (including design, engineering analyses, and administrative controls) upon which DOE depends for its conclusion that activities at the facility can be conducted safely.

standard industrial hazards - Hazards that are routinely encountered in general industry and for which national consensus codes and/or standards (e. g., OSHA, transportation safety, etc.) exist to guide safe design and operation without the need for special analysis to define safe design and/or operational parameters. Some site SAR hazards assessments refer to these as "typical" industrial hazards or just "industrial hazards."

scoping - In CERCLA, scoping is the initial planning phase of the cleanup process, when requirements are discussed and the projects defined. In the NEPA process, scoping relates to public involvement to help identify significant issues early so that efforts can be focused on those areas requiring resolution and to present a balanced environmental impact statement.

transuranic (TRU) mixed waste - Radioactive waste containing a concentration of alpha-emitting transuranic nuclides greater than 100 nCi/g and contains non-radioactive hazardous constituents.

transuranic (TRU) waste - Waste materials contaminated with isotopes above uranium in the periodic table. Transuranic waste is long-lived, but only moderately radioactive. Radioactive waste containing a concentration of alpha-emitting transuranic nuclides greater than 100 nCi/g.

treatment - Any active that alters the chemical or physical nature of a waste to reduce its toxicity or prepare it for disposal.

uranium - The heaviest element found in nature. Approximately 997 of every 1000 uranium atoms are uranium-238. The remaining 3 atoms are the fissile uranium-235. The uranium-235 atom splits, or fissions, into lighter elements when its nucleus is struck by a neutron.

EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

E.1 INTRODUCTION

Facility dispostion activities at Rocky Flats will be guided generally by the Rocky Flats Vision. The Rocky Flats Cleanup Agreement (RFCA) is the legally binding agreement between the Department of Energy (DOE), the Environmental Protection Agency (EPA), and the Colorado Department of Public Health and the Environment to accomplish the required cleanup of radioactive and other hazardous substances contamination at the Rocky Flats Environmental Technology Site (RFETS).

E.2 DECOMMISSIONING PROGRAM

This Decommissioning Program Plan (DPP) provides a plan to implement a decommissioning program at RFETS which will provide an approved baseline by which all decommissioning projects will be executed. This strategy integrates all decommissioning projects into an overall Baseline Decommissioning Program. These projects vary in complexity from simple, non-contaminated structures such as trailers, to large complex plutonium (Pu) contaminated buildings. The process defined in this DPP is applied to all facilities for consistency. A graded approach will be applied to establish the level of detail required for conducting decommissioning work within each facility. This DPP describes the process of managing a decommissioning project from beginning (planning) to end (closeout). As such, it is a blueprint for how to conduct business in the Decommissioning Program.

This DPP has been prepared to reflect the DOE/EPA policy on decommissioning of DOE high risk facilities under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This policy encourages streamlined decommissioning by establishing that decommissioning activities under CERCLA will be conducted as "removal actions." This plan supports an accelerated Decommissioning Program to completely decommission the RFETS. If this is to be achieved several philosophical changes as to how decommissioning projects are managed, controlled, and funded at a DOE site are required. This plan is based on management practices developed and successfully employed in the commercial sector. Further, these practices have had the approval/concurrence of other Federal and State regulators.

As a result of DOE 's shift in focus from nuclear weapons production to stabilization and cleanup, the Office of Nuclear Material and Facilities Stabilization (EM-60) was formed to oversee and coordinate the orderly shutdown and deactivation of these facilities from Defense Programs to EM-60. Facilities declared surplus by EM-60 are transferred to EM-40 for decommissioning.

The Decommissioning Program has considered a combination of decommissioning options as discussed in Section 5 of this Plan, based on the complexity of the facility and its associated hazards. As examples: 1) Trailers, industrial structures, and administrative facilities may be simply moved off site for reuse or demolished as fill material, 2) Excess equipment from these facilities may be removed off site, or dispositioned as waste, and 3) The contaminated facilities may be decontaminated, dismantled, demolished, to provide for the most effective minimization of the associated risks.

It is important to note that decommissioning includes the traditional DOE defined elements of dismantlement, decontamination, and demolition. Dismantlement includes the removal of contaminated equipment, tooling, and the de-energizing or stabilization of electrical systems, piping system and equipment to prepare the facility for ultimate disposition. Decontamination may be used with each decommissioning option to remove radiological and hazardous constituent contamination to provide for the most effective dismantlement or demolition. The final disposition

of the facilities will likely include a combination of dismantlement, demolition, and removal of the non-contaminated facilities and equipment.

The objective of this Plan is to outline an integrated Decommissioning Program which will avoid needless expenditures while maximizing risk reduction. The Program includes characterization of the facilities; decontamination of the facilities; removal of contaminated equipment; dismantlement/demolition of structures; and release of the complex, facility, or area for reuse. Reuse includes: use by the DOE for other missions, privatization of the facility for commercial use, or return of the area to a "greenfield" condition.

The objectives of the Decommissioning Program are as follows:

- Reduce hazards associated with facilities and prepare them for reuse, dismantlement, or demolition by removing unacceptable levels of radioactive material and chemicals, de-energizing electrical equipment, draining systems, and removing classified tooling.
- Dismantle existing facilities and equipment in a safe and compliant manner such that the resulting waste can either be disposed of on site within an engineered waste storage facility, shipped off site to a licensed commercial disposal facility, or shipped off site to another DOE disposal facility.
- Safely remove uncontaminated equipment and facilities for reuse, sale, or disposal as appropriate.
- Ensure facilities are removed or demolished in a manner which is integrated with other site activities.
- Reduce surveillance and maintenance costs of the facilities by decommissioning them as expeditiously as possible.

The strategy developed in this plan be will be implemented as follows:

1. Develop program level supporting plans and procedures which can be applied to all decommissioning projects.
2. Conduct radiological and chemical scoping evaluations of each building to support the refinement of cost estimates and waste volume estimates.
3. Prepare detailed "bottoms-up" cost estimates for each project.

This Plan contains a list of candidate facilities for decommissioning and organizes those facilities into clusters to be consistent with the site Vision as defined by the Accelerated Site Action Project. The scope of work for the Decommissioning Program is outlined. The Plan also provides a guide for the selection and priority scheduling of the decommissioning activities. The plan has been prepared in sufficient detail to provide persons not versed in decommissioning with enough information to understand the basics of the decommissioning approach at RFETS as well as provide a guide for the persons charged with execution of the program.

Under the Decommissioning Program, contaminated materials and components are accumulated and disposed in accordance with the requirements of the site Waste Management Program. This program condenses, stabilizes, and confines radioactive wastes to protect people and the environment in a publicly acceptable manner. To the extent practicable, land, facilities, and components will be converted to a reusable condition. The long-range planning and program execution, as described herein, will enhance personnel safety, reduce maintenance and surveillance costs, and minimize the total commitment of land and resources.

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The guidance for this plan comes from many sources. These include the U. S. DOE Decommissioning Implementation Guide and the Decommissioning Resource manual, DOE orders, instructions, and directives, company policies and procedure manuals, federal, state, and local laws and regulations, and interaction with other DOE complex contractors and commercial nuclear facility managers with decommissioning experience. This guidance is currently scattered throughout dozens of reference documents. In addition to being the approved baseline for all decommissioning projects, this DPP summarizes the source material in one concise document, which will be used as a guide in implementing the Decommissioning Program.

Buildings at RFETS have been grouped into "clusters" based upon the use, function, and interrelationships of each facility.

The text portion of this Plan will be revised by the Decommissioning Program when new guidance or other circumstances warrant. These other circumstances might include the resolution of one or more of the issues in the strategic plan, or a change in direction or regulation. This Plan will be issued as a controlled document by the Engineering/Construction/Decommissioning organization.

E.3 FACILITY DISPOSITION PROCESS

The Decommissioning Process is a phase of the overall Facility Disposition Process. The three major phases of the Facility Disposition Process are deactivation, decommissioning and remedial activities. The elements of the overall Facility Disposition Process are illustrated in Figure E-1.

It is important to note that for the large plutonium facilities all phases or elements of the facility disposition process may be active at any one time. For some facilities, operations may be conducted while deactivation and decommissioning events are being conducted in other portions of the facility. Portions of all the facilities were deactivated in the past and are available for prompt decommissioning. If funds are available, prompt decommissioning is provided for by this plan. In many cases, prompt decommissioning is very cost effective by reducing the surveillance and maintenance (S&M) costs at the beginning of decommissioning and, thereby, defraying part or all of the cost of decommissioning by utilizing current year S&M funds.

The explanation of the disposition process below is given in whole facility sequence for simplicity of explanation. However, it is the intention of the program to execute the program by sections of the larger facilities.

The Facility Disposition Process at RFETS begins with a Deactivation Phase. Deactivation removes containerized Special Nuclear Material (SNM), stored SNM, and non-fixed SNM to acceptable levels, and processes residues, liquids and SNM. Pu holdup in ducting and equipment will be removed during the deactivation period to a level which will allow down-grading the building security category. The remainder of the holdup will be removed during the decommissioning operations period. Deactivation performs a preliminary characterization of the building process equipment to identify quantities of Pu and then to assure that attractive quantities of Pu have been removed prior to turnover to Decommissioning. The intent of this preliminary characterization survey is to locate attractive quantities of Pu and then to verify that any quantities of Pu remaining after deactivation do not present a criticality concern nor require security clearance beyond "L", and preferably, would allow uncleared personnel to perform the decommissioning work.

A preliminary hazard analysis will be performed at the beginning of the deactivation period based on the existing building Safety Analysis Report (SAR). Once the attractive quantities of SNM have been removed, the buildings SAR will be down graded or the buildings will be re-categorized as radiological facilities. The decision for decommissioning of the buildings will focus on maximum use of the graded approach and the condition of the building after completion of deactivation activities.

A major element of the project safety analysis will be the evaluation of the safety conditions that remain at the time decommissioning of the facility begins. The evaluation of safety conditions will focus on the radioactive and hazardous material inventories that remain after completion of deactivation activities. Ideally, all of the nuclear and hazardous material will be removed during deactivation; however, experience has shown that many of the facilities scheduled to undergo decommissioning will still have radioactive and hazardous material remaining in the facilities and process lines. A thorough and proper review of material inventories will be conducted and incorporated into the safety documentation. In addition, although deactivation focuses on removal of energy sources from the facility, occupational hazards may still exist that would influence the level of detail required for the safety documentation. Both material inventories and occupational hazards will be addressed during development of the safety documentation which will be incorporated into a building specific Health and Safety Plan for decommissioning the building.

A Project Plan will be prepared which establishes a baseline cost and schedule to execute the Decommissioning Process. Approval of the Project Plan establishes the Project's financial authorization basis and the reporting requirements between the Decommissioning Program and the DOE. The DPP establishes the Management and Regulatory Authorization process to carry out the decommissioning of the RFETS facilities.

The RFCA establishes the methodology for accomplishing accelerated actions during decommissioning including the RFCA Standard Operating Protocol (RSOP). The RSOP applies to the routine, substantially similar accelerated actions associated with the majority of the facilities located at the RFETS. Between 400 - 500 buildings at Rocky Flats are general support buildings with low levels of risk or with no contamination. Decommissioning of these facilities follows a routine process as described in the DPP which is the implementing regulating document for all decommissioning actions at RFETS.

Once a building/cluster has been characterized and the risks identified, understood, and mitigated a decision will be made, involving both regulator and public involvement, as to the relative magnitude of risk and the degree of regulatory oversight required. This will determine whether decommissioning can proceed under the authorization of the RSOP or whether additional regulatory review and approval of a building/cluster specific Decommissioning Operations Plan (DOP) is required. The DOP will follow a process similar to that of a Proposed Action Memorandum rather than a record of decision process.

In general, buildings which are contaminated with Pu or Uranium are considered high risk and will require additional attention and consideration whereas, general support buildings with low levels of risk or with no contamination can proceed with decommissioning on the basis of the RSOP only.

A building S&M activity may also be required; the extent of which depends on the duration between acceptance of the facility by the EM-40 Program and the actual beginning of decommissioning operations. The Decommissioning Program is responsible for performing this S&M activity. Building S&M will continue throughout decommissioning. Once the building has been decommissioned, the Environmental Restoration (ER) organization will be responsible for continued surveillance of the site.

Where possible, during deactivation, Resource Conservation and Recovery Act (RCRA) permits will be closed. This, in general, will include areas where RCRA materials are stored and can easily and completely be removed. Examples of RCRA permitted areas which may not be closed during deactivation could include some tanks and some soil areas adjacent to or beneath the facility. In any case, tanks will be drained and flushed during deactivation with ultimate disposal of the tank itself occurring during decommissioning. Soil areas, including building slabs (floors) and subfloor components such as sewers and drain lines will be closed after the completion of decommissioning by ER.

The primary field activity prior to beginning decontamination, dismantlement, and demolition activities of high risk facilities is building characterization. This will be performed in accordance with an approved Characterization Plan. The purpose of building characterization is to determine the condition of the building (physical, radiological, hazardous materials) prior to the initiation of field work. This information forms the basis for preparing a decommissioning safety analysis; evaluating personnel risk; and engineering safety systems, equipment, and techniques. Regulatory approval of a Characterization Plan will not be required.

Once the plans and procedures for decommissioning operations have been prepared and resources identified and put in place, a decommissioning performance review will be conducted by the Decommissioning Program Manager to ascertain project readiness prior to proceeding with field operations. Upon completion of the review and resolution of any deficiencies, decontamination, dismantlement, and demolition work will proceed. The lead regulatory agency will be notified prior to the start of field decommissioning work. Radiological surveys will be conducted concurrent with and/or upon completion of these activities. The surveys will be conducted and documented to establish that residual levels of radioactive contamination are below agreed upon limits and to establish the radiological conditions of the building site prior to performing the remedial activities for final disposition.

The remedial activities will place the building/cluster site in its final condition by completing any required remediation, closing RCRA units, completing all regulatory documents and providing a final site survey.

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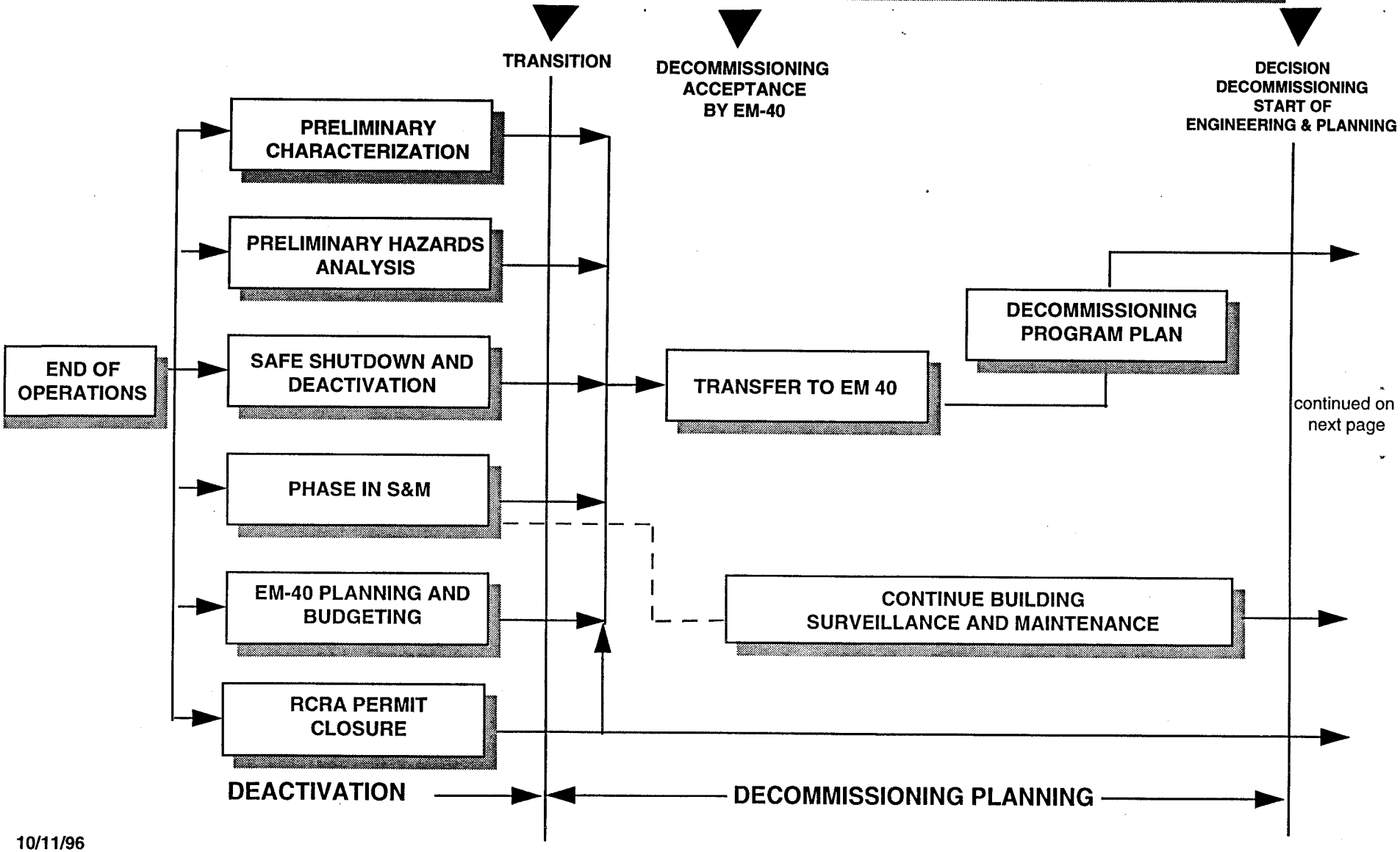
Facility Disposition Process

Figure E-1



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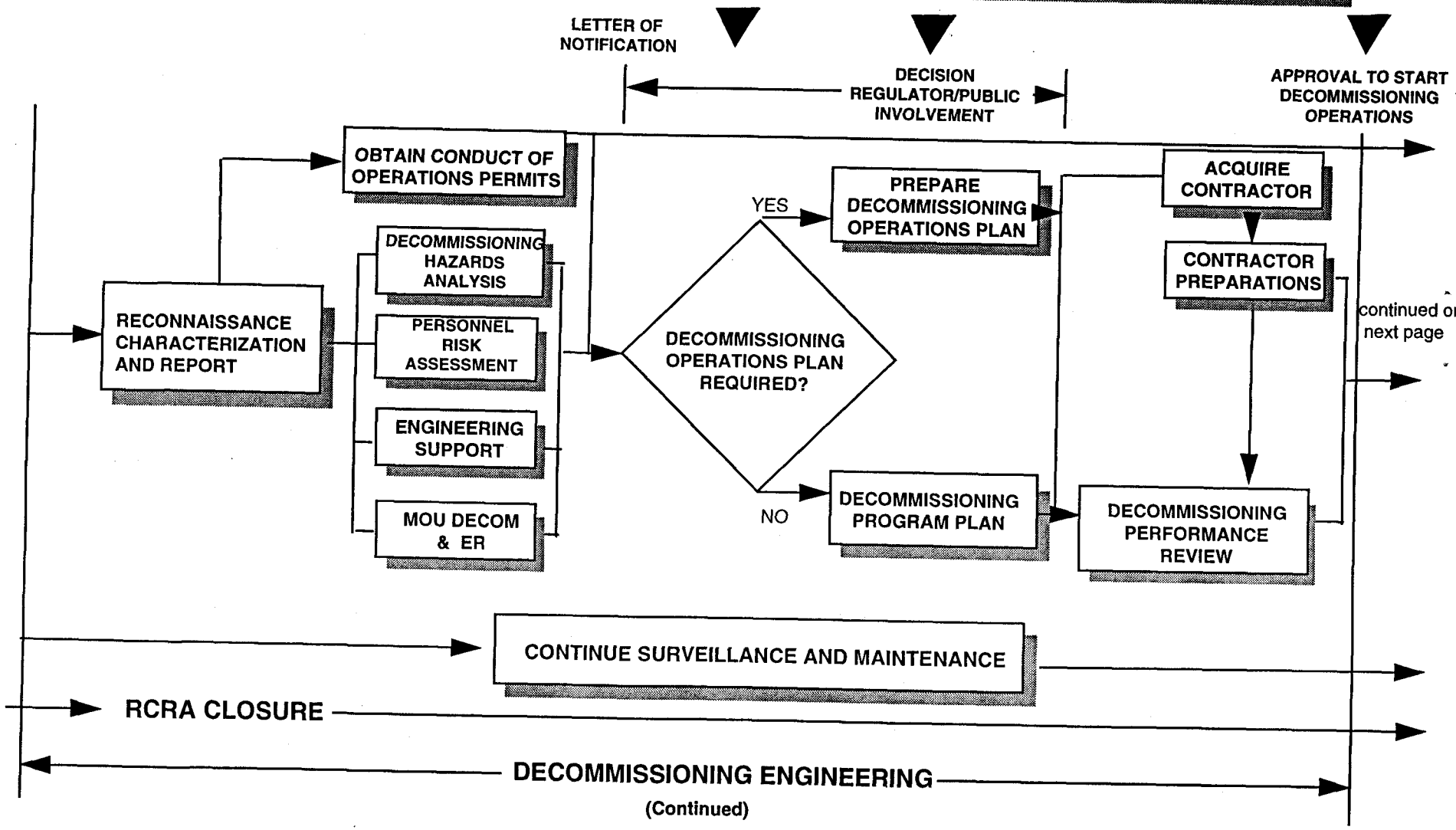
Facility Disposition Process

Figure E-1



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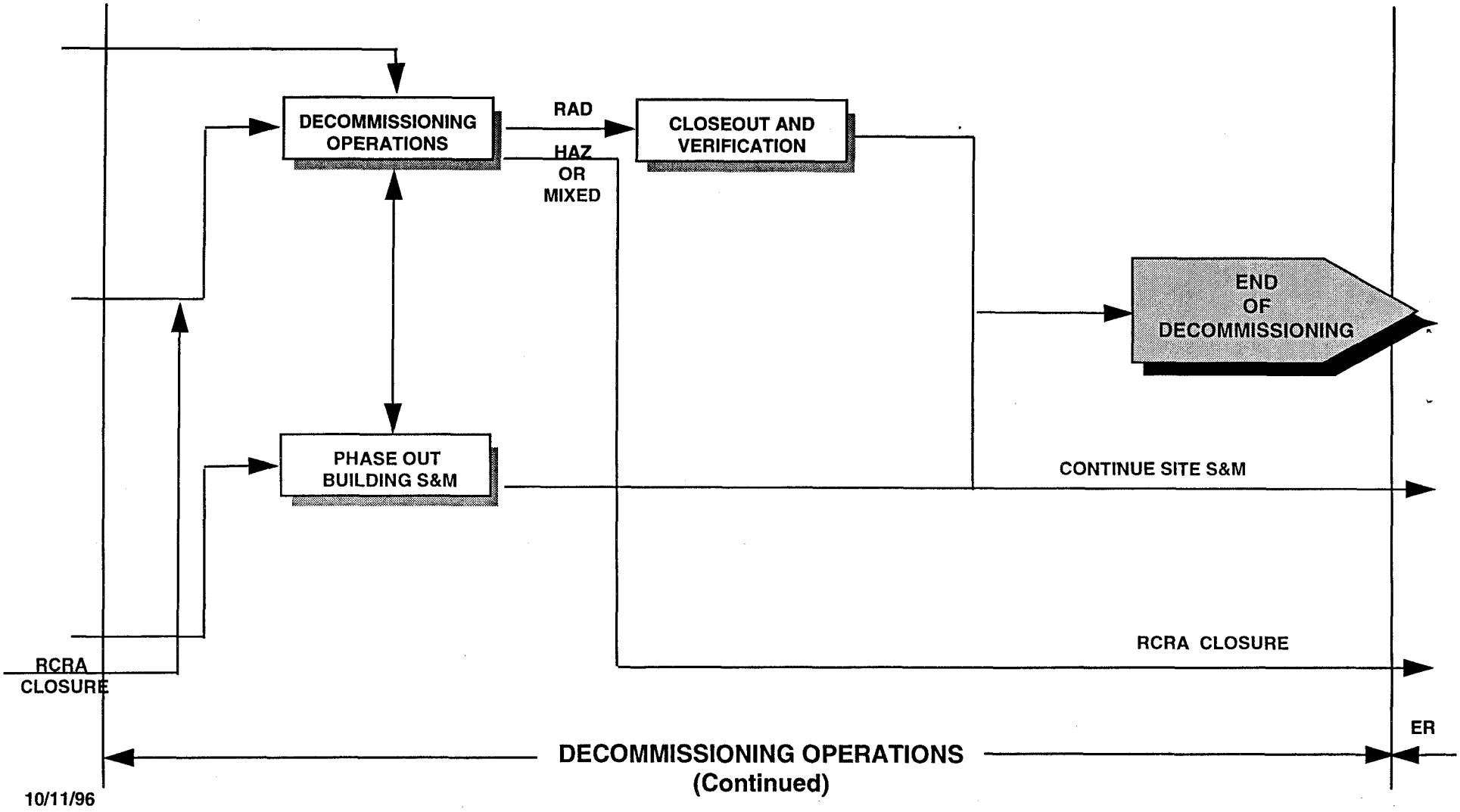
Facility Disposition Process

Figure E-1



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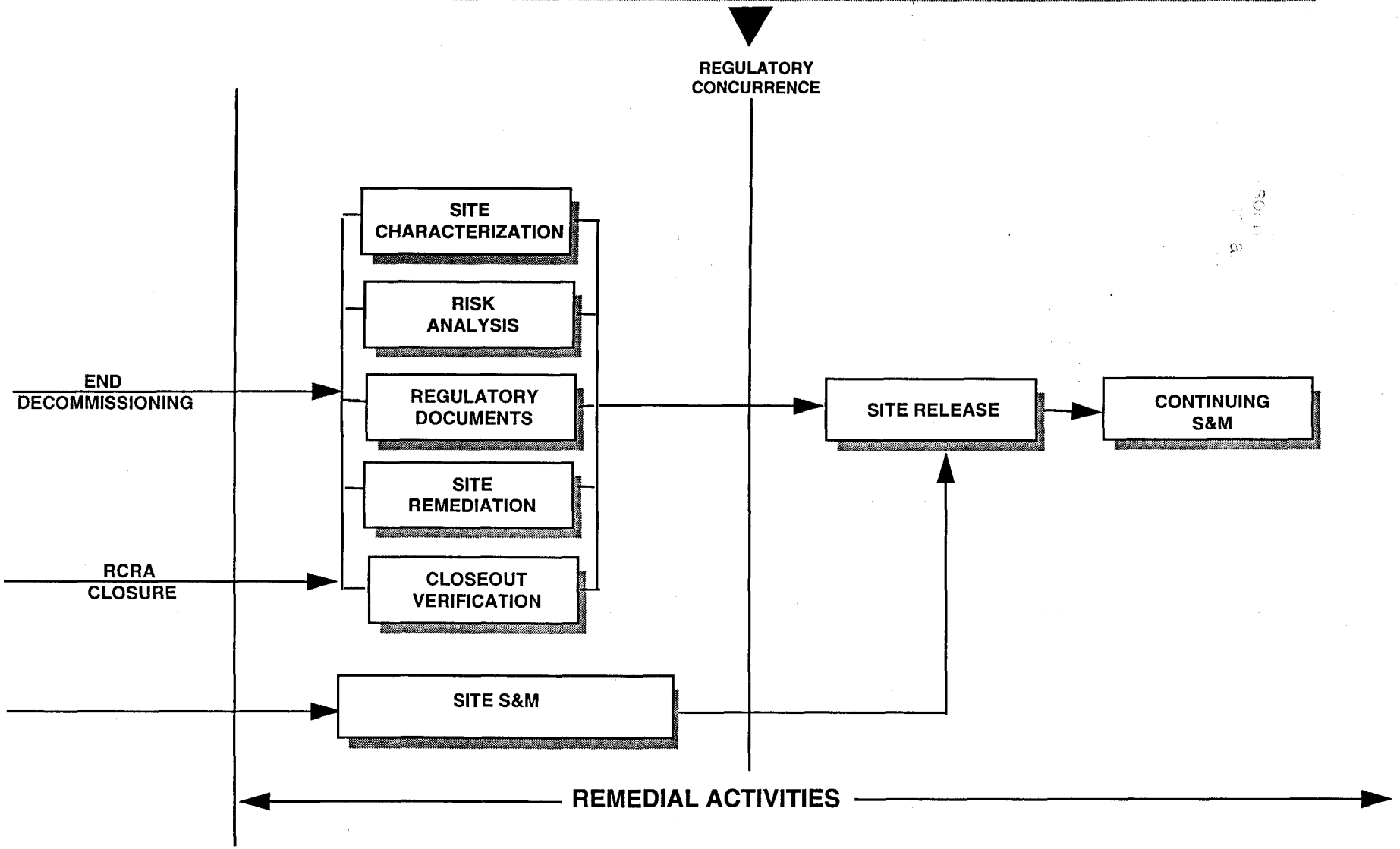
Facility Disposition Process

Figure E-1



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SECTION 1

GENERAL INFORMATION

1.0 GENERAL INFORMATION

1.1 INTRODUCTION/BACKGROUND

The end of the Cold War moved the Department of Energy's focus from nuclear weapons production to the stabilization and cleanup of previously operating facilities. Many production facilities that once operated with a high priority, are now considered surplus or excess. A Department of Energy (DOE) organization, Office of Nuclear Material and Facilities Stabilization or EM-60, was formed in 1992 to oversee and coordinate the orderly transition of these surplus facilities from Defense Programs (DP) to EM-60.

Rocky Flats Environmental Technology Site (RFETS) was significantly impacted by this transition of DOE missions. After a period of surplus facility assessment by EM-60, one of the RFETS DP funded facilities (Building 889) was transferred to EM-40 responsibility. The remaining facilities will complete the deactivation process prior to being determined to be of no further use. Of the over 450 facilities identified at RFETS, 8 are contaminated with plutonium, 12 are contaminated with both uranium and plutonium, 34 have minor radioactive contamination and the remainder have no known history of radioactive contamination. Many of these facilities were used to conduct production operations while others were ancillary facilities used for storage, administration, and support services.

The strategy of DOE is to deactivate surplus facilities on a priority basis and place as many facilities as possible in a safe, stable condition. This will lower the costs associated with the surveillance and maintenance (S&M) of these facilities. Eventually the facilities will be decommissioned. In order for this to occur, the various options that are available for the ultimate disposition or endstate must be evaluated and a rationale to achieve that state must be developed and approved. The evaluation should determine the optimum deactivation endstate and compare long-term S&M costs and risk versus an earlier decommissioning.

Significant resources will be required to plan and implement the RFETS Decommissioning Program during this time of budgetary restraint. A prioritized, integrated decommissioning approach will be utilized which considers cost effectiveness and risk reduction for Site material stabilization and deactivation activities. This Plan proposes clear endstate determinations and cost effective alternatives within the framework of a project management approach. Stakeholder involvement is included in this approach and is considered essential to the overall planning process. This integrated, prioritized decommissioning planning approach will provide achievable cost and schedule goals to the DOE budgetary process.

1.2 ASSUMPTIONS

Assumptions were identified in this planning process to establish a frame of reference for subsequent plan development. The following assumptions have been established for the RFETS Decommissioning Program.

1.2.1 General Assumptions

1. The Site's primary mission will continue to be stabilization of surplus facilities and special nuclear materials, environmental cleanup, and restoration. The Site will temporarily maintain its plutonium storage capabilities. The Site will continue to manage all waste types through treatment, interim storage, and off-site disposal.

2. A minimal number of site infrastructure and support services (including central shops, maintenance, utilities and power operations, etc.) will be maintained to support Site decommissioning activities. Temporary services will be utilized as needed.

3. Resources will be available to continue maintaining facilities in a manner that does not result in unacceptable risks to personnel or the environment. DOE will provide necessary resources to support maintenance of facilities throughout deactivation and decommissioning.

4. Skilled, experienced personnel will be available to deactivate systems, provide surveillance and maintenance and decommission all facilities. A new personnel skill mix and retraining of personnel may be required.

5. Waste minimization and cost reduction will be emphasized during decommissioning.

6. If during the course of characterization and assessment of facilities unexpected hazards are discovered, plans will be altered to control hazards and mitigate risks to workers, the public and the environment.

7. Stakeholder involvement in RFETS planning will expand to include more information on decommissioning activities and will continue throughout the decommissioning process.

8. Deactivation of a facility does not have to be completed prior to initiation of decommissioning activities within that facility.

9. Checklists for turnover of facilities from EM60 to EM40 will be negotiated and acceptance conditions for individual facilities will be flexible.

10. Soils directly under the building will be assessed and remediated, as required, as an ER site closure activity.

1.2.2 Regulatory Assumptions

1. The decommissioning of facilities will be conducted as a ~~"non-time critical~~ removal action" in accordance with the USDOE and USEPA Policy on decommissioning of DOE facilities and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

2. Decommissioning activities will be conducted according to selected environmental laws and agreements. A "necessary and sufficient" approach to safety documentation and DOE Order compliance will be pursued.

3. Waste from decommissioning will be handled, stored and/or disposed in accordance with principles agreed upon in the Rocky Flats Cleanup Agreement (RFCA) and Site Vision Statement.

1.2.3 Schedule Assumptions

1. Space for waste storage will not impact project schedules. Wastes can be transported to a storage site immediately subsequent to packaging and assay.

2. Facilities or portions of facilities will be available for decommissioning with sufficient time to execute the designated decommissioning approach.

1.3 TRANSITION TO DECOMMISSIONING

A comprehensive list of RFETS facilities is given in Appendix 1 along with a short description of the major clusters, their history, and current status. Normally within the DOE system, the ownership of facilities transfers from operating (Defense Program) to short term surveillance and maintenance (EM-60) and then to decommissioning (EM-40). The facility hand-offs were intended

to be conducted formally using checklists to confirm readiness (limited hazards) and to ensure that no further programmatic use exists. The major concern is appropriation of adequate budgets for surveillance and maintenance (S&M) activities and decommissioning. The transfer to EM-60 occurred abruptly when the RFETS mission was changed from production to environmental cleanup during FY94. However, the formal transfer of facilities to EM-40 for decommissioning has occurred only for Building 889.

Before facilities are turned over for decommissioning, certain conditions will be established to make best use of valuable resources and to minimize risk. A summary of facility conditions that will exist at the start of decommissioning are illustrated in Table 1.3.1 and an Example of end state issues which will be considered in developing a checklist to turn facilities over to decommissioning is provided as Figure 1.3. Further guidance to accomplish deactivation is provided in the Facility Deactivation End Points Handbook prepared by EM-60.

1.3.1 Evaluation of the Initial State Safety Conditions

A major element of the project safety analysis is evaluation of the safety conditions that remain at the time of decommissioning of the facility. The evaluation of safety conditions should focus on the radioactive and hazardous material inventories that remain after completion of deactivation activities. Ideally, all of the nuclear and hazardous material should be removed during deactivation; however, experience has shown that many of the facilities scheduled to undergo decommissioning still have radioactive and hazardous material remaining in the facilities and process lines. A thorough and proper review of material inventories will be conducted and incorporated into the safety documentation. In addition, although Deactivation focuses on removal of energy sources from the facility, occupational hazards may still exist that would influence the level of detail required for the safety documentation. Both material inventories and occupational hazards will be addressed during development of the safety documentation.

1.3.2 Evaluation of Decommissioning Project Safety Requirements

The deactivation process starts with termination of operations, including establishment of a surveillance and maintenance program and ends with achievement of safe shutdown and transfer of a facility to Decommissioning. The Decommissioning Project documentation includes a preliminary characterization and hazards analysis, establishment of an effective S&M program, and initiation of the budget cycle. Work performed in support of the proposed activity or project is primarily preparatory in nature and provides the framework for development of the project plan and preliminary engineering work. Safety documentation associated with Decommissioning of a facility will be prepared.

Engineering work is performed to define and estimate the decommissioning alternatives. When the safety documentation for the proposed activity or facility is completed it is included as a part of the Project Decommissioning Plan. For those facilities that are below the Hazard Category 3 threshold the Health and Safety Plan will suffice as the final safety documentation.

TABLE 1.3.1 - FACILITY CONDITIONS

FACILITY CONDITIONS	OPERATIONS	DECOMMISSIONING	COMMENTS
Security and criticality alarms	Active and Operational	Security Disabled, criticality minimized	Locked doors may be used to separate security areas
Nuclear systems and equipment	Energized and operational	Drained, de-energized, tagged out but operable	Installed pumps and valve lineups may be used to flush and clean piping systems
Waste Processing	Active	Completed	Only the waste operations within the Decommissioning area need to be completed
Consolidation of stored waste	Containerized TRU, LLW, Mixed or hazardous waste stored	All containerized waste removed	Some containers may be tolerated if not interfering with Decommissioning
Pu consolidation	Holdup ~~and rollup~~ quantities may exist	Holdup ~~and rollup~~ quantities may exist	Removing holdup may be done more expediently by Decommissioning workers
Security	Q and L clearances required	Red Badge or L clearances required	Q cleared workers too expensive
Contamination	Loose radioactive and hazardous material may be present	Loose radioactive and hazardous material may be present	Decontamination is an essential part of decommissioning
Surveillance and Maintenance	Required	Required	Surveillance and maintenance activities will be ongoing until decommissioning is completed
Inventoried Equipment tools and supplies	Present and useable	Removed or transferred to PU&D	Excess materials and Equipment should be disposed of by operator

FIGURE 1.3 EXAMPLE

BUILDING/SYSTEM/COMPONENT - END STATE CONSIDERATIONS

The following has been developed to define the end state issues which will be considered for transition from deactivation to decommissioning. Outlined below are the primary lead responsibilities of deactivation and decommissioning.

Deactivation	Decommissioning		
_X_	___	1.	Owners, tenants, excess office furniture and equipment will be removed.
_X_	___	2.	Excess spare parts, tools, and supplies will be removed if they can be radiologically free released.
_X_	___	3.	Classified documents and materials (i.e. tooling) will be removed to minimize building security requirements.
_X_	___	4.	The final Safety Analysis Report shall be reviewed and updated for deactivation status in accordance with applicable procedures. The FSAR will be reviewed for cancellation or down graded once the quantities of Special Nuclear Materials are below safety hazard category 3 thresholds.
_X_	___	5.	Environmental and/or other applicable permits associated with the facility shall be reviewed with the decommissioning program, closed or incorporated into the Decommissioning Operations Plan.
_X_	___	6.	Accountable special nuclear materials (SNM) and radioactive sources shall be removed from the building. All Criticality Safety Operating Limit's (CSOL's) and Nuclear Material Safety Limit's (NMSL's) postings shall be removed or replaced with "Exempt Fissile Material Only" limits postings.
_X_	___	7.	Unattached hazardous materials and excess chemicals (i.e., lead, mercury, etc.) shall be removed from facilities and disposed of in accordance with established procedures.
_X_	___	8.	Stored radioactive and mixed waste (i.e., outside systems in containers such as barrels, drums, boxes, etc.) shall be removed from facilities and disposed of in accordance with appropriate procedures.
_X_	___	9.	Hazardous and radioactive material which is attached/contained and will not be removed without going into decommissioning shall be located, identified, quantified, and recorded as part of the shutdown/deactivation file. Units with oil, containing PCBs, will be dispositioned as part of the deactivation.
_X_	___	10.	Tanks, vessels, piping, and idle equipment shall be deenergized, drained, flushed, and handled in accordance with standard operations and procedures.

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Deactivation	Decommissioning		
_X_	___	11.	Electrical services that are not needed for S&M or decommissioning activities shall be isolated and tagged out.
_X_	___	12.	Crane systems will not be deactivated and any available documentation will be turned over to decommissioning.
_X_	___	13.	Ventilation hoods will be surveyed and isolated as necessary to ensure safe turn over to Decommissioning.
_X_	___	14.	The SAAMs sampling airheads and health physics vacuum systems will be reduced to the required level as identified by the decommissioning Radiological Engineering Group.
_X_	___	15.	The criticality monitoring and alarm system shall be deactivated and marked appropriately.
_X_	___	16.	Appropriate building penetrations (i.e. louvers pipe openings unused vent pipes etc.) shall be closed off to prevent animal and weather intrusions.
_X_	___	17.	Outstanding non-Conformance Reports and Work Control Forms requesting modifications or repairs to the building/system to be deactivated shall be canceled/dispositioned. These will be reviewed with the Decommissioning Program to ensure any maintenance identified to be completed in support of decommissioning is turned over.
_X_	___	18.	Historical building radiological and hazardous material surveys will be available on file and will be turned over to the Decommissioning Program.
_X_	___	19.	Existing equipment operating procedures, records, drawings, and photographs (if available) shall be available and turned over to decommissioning.
_X_	___	20.	Entrances to the facilities shall be locked and access to the area controlled and turned over to the Decommissioning Program.
_X_	___	21.	Site Use Review Board concurrence will be completed to deactivate the building/cluster.
_X_	___	22.	Personnel who reside in the building will be relocated as part of building deactivation prior to decommissioning.
_X_	___	23.	Non-attractive quantities of fissile materials in the exhaust systems, including ducts, and plenums, shall be adequately evaluated and documented.
___	_X_	24.	Debris in and around the buildings will be removed.
___	_X_	25.	The environmental monitoring systems shall be identified and maintained in serviceable condition. These systems will be turned over to decommissioning for closure.

Deactivation	Decommissioning		
___	_X_	26.	Asbestos in and around the facilities, shall be removed or encapsulated in accordance with established procedures.
___	_X_	27.	A surveillance and maintenance (S&M) Plan for guidance on future requirements to maintain the facility in a safe, stable condition until final decommissioning, shall be developed.
___	_X_	28.	Building electrical, telecommunications and water services shall be disconnected and isolated.
___	_X_	29.	The building steam and condensate system shall be disconnected and isolated.
___	_X_	30.	Systems with flow routes to disposal sites (i. e. sanitary and process drains) shall be isolated by sealing or capping.
___	_X_	31.	The fire protection systems will be maintained and removed during decommissioning.
___	_X_	32.	Air supplies and exhaust systems shall remain in operation to support decommissioning.
___	_X_	33.	Radiologically controlled areas shall be decontaminated and released or the contamination levels reduced or contained in accordance with established release criteria and waste packaging requirements.
___	_X_	34.	Hoods and other equipment that are permanently mounted will be left in place for disposition by decommissioning unless it is determined to have a cost benefit to be removed as excess equipment.
___	_X_	35.	Compressed air systems will remain in operation and removed during decommissioning.
___	_X_	36.	Accident and area background dosimeters will remain in place.
___	_X_	37.	Other: Administrative documentation required to disposition the facility prior to final decommissioning will be accomplished by the Decommissioning program. This documentation includes as applicable and is not limited to: National Historic Site assessment. Housing and Urban Development review. Wetlands evaluation. NEPA/CERCLA/RCRA. Endangered and Protected Species Act.

SECTION 2

DECOMMISSIONING PROGRAM MANAGEMENT

2.0 DECOMMISSIONING PROGRAM MANAGEMENT

Program management and control will function under an integrated scope, schedule, and cost control system that identifies responsibilities and interfaces to ensure all project personnel are fully familiar with the system.

The project organization, under the direction of a Project Manager (PM), is an integrated team of the best possible individuals for each of the key positions. This approach to quality staffing will be used throughout the Decommissioning Program.

The management approach of the Decommissioning Program will provide for real-time schedule and cost controls. These controls will provide the tools necessary to inform the PM of project status, permit early detection of problems and analyze trends, and devise corrective actions. The real-time controls identify changes as requirements dictate - not when the end of the milestone/project is reached, and costs have already exceeded the target.

This approach provides the tools to meet the Department of Energy's (DOE) philosophy, which puts worker safety first, constructs outcome- oriented projects, provides management and control of finances, focuses technology, and changes the perspective of personnel from institutional to entrepreneurial.

2.1 DECOMMISSIONING PROGRAM

The Decommissioning Program is comprised of the resources to budget, plan, engineer, execute and control the decommissioning of the entire Rocky Flats Environmental Technology Site (RFETS), consisting of several major facilities. Each major building, group of buildings, or grouping of similar building areas may comprise a decommissioning project.

The decommissioning projects assigned within the Decommissioning Program each have many common activities which will be managed at the Program level. These activities consist of planning, engineering, permitting, characterization, waste disposal, site preparation and final release.

In this manner these activities can be accomplished beginning immediately with a level of effort staffing. The deliverables of these activities are prepared in advance of individual project needs. This will allow the operations activity schedule of the Decommissioning Program to be compressed. In effect decommissioning operations drives the planning, engineering, etc., support activities. This will also have a major effect on the surveillance and maintenance costs due to the reduced overall schedule.

Activities which include dismantlement, decontamination, demolition, and site specific preparatory activities will be managed at the Project level. The PM will be responsible for the integration of project activities for individual projects and will have full responsibility for directing all resources necessary to complete the project.

2.1.1 Decommissioning Process

The Decommissioning Process is illustrated in Figure 2.1.1 and is described in general terms as decommissioning planning and engineering, and decommissioning operations. This process documents the minimum elements that will be utilized by the Decommissioning Program to document their actions.

2.1.1.1 Decommissioning Planning and Engineering Phase

The decommissioning planning phase, Figure 2.1.1 page 1, begins with the selection/transfer of buildings/units to the Decommissioning Program. The transfer of buildings/units from the deactivation program to the decommissioning program begins with the review of deactivation's

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documentation and characterization data and a walk-down of the buildings/units by decommissioning personnel. Once transfer has occurred, the decommissioning program will develop project specific documents in accordance with the Decommissioning Program Plan (DPP). A project specific plan will have been developed by the Decommissioning Program staff for preliminary budgeting purposes which reflects the Decommissioning section of Accelerated Site Action Project (ASAP). The Decommissioning Program Manager will develop this plan, to the detail necessary, to apply the Decommissioning Cost and Schedule Control System. This plan is based on the Final Deactivation Report, building process knowledge, and decommissioning knowledge. Depending upon the availability of funds, the decommissioning planning phase will primarily be conducted prior to the turnover of the facility/cluster to the Decommissioning Program.

During the decommissioning planning phase, surveillance and maintenance and required Resource Conservation and Recovery Act (RCRA) unit inspections will continue, only if required by the regulator.

The Decommissioning Planning and Engineering Phase, Figure 2.1.1 page 2, begins with the commencement of characterization of the facility. Characterization requires knowledge of the facility and of the waste to be generated by that action. To meet that requirement, a characterization plan will be developed and once produced, will be available for review by the responsible oversight agency. The characterization plan describes the number, type, location, and analysis method to be utilized during sampling. It further describes Quality Assurance (QA) policy, project organization, and functional activities and the data quality objectives and measures necessary to achieve adequate data for the planning of the decommissioning action.

Waste Management activities and Waste Minimization requirements will be developed following characterization and incorporated in the Decommissioning Operations Plan (DOP) and/or Integrated Work Control Program (IWCP). An approximate volume for each waste type will be developed and provided to the Waste Management Organization for its planning purposes. Waste Minimization techniques will be explored for reduction of the volumes of waste to be generated by the decommissioning actions. On-site treatment will also be considered.

The Decommissioning Program will commence development of a Health and Safety Document, Engineering Support documents and a memorandum of understanding (MOU) with Environmental Restoration (ER), if necessary. RCRA Permits are not required under Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA) actions, but the information should be identified in the administrative record. The Health and Safety documents will address personnel risk assessment, and the decommissioning safety analysis. The personnel risk assessment is primarily for the protection of the workers and will identify any safety issues such as personnel protection equipment, and confined space entry. Personnel risk analysis will address the potential for contamination of personnel and hazards associated with chemicals in the area. Engineering support will assist in identifying methodologies and equipment to be utilized during the decommissioning process. This step is to minimize impacts and provide a well organized approach to decommissioning. The MOU with ER is created if the scope of the decommissioning does not remove all the Chemical or radiological hazards associated with the removal action. Examples of items to be included in the MOU are spills outside the building prior to the decommissioning action, underground or embedded piping, and sub-basement/soil remediation.

A decision is then required based on the risks that are associated with the decommissioning action. If the risk associated with the decommissioning is determined to be significant; a DOP will be generated in addition to the DPP to address those significant risk issues. If the decommissioning risk is determined to be low, the DPP will be utilized as the sole regulatory document to implement the action. These documents will be reviewed by the public, including the regulatory agencies, for comment on these actions. Written comments will be addressed and responded to in writing.

Once the requirements and actions are identified, the acquisition of the work force will commence. Prior to starting the work, a review of procedures and decommissioning techniques will be completed. Personnel involved in the actions will have their training and qualification verified. All work on decommissioning actions will be completed to an approved integrated work control plan by the Decommissioning Program. During the decommissioning engineering phase, surveillance and maintenance and required RCRA unit inspections will continue.

2.1.1.2 Decommissioning Operations Phase

The Decommissioning Operations Phase, Figure 2.1.1 page 3, will be conducted in accordance with all requirements identified in the plans. The PM may vary the order of the completion of the action but only after a decision has been reached with the health and safety manager. As the actions are completed and verified, a concurrent phaseout of building surveillance and maintenance and inspections will occur. If RCRA closure is not completed during the decommissioning action, inspections will be continued.

A completion report will be generated identifying work completed, method of validation, sampling date (if any), status of any areas of risks, any new areas of concern, and the status of the unit at the end of the decommissioning action. This document closes the decommissioning administrative record.

2.1.2 Scope of Work

In general, the decommissioning scope of work encompasses all facilities at RFETS fully described by the ASAP work breakdown structure. Full deactivation of a building does not have to occur prior to initiation of decommissioning activities. Decommissioning can begin in sections of a building that can be isolated from areas where deactivation has not been completed.

The scope of the Decommissioning Program includes several hundred separate retired, deactivated, transitional, and active facilities which will undergo decommissioning as individual projects. A complete list of facilities which will to undergo decommissioning is provided in Appendix 1. The Decommissioning Program also includes process equipment (such as process and storage tanks), ventilation systems, and ancillary filter houses and effluent stacks, and security devices such as fencing and guard posts. The facilities include laboratories and production facilities (some with heavily contaminated glove boxes), effluent treatment facilities, hazardous and mixed waste storage facilities, fabrication shops, and numerous support facilities.

In all cases the buildings have been grouped into "clusters" based upon the functional use of each structure, the interrelationships between structures, and geographical location of the structures. Depending upon the availability of resources and the buildings within the cluster, the cluster may be considered as an individual project.

In order to derive the greatest benefit from the decommissioning funds, decommissioning of individual buildings or rooms will be considered and performed when cost effective and otherwise feasible. This strategy is especially effective when reducing the contamination level of a contaminated building or room which has no future use and offers a large savings in surveillance and maintenance and health protection costs.

Each Decommissioning Operating Plan includes the management process for evaluating both the risk and final disposition of surplus nuclear and/or support facilities. The specific plan will include the characterization, hazards analysis, environmental review, and planning required to initiate and implement the decommissioning operations.

The project implementation steps include, but are not limited to: decontaminating equipment and structures to allow their reuse and/or demolition and removal; ensuring worker safety and health protection; managing primary and secondary wastes to comply with regulatory requirements; and controlling residual hazards to ensure protection of the public and the environment.

Activities include:

- Site/facility assessments
- Regulatory and public involvement
- Maintenance actions
- Project scoping and engineering plans and procedures
- Decommissioning operations
- Closeout/verification

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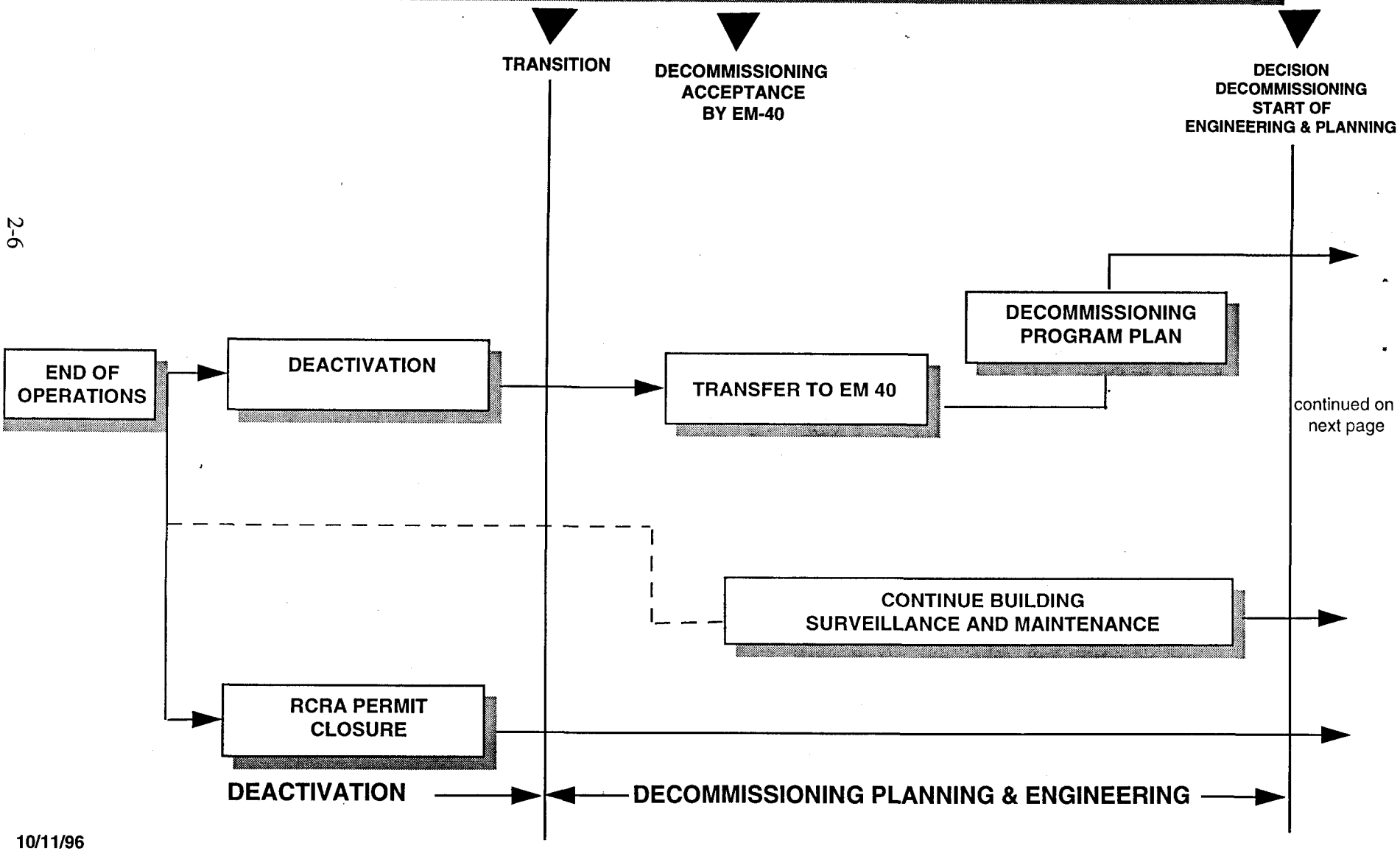
Decommissioning Process

Figure 2.1.1



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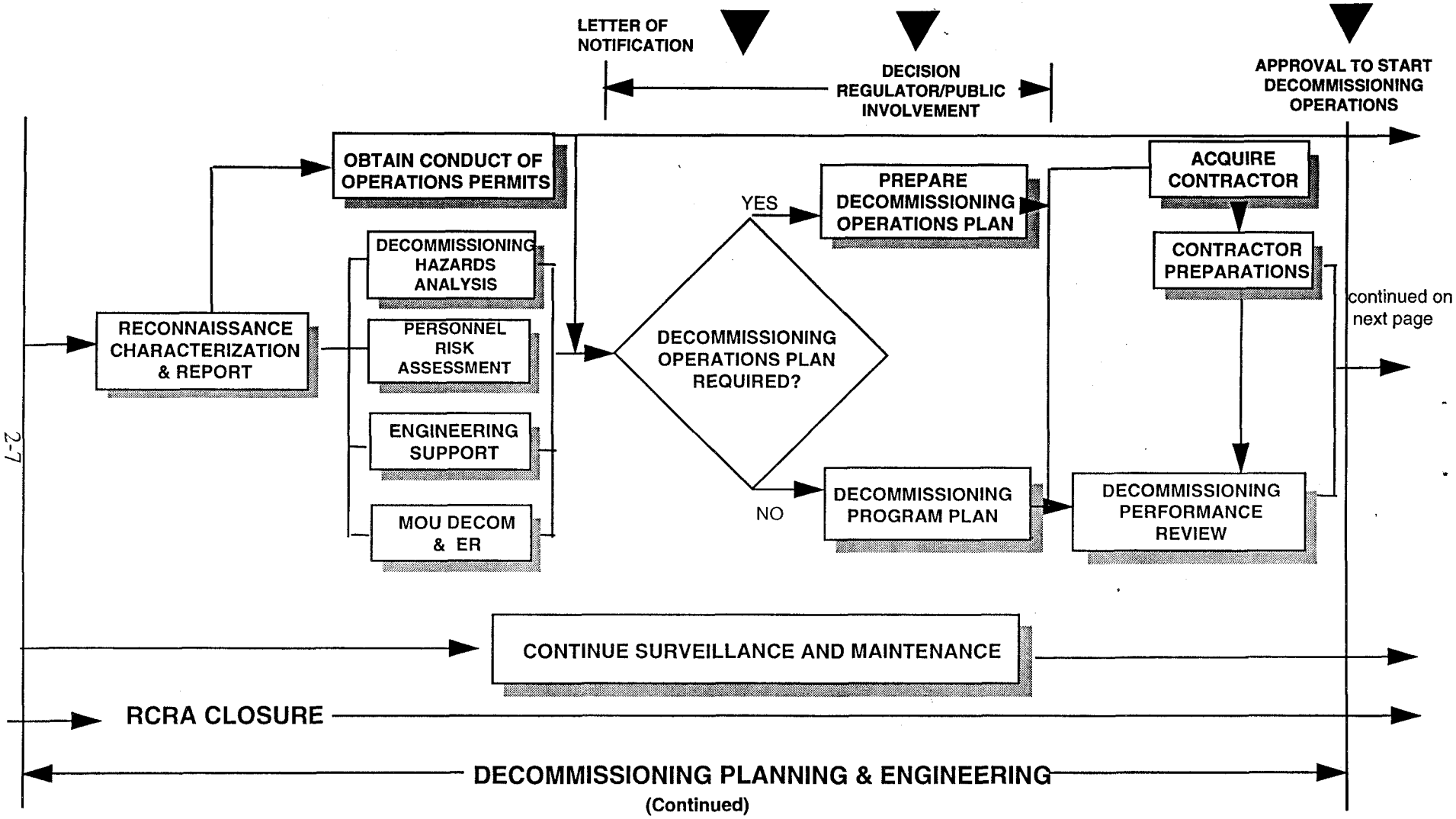
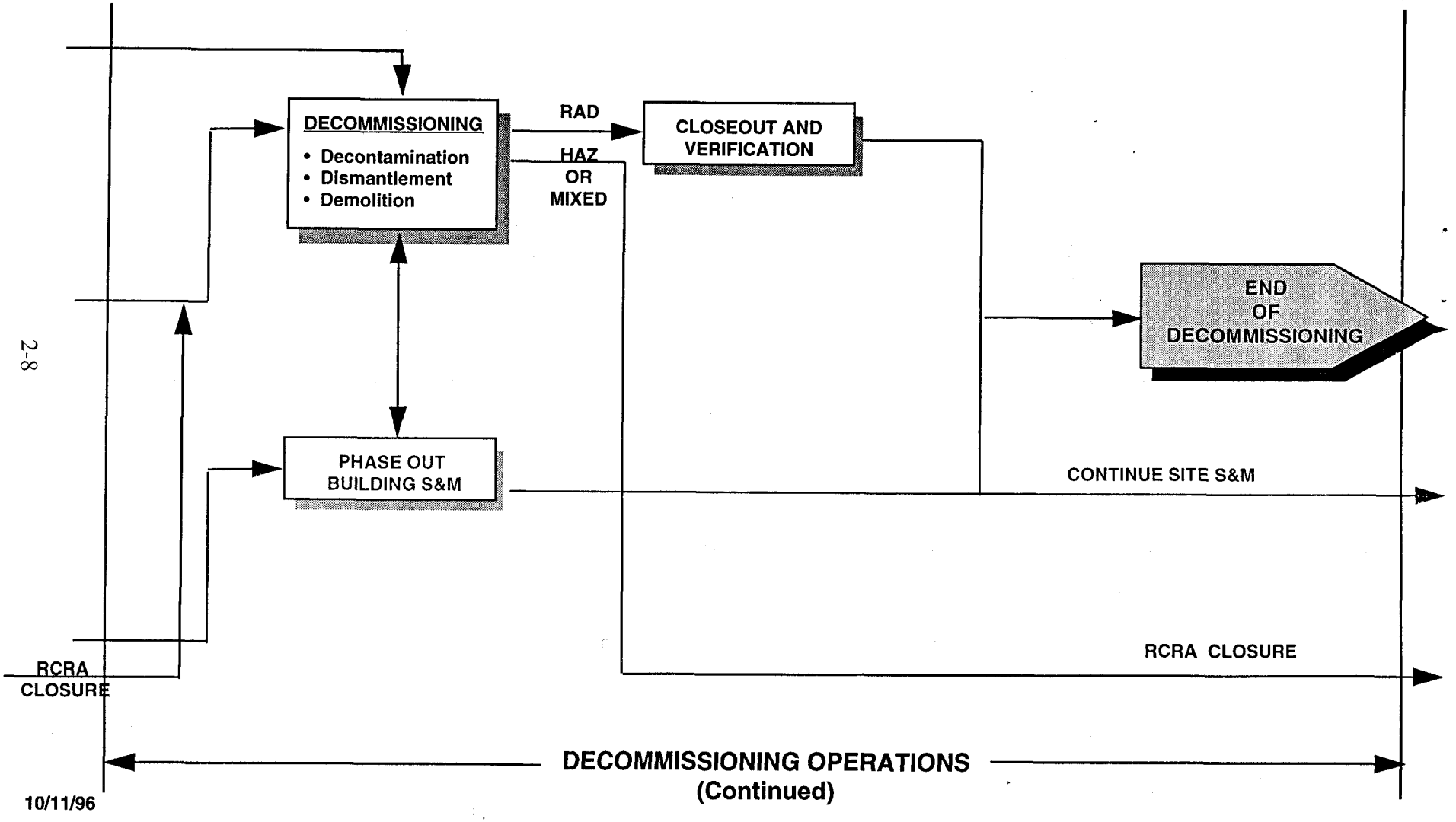
Decommissioning Process

Figure 2.1.1



Decommissioning Process

Figure 2.1.1



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The scheduling of these activities must reflect consideration of risks to human health and the environment, facility planning, and impacts to regulatory commitments. Approved project baseline schedules and costs will be used as performance measures for these activities.

2.1.3 Work Breakdown Structure (WBS)

The RFETS ASAP work breakdown prescribes the first six levels of decommissioning. Figure 2.1.2 is an example of the WBS dictionary for a typical decommissioning project. The WBS developed for specific decommissioning projects will begin with level 5 in order to comply with the site WBS.

A typical level 7 WBS dictionary for a decommissioning project is shown in Table 2.1.1. This can be expanded to greater levels of detail where the scope of work is more detailed or where greater project control is desired. Likewise, it can be reduced to eliminate those tasks that are not required to support a specific job.

Figure 2.1.3 provides an example of the cost support sheets used for scoping each WBS element. These sheets are prepared by decommissioning personnel to establish baseline scope and cost estimates for each element. Each WBS element is supported by a listing of the type of personnel required, their average labor rate, the duration of each individuals contribution, costs of support equipment and services, travel requirements, etc. Also included is a detailed description of the task and a list of any assumptions made and describes unusual activities that affect cost. In general, as much information as can be gathered to support the cost estimate is provided. As the project matures, the cost data will be assigned to cost accounts and used as the performance baseline.

2.1.4 Decommissioning Program Document Hierarchy

The Hierarchy of Documents which govern the Decommissioning Program and the Decommissioning Projects within the Program are illustrated in Figure 2.1.4. A list of the various Plans which will guide the implementation of each decommissioning project and which are subordinate to the DPP and the DOP are illustrated in Table 2.1.2. These Plans are provided for information purposes and will not require regulatory approval.

EXAMPLE

1. PROJECT TITLE/SUBPROJECT TITLE: ROCKY FLATS PLANT DECOMMISSIONING PROJECT												2. DATE:	3. IDENTIFICATION NUMBER Building 779	
4. INDEX LINE NO.	5. WBS ELEMENTS INDENTURE LEVEL											TITLE	6. BUDGET AND REPORTING NUMBER	7. OTHER ADS #
	1	2	3	4	5	6	7	8	9	10	11			
1	1											RFETS VISION ACHIEVED		
2		1										ACHIEVE INTERMEDIATE SITE CONDITION		
3			6									RELEASE NUCLEAR PRODUCTION ZONE		
4				14								REMOVE 779 CLUSTER		
5					4							DECOMMISSIONING		
6						03						D&D BUILDING 779		
7							1					PLANNING & ENGINEERING		
8								1				PLANNING		
9									1			PLANS		
10									2			PERMITS		
11									3			SPECIAL STUDIES		
12									4			BASELINE DOCUMENTS		
13								2				ENGINEERING		
14									1			SITE PREPARATION ENGINEERING		
15									2			PROCESS EQUIPMENT REMOVAL ENG		
16									3			DIST SYS/SALVAGE ENGINEERING		
17									4			DEMOLITION ENGINEERING		
18							2					CHARACTERIZATION		
19								1				RECONNAISSANCE CHARACTERIZATION		
20								2				OPERATIONAL SUPPORT/FINAL SURVEY CHARA		
21								3				IMPLEMENTATION CHARACTERIZATION		
22								4				ESTIMATE RADIOACTIVE INVENTORY		
23							3					SITE PREPARATION		
24								1				MOBILIZATION		
25								2				ISOLATION & PREP. OF BLDG SERVICES		
26								3				TEMP INSTALL & REMOVAL OF SERVICES		
27								4				ASBESTOS ABATEMENT		
28								5				BACKFILL SEED & GRADE		
29							4					DECONTAMINATION		
30								1				AREA 1		
31								2				AREA 2		
32								3				AREA 3		
33								4				AREA 4		
34							5					DISMANTLEMENT		
35								1				PROCESS EQUIPMENT REMOVAL		
36									1			WORK AREA 1 ROOM 150		
37									2			WORK AREA 2 153 A, B		
									•					
									•					
									•					
									•					
									•					
64									27			WORK AREA 27 ROOM 152, 154		
65								2				DISTRIBUTED SYSTEMS REMOVAL SALVAGE		
66									1			2ND FLOOR		
67									2			1ST FLOOR		
68									3			ANNEX A		
71							6					DEMOLITION		
72									1			ROOF		
73									2			STRUCTURE		
74									3			FOUNDATION		
75							7					PROJECT & OPERATIONS MANAGEMENT		
76									1			PROJECT CONTROLS DOCUMENTS/REPORTING		
77									2			ADMIN/BUDGET/DOCUMENT CONTROL		
78									3			FIELD COORDINATION REPORTING		
79							8					SUPPORT SERVICES		
80									1			BUILDING SUPPORT		
81									2			MEDICAL EXAMS		
82									3			TRAINING REQUIREMENTS		
83									4			PROCUREMENT ACTIVITIES		
84									5			TECHNOLOGY DEVELOPMENT		
85									6			SECURITY AND ENVIRONMENT		
86									7			SUPPLIES AND SMALL TOOLS		
87									8			SURVEILLANCE AND MAINTENANCE		

Figure 2.1.2 Work Breakdown Structure Dictionary

Table 2.1.1
Typical Level 7 Decommissioning Project WBS Dictionary

Level 7 & lower WBS Number	Task Description
1.0	**PLANNING**
•	Coordinate With DOE
•	Prepare Detailed Work Procedures
•	Prepare Administrative Procedures
•	Prepare Engineering Procedures
•	Prepare Safety and Health Procedures
•	Prepare Field Operations and Training Procedures
•	Prepare QA/Quality Control (QC) Procedures
•	Regulatory Compliance/Review
•	Prepare QA Project Plan
•	Prepare Waste Mgmt/Disposition Plan
•	Prepare Security Plan
•	Prepare Project Plan
•	Prepare Safety and Health Program Plan
•	Perform Pathways Analysis
•	Obtain Permits
•	Prepare Training Plan
•	Prepare Waste Minimization Plan
•	Prepare Characterization Plan
•	Prepare Data Management Plan
•	Prepare Alternative Assessments
•	Structural Dismantlement Design
•	Temporary Systems Design
•	Process Design
•	Utility Design
•	Geo-Technical Assessments
2.0	**CHARACTERIZATION**
•	Site Characterization
•	Develop Radiation Exposure Estimate
•	Nuclear Criticality
•	Pathways Analysis
•	Prepare Final Survey Packages
•	Implement Final Survey Packages
•	Analyze Final Survey Date
•	Prepare Final Survey Report
3.0	**SITE PREPARATIONS**
•	Establish Laydown, Shipping, Personnel Support and Radiation Monitoring
•	Isolate Building Services
•	Temporary System Installation
•	Size Reduction Area
•	Asbestos Removal
•	Remove Temporary Support Structures
•	Remove Stored or Loose Waste
•	Backfill/Seed/Grade
4.0	**DECONTAMINATION**
•	Loose Contamination, Facility and Equipment Surfaces
•	Drains and Embedments
•	Decontaminate Decommissioning Equipment
5.0	**DISMANTLEMENT**
•	Distributed Systems
•	Process Equipment Removal & Dismantlement
•	Pipework Removal
•	Electrical Removal
•	High Efficient Particulate Air (HEPA) Units and Duct Work
•	Package Contaminated Material
•	Package Resins and Filter Material
•	Contaminated Material to Process Facility
•	Contaminated Waste to Disposal Site
•	Recycle Material
•	Non-Contaminated Waste Disposal
6.0	**DEMOLITION**
•	Structure
•	Foundations

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Level 7 WBS Number	Task Description
7.0	**PROJECT MANAGEMENT SUPPORT**
	• Project Management Staff • Project Controls • Scheduling • Document Control • Administrative Support • Operations Manager
8.0	**SUPPORT SERVICES**
	• Support Provided by Building Manager • Security • Environmental Control and Surveillance • Personnel Monitoring • Personnel Orientation • Emergency Medical Assistance • Occupational Safety Training • Radiological Safety Training • Medical Examinations • Operational Health Physics • Respiratory Protection • QA-Inspection, Test, Calibration Shipping and Receiving, Document Control, Records, Audits, and Procurement Control • Procurement • Equipment, Supplies, & Special Tools • Services and Specialty Contractors • Surveillance & Maintenance • Technology Department

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TABLE 2.1.2

PLANS SUBORDINATE TO THE DECOMMISSIONING PROGRAM PLAN AND THE DOP

PLAN #	TITLE
RMRS 001	Mobilization Plan
RMRS 002	Demobilization Plan
RMRS 003	Administration Plan
RMRS 004	Training Plan
RMRS 005	Project Staffing Plan
RMRS 006	Cost and Schedule Plan
RMRS 007	Health & Safety Plan
RMRS 008	Environmental Plan
RMRS 009	Quality Assurance Program Plan
RMRS 010	Records Management Plan
RMRS 011	Characterization Plan
RMRS 012	Waste Management Plan
RMRS 013	Data Quality Management Plan

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1. PROJECT TITLE/SUBPROJECT TITLE		2. DATE	3. IDENTIFICATION NO.
Rocky Flats Plant D&D Project		11 Sept 95	Building 779
4. WBS ELEMENT CODE		5. WBS ELEMENT TITLE	
1.1.6.14.4.03		D&D Building 779	
6. INDEX LINE NO.	7. REVISION NO. AND AUTHORIZATION		8. REVISION DATE
6			

9. ELEMENT TASK DESCRIPTION

The objective of this element is to decommission Building 779 to the state that the building land area is compliant with the proposed future use. Compliant means meeting or exceeding all the federal, state, and local environmental laws and regulation requirements.

a. Cost Content: All costs from all sources for decommissioning of Building 779 as defined by the technical scope are included here. This element is a summary element for the decommissioning effort and the costs are summed from lower level elements.

b. Technical Content: Includes all the work relating to the decommissioning of Building 779, which includes the technical details of clean-up processes; radioactive and hazardous waste removal, packaging, storage, and shipment; environmental and safety regulation compliance.

c. Work Statement: The work includes:

- Planning and Engineering
- Characterization
- Site Preparation
- Decontamination
- Dismantlement
- Demoliton
- Project and Operations Management
- Support Services

WBS Cost Buildup Summary			
Labor	Manhours	Rate ($/hr)	Cost
		Subtotal Labor	
Material & Services	Quantity	Rate	Cost
		Subtotal Materials	
		TOTAL WBS COST	

Figure 2.1.3. EXAMPLE - Work Breakdown Structure Dictionary Part II - Element Definition

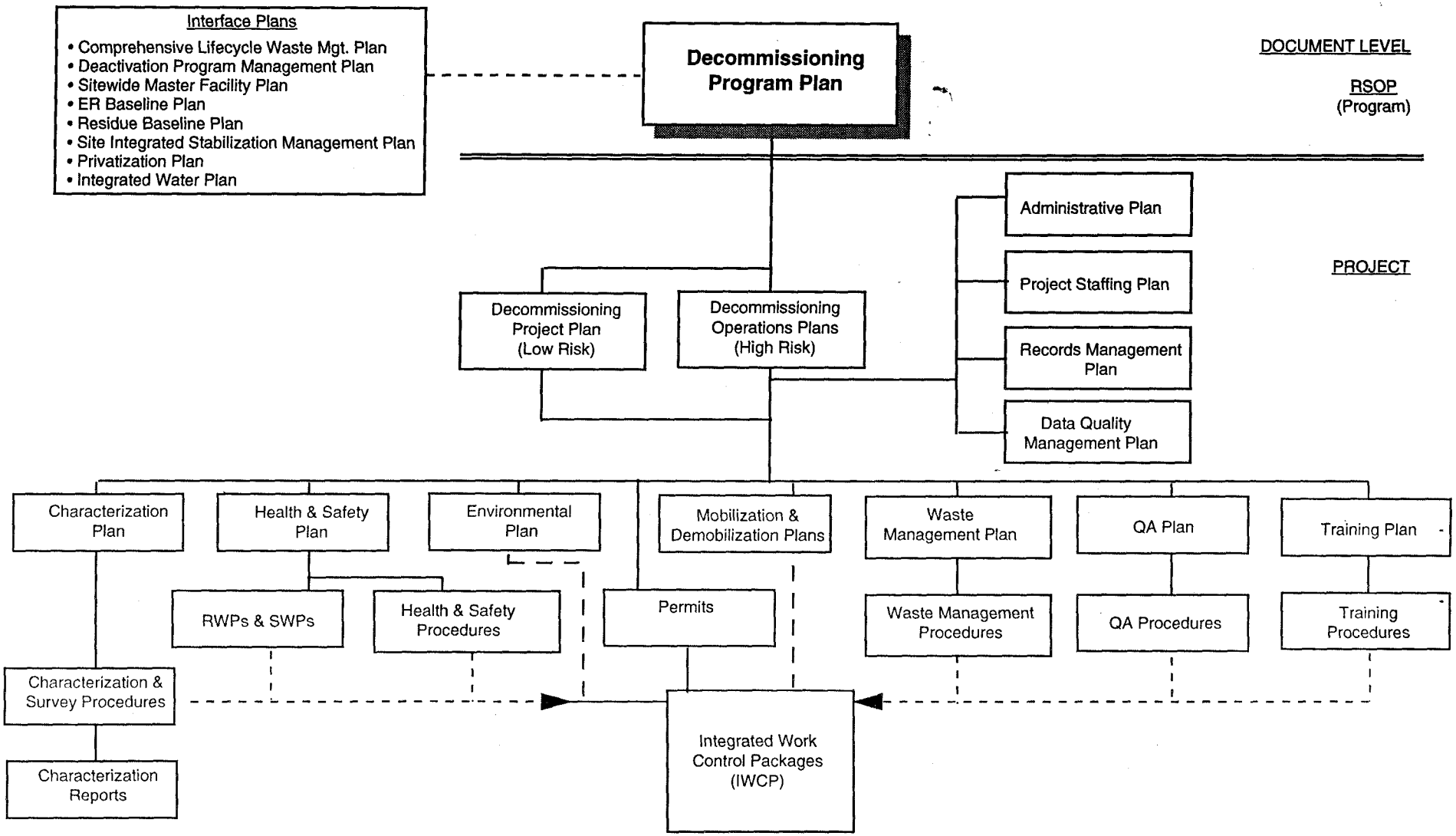

Figure 2.1.4. Decommissioning Program Document Hierarchy

2.2 DECOMMISSIONING PROGRAM INTERFACES

The purpose of this section is to identify the interfaces between the decommissioning program and other planning activities at the RFETS. There are a number of RFETS plans in place or currently being developed that will require careful coordination with the decommissioning program. These are listed on Figure 2.1.4. These plans are complementary to this DPP and will not impact the execution of this plan nor will they impact the regulatory requirements discussed in this plan.

2.3 QUALITY PROGRAM

A commitment to a quality program and a continuous improvement philosophy are applied from project start through completion. This commitment to quality is instilled at all project levels, and adherence to this commitment is instrumental in the project's success.

Quality engineers are involved at the initial planning stage of a project. Activities requiring QA/QC participation in the planning stage include:

- Preparation of the QA program plan and QA/QC procedures
- Assistance in developing the DOP and Decommissioning Project Plan
- Assurance that plans and procedures comply with regulatory and permitting requirements
- Assurance that comment resolutions are complete
- Assurance that the project has a uniform consistency from the PM to the field worker
- Assurance that the company engineering and administrative procedures are adhered to and are consistent with other project/DOE requirements
- Review of procurement bid packages
- Audit suppliers' facilities and processes

During the operations phase of the project, quality assumes a proactive role during project execution. This serves to bridge traditional QA and TQM. Its major effort is to anticipate potential problems, offer solutions, and take the steps necessary to prevent potential problems. This approach expands the traditional role of QA/QC beyond simply verifying if specifications/procedures are being implemented. QA/QC is responsible for objectively verifying that management/DOE directions and policies are being effectively implemented by the responsible organizations. This is a natural evolution of the broad base QA/QC has traditionally had. It also underscores the importance of communications. The QA/QC role during operations includes:

- Performing audits and surveillance of the project
- Verifying personnel training records
- Review data-gathering methodologies
- Determine compliance with procedures
- Perform incoming inspections of materials
- Inspect waste packaging operations
- Perform walkdowns
- Review data (medical, HP measurements)
- Monitor project for potential improvement
- Monitor corrective action initiatives

During execution of any project, the goal of management is to provide service as problem-free as possible. The best measure of the quality program's effectiveness is a satisfied client. If everything goes well, it is hard to measure the effectiveness of the quality program on averting potential problems. Non-occurrence cannot be measured, which makes it difficult to assess the monetary value of the QA program.

The payback of a quality program is reflected in a smoothly run project and is evidenced by efficient execution measured as high productivity. The time spent up front in assuring consistency throughout the paperwork system, operational methods, and personnel training result in minimal changes throughout the life of the project. A proactive approach to quality, which involves the entire project team, results in high morale and minimizes the number of surprises, the

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reactions to which can result in chaos on the project. One measure of the success of the quality program on a project can be seen in the turnover rate, which is tied to job satisfaction and high morale. Another measure of success is the low number of corrective actions and non-conformances even though a large number of quality surveillances have occurred.

2.4 SCHEDULES

The Decommissioning Program scheduling system is structured to provide management with an integrated planning and control system from an established baseline for external status reporting and internal status visibility. It consists of a hierarchy of related levels of schedules with each succeeding lower level more fully detailing the specific tasks required to meet project requirements. Best business practice schedule techniques used by Decommissioning provide the total schedule reporting project requirements.

The scheduling system used by the Decommissioning Program consists primarily of three levels, with a fourth level that covers special or optional schedules. The hierarchial relationship of these schedules is shown in Figure 2.4.1.

The top level project schedule is the master schedule (Figure 2.4.2) which is a summary of the intermediate schedules and correlates to upper-level WBS elements. The master schedule contains all levels of DOE milestones that are contractual in nature.

The intermediate schedules (Figure 2.4.3) provide a logical sequence from the master schedule to the detail schedules, and contain Decommissioning intermediate milestones that are selected by management as points of progress measurement in support of the DOE master schedule milestones. The intermediate schedules summarize the detail schedules such that a logical tie between the detail schedule and master schedule exists.

The third level (detail) schedules include work package schedules that are developed for cost account plans and the detail activities of the CPM (critical path method) schedule. The CPM detail schedules, sometimes going below the work package level for optimum schedule control, augment the work package schedules and assist in management of design, procurement, fabrication, assembly, installation, test, and checkout.

The Decommissioning Program scheduling system is dynamic and iterative in nature. During a project's planning stage, schedules may initially be manual and are usually developed in a top-down fashion. That is, the master schedule is developed first and, as project planning becomes more definitive, lower level (more detailed) schedules are developed. As detailed level schedules are developed, they are automated using CPM scheduling techniques and become the basis for all upper-level schedules. The upper-level master and intermediate schedules that were manual are then replaced by automated schedules. Ultimately, all levels of scheduling and milestones for each Decommissioning project are automated in a single, scheduling data base.

2.4.1 System Requirements

All project work is scheduled and progress is monitored according to the following requirements:

- A master schedule is developed with input from the functional and cost account managers and is maintained by the Project Control department. The master schedule represents selected upper levels of the project WBS and shows DOE milestones in a time-phased bar chart format;

- Intermediate schedules are developed with input from the functional and cost account managers and are maintained by the Project Control department. These schedules are an expansion of the master schedule, reflect a lower level of the WBS, and are portrayed in a time-phased bar chart format;

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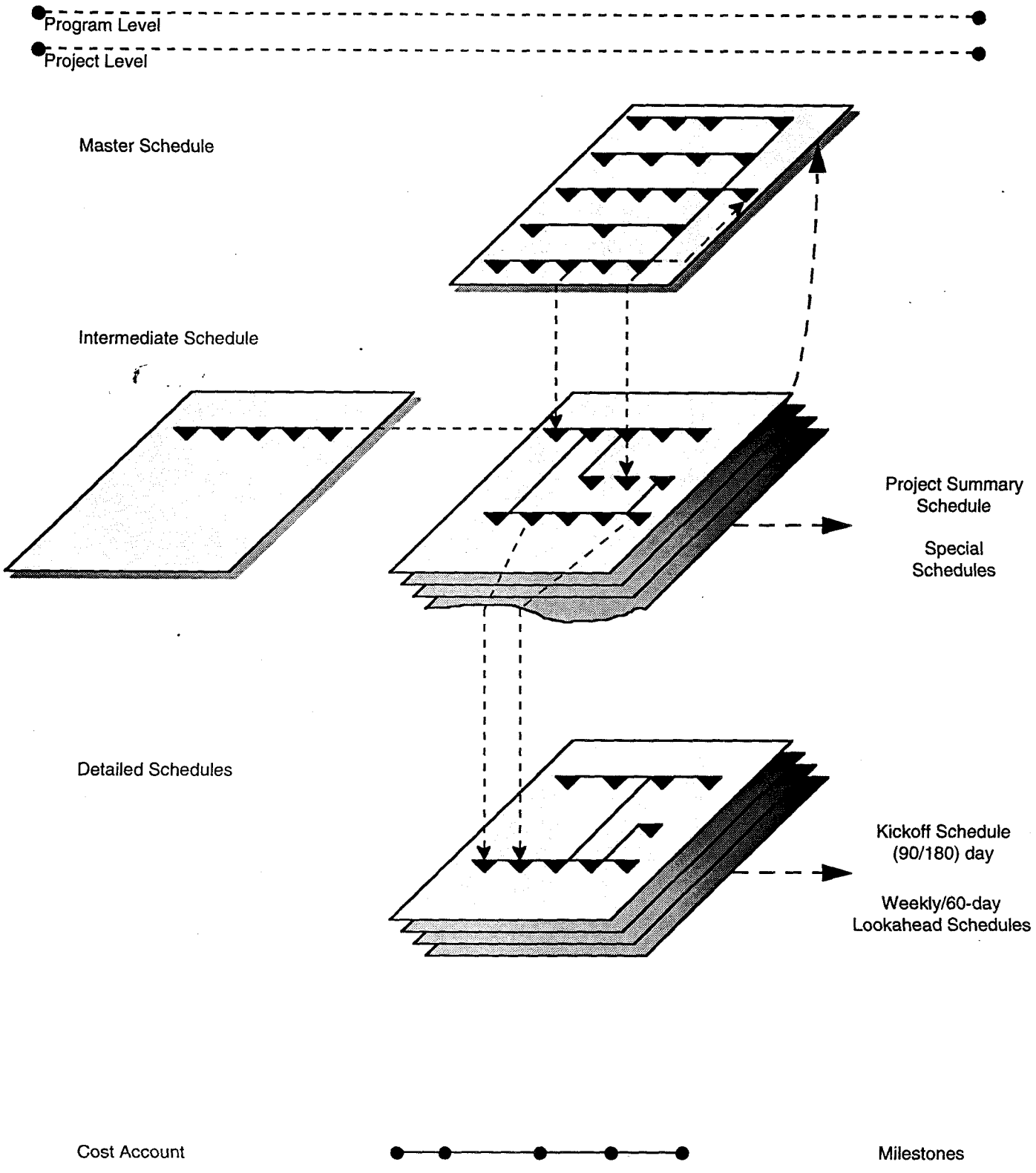
- Decommissioning management selects intermediate milestones that appear on the intermediate schedule, and are associated with an intermediate WBS element;
- All authorized work is planned in time-phased cost accounts within the scheduling constraints established by the master and intermediate schedules;
- Each work package within a cost account must have as a minimum a schedule consisting of a start and completion date. Interim milestones are included where appropriate to increase the objectivity of performance measurement;
- All milestones are dated and represent events that are identified and described;
- Detailed CPM schedules are developed for each project;
- Each activity in the detail-level CPM is traceable to a work package (or identified as matrix support) as well as to the intermediate and master schedules;
- Schedule status is determined monthly;
- Schedule slips and forecasted completion dates are reflected on the applicable CPM schedules and cost account plans;
- Revisions to baseline schedules are requested with a baseline change request (BCR), authorized with a revised cost account authorization (CAA), and recorded in a change control log; and,
- Schedule traceability is maintained through all levels of schedules.

Schedules will also be prepared by Project Controls staff for special studies. A typical special schedule is the project activity schedule, which will be prepared each week to display day-to-day events, thus ensuring overall project awareness. Detailed schedules, including weekly work plans and 60/90-day "look-ahead" schedules, will also be derived from the project summary schedule.

Figure 2.4.1. Proposed Schedule Hierarchy for the Decommissioning Program at RFETS



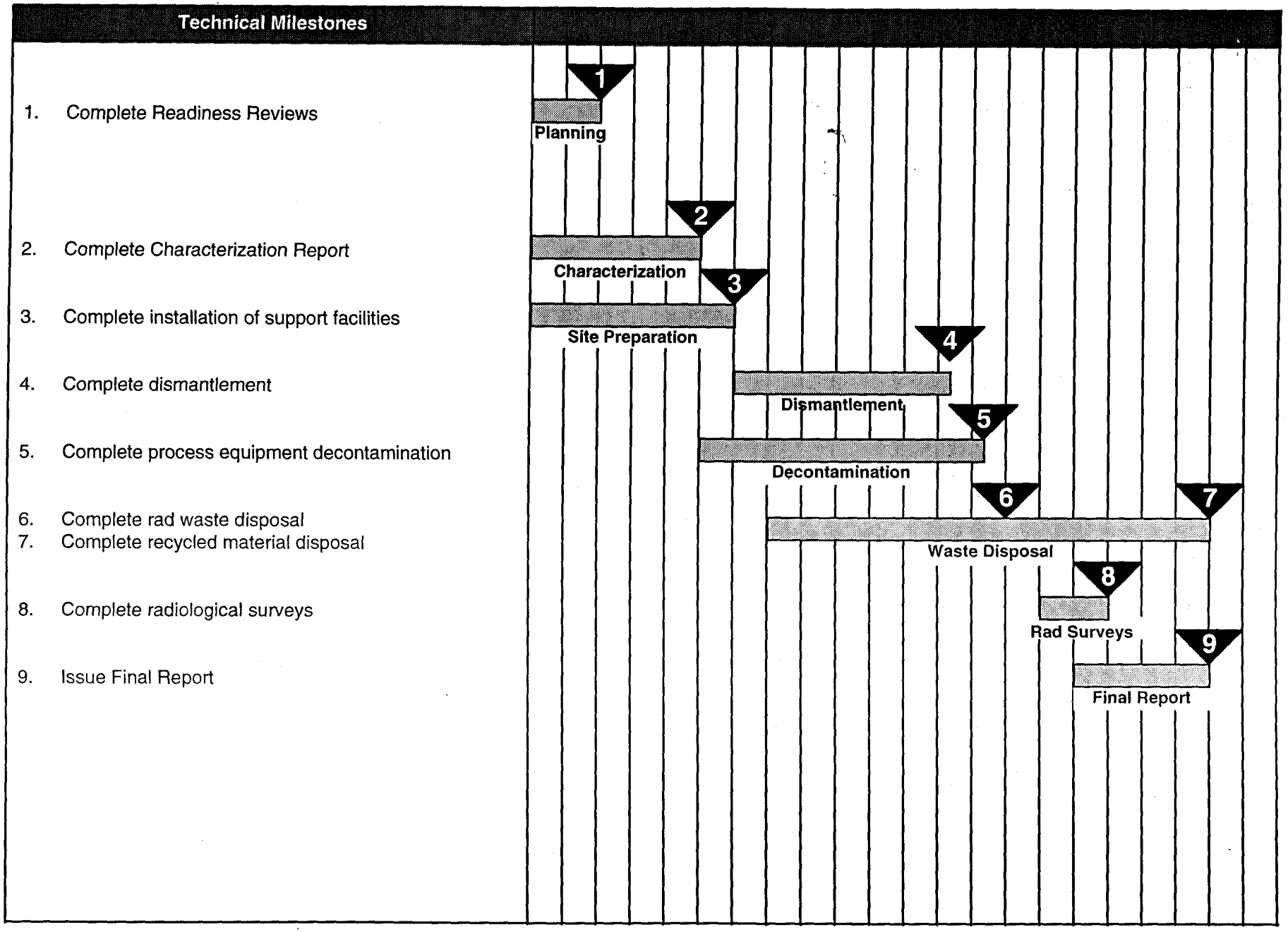


Figure 2.4.2. Typical Project Milestone Schedule

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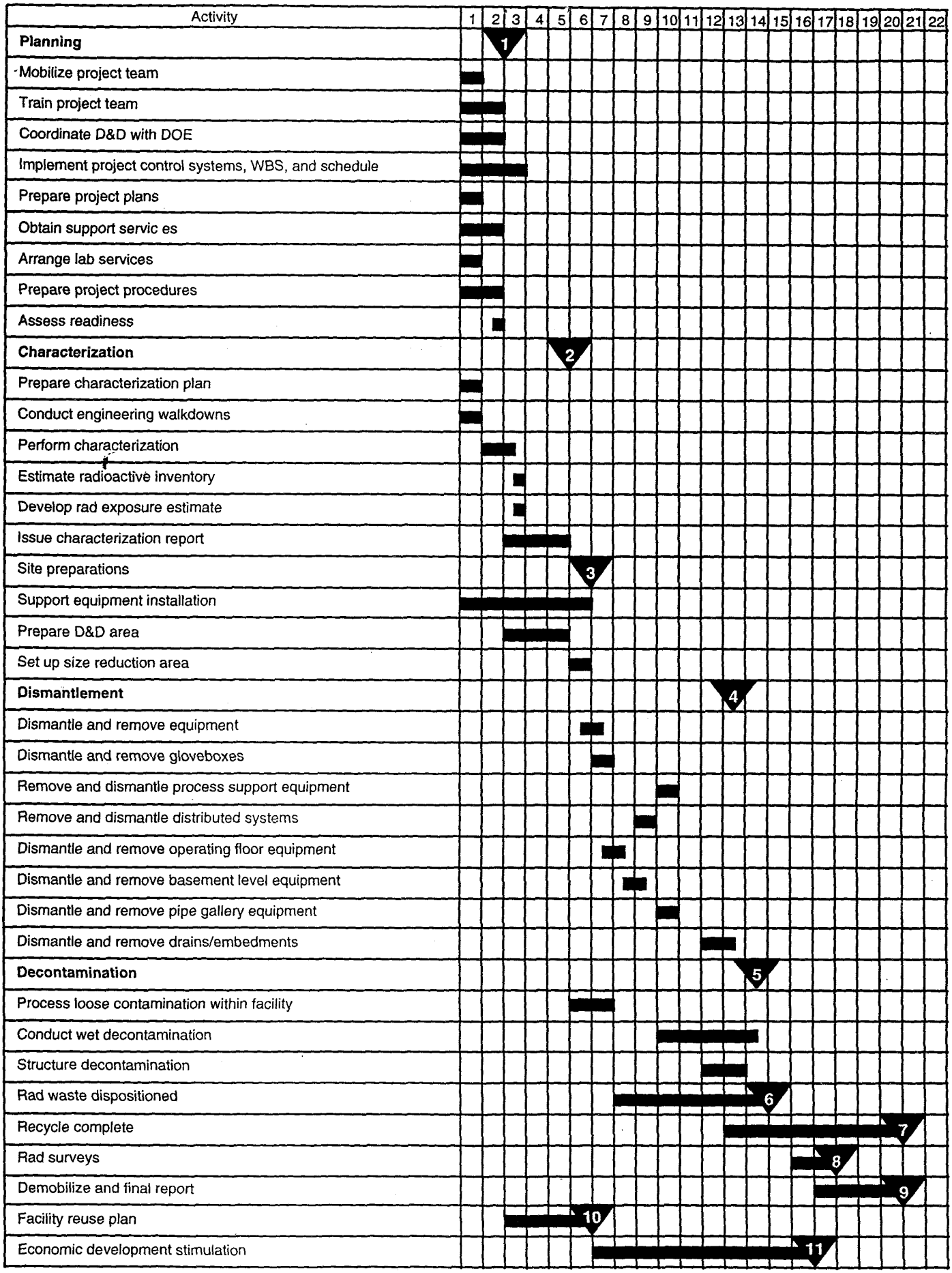

Figure 2.4.3. Typical Project Summary Schedule

2.4.1 Description of Work Activities (as illustrated on Figure 2.4.2)

Planning

The initial activity on any decommissioning project is the planning phase. This phase will address a number of important activities, including the preparation of detailed work, engineering, safety and health, training, QA/QC, and field operations procedures. A regulatory compliance review will be conducted. For high risk projects, a detailed DOP addressing waste management, general work, QA, security, safety and health, and risk will be generated. All other projects will be executed according to Project Plans generated during the planning process.

Reconnaissance Characterization

Previous facility characterization studies will be reviewed and, if necessary, further site characterization of the area will be performed. The purpose of site characterization is to quantify the physical and chemical contamination and the extent of its distribution and to provide data to support dose assessments, and ALARA analyses to support selection of cleanup criteria and approach to decommissioning. This is a scoping activity as opposed to a full scale validation survey as would be required for Site release. A radiation exposure model will be developed to ensure that the workers will not be exposed to unnecessary levels of alpha, beta, and gamma radiation. Data to determine if and where there are criticality issues that need to be addressed will be gathered.

Site Preparation

After completion of planning and permitting, the Site will be prepared for decommissioning operations. The facility/work area will be isolated, and operational support requirements will be established. Asbestos removal (if required) will be performed early in the project. Loose dust, dirt, and debris will be cleaned from the surface, and volume will be reduced for eventual disposition.

Support Services

This work includes setting up all the necessary operational support services, such as security, environmental control, health physics and surveillance, personnel monitoring, training, respiratory protection, medical, QA, shipping and receiving, document control, transportation, procurement, stores, and analytical laboratories. The location and interface between all these support services will be done efficiently and completely before any decontamination operations begin.

Decontamination

The site characterization, using in situ methods where practical, will identify the areas and components that exceed approved release criteria. Typically, these areas include pockets where product has accumulated or where loose radioactive material was handled/processed. If radioactive material is found above approved release criteria, appropriate decontamination techniques will be implemented. Consideration will be given to the cost effectiveness of decontamination verses dismantlement and disposal as waste. Decontamination techniques will be used in order to reduce SNM contamination levels such that waste which would have been classified as TRU can be reclassified as Low Level Radioactive waste.

Dismantlement

The sequence of removal of equipment and auxiliary structures will be determined during the planning stage and supported with the site characterization information. The dismantling will include all distribution systems, process equipment, gloveboxes, pipework, ducting, electrical heaters, wire and circuit devices, control valves, piping, and HEPA system.

Waste Management

For materials that may contain radioactive or hazardous materials, appropriate surveys and sampling will be performed. Waste materials will typically be sorted at the time of removal and will be staged for further decontamination, survey, recycling, processing and packaging.

Contaminated liquids will be treated, solidified or shipped offsite for processing. Contaminated material such as filters, components and dismantlement material will be evaluated to determine the optimum method for disposition including unconditional release, decontamination, onsite processing or shipment offsite for further processing or burial.

Any recyclable materials such as metal (regulations permitting) will be cleaned and dispositioned based on existing marketing conditions. Waste streams will be solidified and packaged depending on their radiation level.

Solid radioactive waste is expected to be categorized as follows:

1. Potentially contaminated or requiring minor spot decontamination: These include potentially contaminated materials that 1) appear to be uncontaminated 2) all surfaces are easily accessible and 3) have a small surface area-to-weight ratio will be surveyed to determine if the material can be released for unrestricted use without decontamination or with minor decontamination effort. For example, a small surface area with only spot and/or smearable contamination can easily be decontaminated by such means as wiping, grinding, or grit blast.

2. General contamination with accessible surfaces: Materials with readily accessible surfaces for purposes of surveying and decontamination will be decontaminated or shipped offsite to a processing facility for decontamination of surfaces and final disposition.

3. General contamination/inaccessible surfaces. Smaller metallic scrap, piping or metals with inaccessible surfaces will be assumed to be contaminated and be packaged for further processing or shipped directly to burial.

Waste materials will be classified as volumetric or surface contamination. Volumetrically contaminated materials are not currently subject to release criteria. EPA, NRC, and DOE have efforts underway to develop release criteria. Surface-contaminated materials are subject to release criteria.

Transportation and Disposal

Waste will be stored at RFETS, or, if regulations will allow for offsite waste processing and disposal, licensed carriers will transport the waste material to a licensed nuclear waste processing facility or disposal site.

Recycling

Materials that can be recycled will be sorted into various categories, such as size, shape, radiation level, and fixed or smearable contamination. Materials such as metals, if the current regulations permit, could be taken to a recycling facility such as the NCPP facility at RFETS. The NCPP facility can decontaminate the surface of metals, smelt the metal into a billet, and then roll it into a sheet. NCPP can also form the sheet into boxes and drums that can be used as waste containers by DOE. Non contaminated lead should be recycled to commercial ventures.

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Final Surveys

Once the facility has been decontaminated and all the equipment and auxiliary structures have been removed and all RCRA-regulated units have been closed, a detailed survey will be performed to verify that acceptable decontaminated levels have been attained. A final report describing the results of the decontamination, including cost and schedule extrapolation, worker reutilization, facility reuse status, and material recycle success, will be assembled.

2.5 PLANNING & PROJECT CONTROL

The Decommissioning Program will utilize a simple and effective scope, schedule, and cost control system that identifies responsibilities and interfaces. All project personnel will become fully familiar with the system through training on policies and procedures.

The project control system will be based on DOE Project Control System Guidelines (DOE N 4700-5) and good business practices. Based on the project scope of work, a performance baseline will be developed, performance will be measured and evaluated using an earned value system, and corrective action will be identified and taken in accordance with the 4700.5 guidelines.

2.5.1 Cost Accounts Project Work Breakdown Structure

The WBS will include an appropriate level for planning, budgeting, and controlling each project and will also provide the basis for all program planning, operation, and management. The WBS index and dictionary describes the work that will be accomplished within each element.

The cost account is the level at which authority is delegated, work is budgeted, and activity is monitored and measured against project plans. All cost accounts for the work to be performed by the functional groups within the project, and each cost account is further subdivided into activities (work packages) tracked by the expenditure of job hours and labor dollars, material dollars, subcontract costs, or other direct costs. Cost accounts are uniquely identified so that any resources budgeted, committed, or used can be directly traced to the specific cost account. Thus, this feature will facilitate planning, controlling, and measuring work.

Each cost account will contain planning work packages that will constitute the fundamental unit for planning, budgeting, authorizing effort, and measuring performance at the level where the work is accomplished. One person is responsible for each planning package, which will be uniquely identified.

Planning packages for work scheduled to start within 4 to 6 months will be further broken down into work packages, which will contain short time span activities and will develop naturally during planning for work associated with a task. The time-phased work packages form the keystone for planning and for measuring accomplishments.

Continuous subdividing of future activities into near-term work packages ("rolling wave planning") will achieve maximum near-term work definition. Although planning packages will define each task less concisely than will the work packages, the planning packages will be defined in terms of start and stop dates and specific assigned budgets so that funds allocated to future efforts will not be used for current tasks. These budgets will be time-phased and summarized to the cost account total to ensure that the total budgeted cost of work scheduled (BCWS) for a cost account agrees with the budget authorized. Level-of-effort tasks that do not lend themselves to subdivision into scheduled packages will be planned in terms of time-phased budgets. The budget for each cost account will be the sum of the budgets of its respective work packages.

2.5.2 Budgeting

Individual work package budgets will be prepared based on the WBS and in conjunction with schedule planning. They will incorporate estimates of manpower and other resource requirements and will be prepared in terms of job hours and total labor, material, subcontract, and other costs to the WBS level required for effective planning and cost control.

Budgets will be developed at the cost account level and will use control points to define the accomplishments that will determine the earned value of a work package. Each control point will represent a predetermined percentage of the allotted budget against which actual costs will be compared and performance evaluated. Control points will vary according to the type of activity but, once established, will not be changed for the duration of the project.

The performance measurement baseline (PMB) will be equal to the sum of all cost account budgets and will be the baseline against which cost and schedule performance is measured. For future efforts not planned to the cost account level, the PMB will also include budgets assigned to higher-level WBS elements.

2.5.3 Work Authorization

Project Controls staff will work with the appropriate department managers to prepare their work authorizations (WAs), which will define the products and services needed to accomplish WBS element work. The work will be defined in terms of work to be performed within a schedule and for a budget in estimated job hours, total labor, material, subcontract, or other direct costs. Work will be assigned to specific project groups, and planning personnel will ensure adherence to and understanding of the control procedures. The data contained within the WA will provide the basis for detailed planning and monitoring of performance and progress. In addition, the WA will include contract milestones, project event dates, and the cost accounting codes.

2.5.4 Performance Measurement

Budgets and schedules will be tracked directly and consistently with the accomplishment of work, so that progress measurement is more than a simple measurement of spending rate. An earned value methodology will be used to measure performance.

The project control system will enable progress toward all project objectives to be assessed as objectively as possible. As PMs plan their work, they will work with the Project Controls Supervisor to determine which earned value technique is most appropriate as a measure of the work. Discrete earned value techniques will be used, depending on the type of work or cost account, as follows:

Three types of variances will be monitored: schedule, cost, and "at completion." Cumulative-to-date and incremental variances will be evaluated monthly.

A schedule variance (SV) occurs when BCWP differs from BCWS. If BCWP is less than BCWS, then less work has been done than was planned and the schedule variance is unfavorable. It will be the responsibility of the Project Controls manager to analyze the schedule variance and determine actual schedule status with regard to: cost account milestones, possible impact on higher-level milestones, and appropriate corrective action.

A cost variance (CV) occurs when BCWP varies from actual cost of work performed (ACWP). A negative cost variance (BCWP - ACWP) indicates an unfavorable cost status; it does not necessarily indicate a cost overrun, but it does indicate the potential for a cost problem.

Cost account managers will perform variance analysis, which will include identifying the cause of the variance, determining its impact and proposing corrective action. At the end of each accounting month, Project Controls will provide the PM with summaries of BCWS, BCWP, and ACWP for each cost account and WBS element and CVs and SVs for WBS elements. If the variance exceeds thresholds established by the Decommissioning Program Manager and PM, the Project Controls organization will initiate a variance analysis reports (VAR) to the Decommissioning Program Manager and Project Manager for review and resolution.

The PM will have the overall responsibility for the Estimate at Completion (EAC), and the Project Controls Supervisor will be responsible for coordinating the preparation of the EAC forecasts for cost accounts or functional organizations. The forecast process will consider the following:

- Actual cost and performance to date
- Projections of "to go" cost based on work scope
- Anticipated problems, escalation, and resources
- Subcontract performance and progress

2.5.5 Evaluation and Cost Status Reporting

Project Controls will prepare a monthly report to provide cumulative costs by WBS element for BCWS, BCWP, ACWP, SV, CV, BAC, and EAC. Project Controls will also provide variance analyses when CVs exceed contract thresholds. The internal reporting systems will be structured to gather information on project status for all levels of management.

The monthly project status, cost management, schedule status, and cost performance reports will be produced directly from the project control system. The milestone schedule and status report will be updated monthly with information derived from the project summary schedule and project milestone schedule for all WBS items, contract milestones, and deliverables.

Monthly cost performance reports will show current and cumulative budget, actual costs, and earned value data by WBS element. They will identify cost and schedule variances and compare the EAC with the budget. In addition, the performance measurement baseline will be updated to report DOE-authorized contract changes.

2.5.6 Cost Schedule and Change Control

All measurements of progress and performance will be compared with the baseline plan to identify deviations from the plan. The baseline plan will remain unchanged throughout the life of the project unless a replanning process (contract change orders) changing or altering the project scope is authorized by DOE. Change orders are changes to the project for items outside the current scope of work that have been authorized by DOE for inclusion in the contract; changes may be directed by DOE or requested by the PM.

2.5.7 Application of Project Control to Subcontractors

The scope, schedule, and budgets for subcontracts will be defined in accordance with the project plan. The subcontractor's scope, payment line items, and reports will be required to be structured in accordance with the WBS so that subcontractor planning and reporting can be integrated into the project management and control system. Monthly reports giving the ACWP and other cost elements (BCWS and BCWP) will be required from each subcontractor.

2.5.8 Database Benchmark

Collection of actual project costs by work element will also facilitate development of baseline database and improve estimates for work involving decommissioning of other radioactively contaminated facilities. It will be important to demonstrate the project control system methodologies during the first decommissioning projects because the baseline database will be integral to the successful accomplishment of overall decommissioning objectives.

2.6 DECOMMISSIONING PROGRAM ORGANIZATION AND RESPONSIBILITIES

2.6.1 Organizational Relationships

The organizations with major interests in RFETS decommissioning are:

• DOE	Operator of the RFETS. DOE will oversee and regulate the decommissioning operations. Most of the radioactive waste from the decommissioning projects will be disposed of at a DOE burial site. Further, DOE will be responsible for compliance with and enforcement of the government regulations, and for interfacing with other regulatory agencies, stakeholders, and the public.
• Kaiser-Hill	Integrating Contractor - Responsible for Program Lead in decommissioning activities.
• RMRS	RMRS has developed and is submitting this plan for the decommissioning activities at RFETS In furtherance of this plan, RMRS shall: 1) develop a detailed implementation schedule for the decommissioning projects, 2) prepare plans and furnish procedures for the decommissioning projects, and 3) perform decommissioning activities in compliance with State and federal regulations.
• Environmental Protection Agency (EPA)	Establish Guidelines in concert with DOE to perform Decommissioning under CERCLA.
• Colorado Dept. of Public Health and Environment (CDPHE)	Day-to-day regulatory oversite of RCRA related matters and participation in planning of decommissioning activities.
• Defense Nuclear Facility Safety Board (DNFSB)	Provides oversight of AEA radioactive material processing and storage within defense nuclear facilities.
• Safe Sites of Colorado	Responsible for building deactivation activities which will prepare the building for decommissioning to proceed.
• Dyncorp	Provides the outlet for disposition/sale of clean decommissioning material.
• Subcontractors	Specialty contractors will be required to provide services not available at Rocky Flats or through its major contractors. These contractors will provide services, equipment, and labor.

2.6.2 Decommissioning Program Responsibilities

The Engineering/Construction/Decommissioning organization is the cognizant organization for the Decommissioning Program. The Decommissioning Program Manager reports to the Vice President of Engineering/Construction/Decommissioning and is responsible for coordinating the activities performed and ensuring that the work is conducted in conformance with DOE and regulatory requirements as they apply to each project. Figure 2.6.1 illustrates the relationship of the Decommissioning organization within the overall Kaiser-Hill/RMRS organization.

The Decommissioning Program Manager is also responsible for developing the programmatic planning, budgeting, and program reporting documents, ensuring that planning initiatives and resource requirements are identified and met, and for overview of the decommissioning projects. Other technical groups are responsible for supplying resources to the Decommissioning PM for the development and implementation of project-specific support.

The Decommissioning Program staff is responsible for prioritizing and defining decommissioning projects. Specific tasks assigned are:

- Identifying and prioritizing projects to ensure integration with other RFETS activities and effective application of available funds;
- Developing project scopes, schedules, and costs;
- Maintaining project development schedules and performing cost control;
- Obtaining funding for specific project implementation;
- Performing project development reporting; and
- Providing support for developing compliance documentation.

The following sections describe the specific groups responsible for providing support to the Decommissioning Program Manager.

2.6.2.1 Decommissioning Project Manager (PM)

The Decommissioning PM reports to the Decommissioning Program Manager and is responsible for management of projects assigned. To carry out this function, each PM is responsible for and has the authority for the development, execution, supervision, coordination, and integration of all aspects of the decommissioning project planning, management, and operations activities. The PMs are participants with the project staff in the development of the work plans that define the scope of each project task, schedule, budget, and deliverable they are required to meet. Resource allocations are requested and approved from these plans by the Decommissioning PM. Additional resources from other organizations will be negotiated by the Decommissioning PM.

Each Decommissioning PM participates in the review of revisions to this DPP and reviews all Project Plans and Procedures. Each PM must ensure that all Project procedures, regulations, codes, and standards are followed.

2.6.2.2 Regulatory Compliance

Regulatory Compliance is responsible for identifying, defining, and ensuring project compliance with applicable federal and state laws, and DOE and industry standards. Figure 2.6.2 illustrates regulatory responsibility relationships. Specific tasks assigned to Regulatory Compliance are:

- Identifying, defining, and developing strategies for areas of compliance,
- Conducting independent project assessments and compliance verifications, and
- Supporting the Decommissioning PM to ensure that regulatory compliance is attained and maintained throughout the life of the project.
- Assist in developing and approving plans delineated in Table 2.1.3.

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2.6.2.3 Environmental, Safety, Health, and QA Group (ESH&Q)

The ESH&Q organization is responsible for identifying, defining, and assessing compliance with applicable federal and state health, safety, and radiological control requirements as well as applicable QA requirements. Specific tasks assigned to the ESH&Q are:

- Identifying, defining, and developing strategies for health, safety, radiological, control, and QA compliance requirements;
- Conducting independent project assessments and overview for compliance and effectiveness;
- Supporting the Decommissioning PM to ensure that health, safety, radiological control, and QA compliance is attained and maintained throughout the life of the project.

2.6.2.4 Waste Management Operations Organization

Management of packaged waste and liquids will be provided by the RMRS Waste Management Operations organization. Waste Packaging Observers will be provided by Decommissioning Operations to ensure waste is packaged in accordance with decommissioning waste packaging procedures. The Decommissioning PM will coordinate with Waste Management Operations to assure decommissioning waste can be dispositioned prior to beginning decommissioning operations.

2.6.2.5 Technology Applications

Technology Applications will provide technical support to the Decommissioning Program in the area of decontamination, recycling, glovebox design, size reduction, mock-ups, technology identification and selection, waste characterization and identification of areas for cost savings.

2.6.2.6 Other Organizational Interfaces

Other interfaces with decommissioning support organizations will be developed on a project by project basis. Other interfaces include Procurement, Technical Assurance, Maintenance Support, Nuclear Criticality, Nuclear Material Accountability and Project Controls.

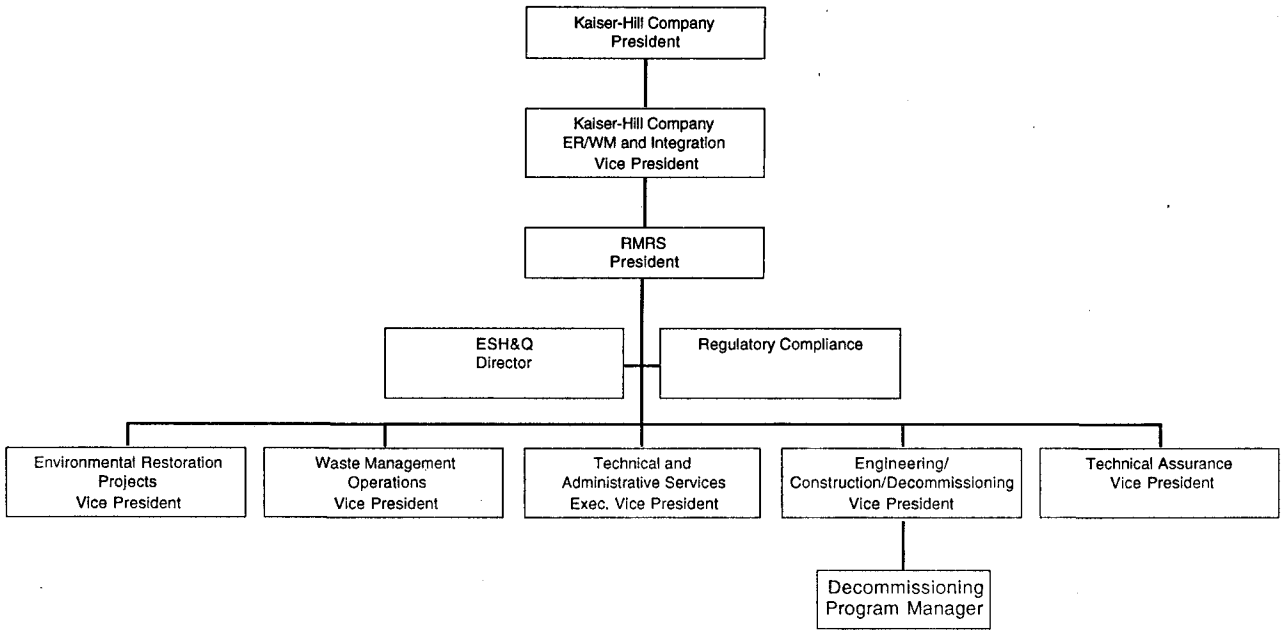

Figure 2.6.1 Kaiser-Hill/RMRS Organization

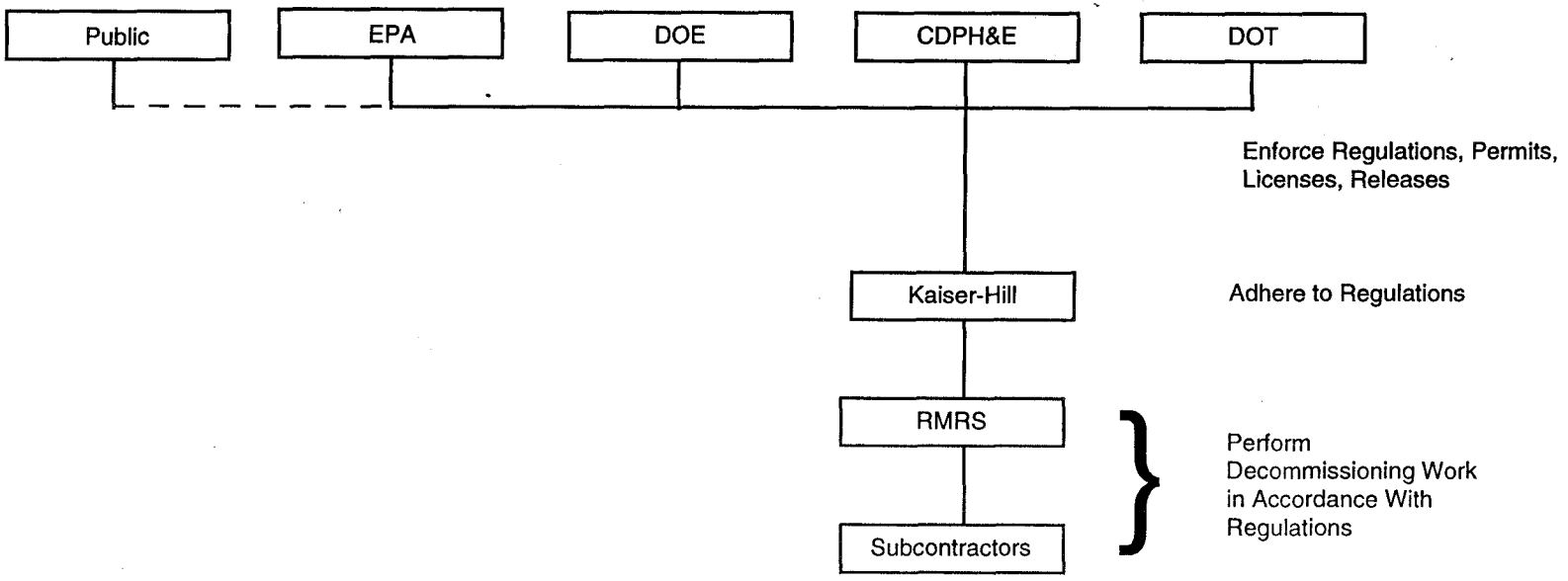

Figure 2.6.2. Regulatory Responsibility Relationships

2.7 MANAGEMENT OF DECOMMISSIONING PROJECTS

The project organization structure is developed simultaneously with the WBS. The WBS is a management tool for organizing activities into coherent elements, controlling costs, planning schedules, and identifying personnel requirements. Therefore, the WBS strongly impacts the organizational requirements of the program.

2.7.1 Project Management Plan

Management of decommissioning projects will be established within a format which includes the following components:

1. This DPP
2. DOP
3. The Project Safety & Health Physics Program
4. The Project Organization Charts
5. Project Procedures
6. The Project QA Plan
7. Project Schedules Including Project Baselines and Milestones
8. Project Budgets and Funding

2.7.2 Decommissioning Project Staffing Responsibilities & Qualifications

The organization was developed based on the selection of key personnel whose qualifications match program requirements. While the assigned personnel report to a functional management organization, they will take direction from the PM regarding project priorities and responsibility. The functional groups from which these individuals originate will retain oversight responsibility for the technical quality of the work. Thus, the project enjoys the commitment of project personnel only for the time period required by the PM. This approach allows for a flexible level of program staffing, while making the full resources of the Project Team available to the Decommissioning program.

Figure 2.7.1 illustrates the project organization and Figure 2.7.2 illustrates the functional management interfaces between the project team and support functions.

The key members of the Decommissioning organization and their general responsibilities are outlined below:

Vice President Engineering/Construction/Decommissioning

This position is the RMRS senior manager who has overall responsibility for the Program, including periodic reviews of all aspects of the project management team's responsibilities, conducting review meetings with the project management team and reporting project progress on cost and schedule to RMRS senior management. This manager is also responsible for conducting meetings with Kaiser-Hill regarding contractual issues. If requested by Kaiser-Hill, he may also participate in meetings with representatives from local, state or federal stakeholders and regulatory bodies.

Decommissioning Program Manager (DPM)

The DPM is responsible for developing decommissioning policy, strategy and long-term planning. The DPM will supervise and provide programmatic oversight to the decommissioning staff of PMs and technical specialists. The manager will work with regulators to establish regulatory policy and provide routine coordination with state and federal regulators and local stakeholders.

Project Manager (PM)

The PM is responsible for managing all of the activities referred to in project decommissioning plans, including the performance of decommissioning activities; surveys; industrial and radiological safety; QA; training; plans; programs; costs; and the assay, packaging, shipping and transport of low level radioactive waste. He is responsible for conducting progress meetings with all members of the project teams, arranging for periodic QA assessments of the project and liaising with management on all matters for which they are directly responsible.

The PM is responsible for performing the following specific duties:

- Directing the project team including the lead discipline engineers and others responsible for the execution of the project's planning and field implementation;
- Delegating to project personnel specific responsibilities within the organization for technical criteria, reviews, and other related activities;
- Determining (with the assistance of the Lead Discipline Engineers) the detailed scope of work;
- Developing the project budget and schedule with the lead scheduler, cost control analyst, Lead Discipline Engineers, and other responsible persons on the project team;
- Reviewing and analyzing cost and schedule reports, developing variance analysis reports, and taking action, as required, to maintain project budgets and schedules;
- Maintaining a chronological record of the project history, and
- Implementing the project's QA Program Plan.

Minimum experience and education requirements for the PM include:

- Previous Project Management Experience
- At least ten years experience in a project management/engineering position on previous decommissioning or decontamination projects,
- Prior involvement in the detailed preparation of a decommissioning program,
- An accredited four-year college degree or 10 years of directly related experience.

Radiation Protection and Occupational Safety Officer (RPOSO)

The RPOSO reports to the PM and receives overview from the Decommissioning Health & Safety Manager. The RPOSO is responsible for defining and implementing procedures related to radiological and industrial safety. These procedures assess safety criteria, monitoring, and training necessary to ensure the protection of employees, the public and the environment. As part of this responsibility, the RPOSO ensures that ALARA is considered in the decontamination process. The RPOSO is also responsible for the approval of radiation work permits. If the RPOSO believes an operation to be unsafe, he or she has the authority to halt that operation. Operations halted for safety reasons shall not be restarted without the concurrence of the RPOSO or the PM. The RPOSO is provided with RMRS industrial safety support from the ESH&Q Industrial Safety Team leader to ensure compliance with OSHA and EPA regulations. The RPOSO is responsible for the activities of the radiation technicians, the preparation of radiation work permits, radiation related procedures, assaying procedures, LLRW disposal procedures, the application of the methodology to be utilized for obtaining and recording the final

characterization surveys and final status survey measurements required to achieve the free release criteria and the preparation and submission of the final status survey report. The RPOSO is also responsible for the management and quality of all radiological data.

Decommissioning Operations Manager

The Decommissioning Operations Manager reports to the PM and is responsible for managing the decommissioning team, labor and supervision, performing the decommissioning activities including the decontamination of surfaces, structures, materials and equipment, the decommissioning activities of any sub-contract work, the movement, packaging and storage of wastes on-site; the monitoring of performed work against plan and for maintaining time records of the operating staff. The Decommissioning Operations Manager is also responsible for ensuring that activities are performed in accordance with procedures, including tasks plans, radiation work permits, and safety requirements.

Specific tasks assigned to the Decommissioning Operations are:

- Review of project scoping and engineering design documents, (i. e., MP, SDP, HASP, Characterization Records);
- Review and approval of pre-operations requirements including readiness reviews, training documentation, sub-contractor evaluation and development of work zones; and
- Compliance with Conduct of Operations during field operations, including maintaining daily logbook, reviewing and approving log and tagout documentation, ensuring training certification, and conducting plan of the day/plan of the week meetings; occurrence notifications, and
- Providing support for development of compliance documentation and project closeout.

Minimum experience and education requirements for the Operations Manager include:

- Two years prior experience as an operations supervisor/superintendent at a nuclear facility involving decommissioning or decontamination
- Experience as a group supervisor on at least one decontamination or decommissioning project
- Involvement in the detailed preparation of a decommissioning program
- Experience in worker training and safety instruction
- Specialized courses in construction technology and management or work experience leading to a thorough understanding of the responsibilities described above

Radiation Safety Officer (RSO)

The RSO reports to the RPOSO and is responsible for the preparation and implementation of radiation protection procedures; radiological data management including, bioassay, sample results, tracking samples, final survey, and characterization surveys. The RSO is further responsible for resolving and responding to audit findings related to Health Physics and for conducting ALARA reviews of work as specified in procedures. The RSO is responsible for staffing the Radiation Protection Department with qualified individuals as required.

Minimum experience and education requirements for the Radiation Safety Office include:

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- Health Physics experience in operating nuclear facilities, decontamination projects or decommissioning project
- Previous assignment as a project/site health and safety officer or as a facility radiation protection officer
- Previous involvement in the detailed preparation of a decontamination or decommissioning program
- Nuclear license compliance experience
- A four year degree plus two years of directly applicable experience or a two year degree plus four years of directly applicable experience.

Occupational Safety and Health Officer (OSHO)

The Industrial Safety Officer reports to the Radiation Protection and Industrial Safety Officer and is responsible for the industrial safety of the decommissioning workers. The OSHO is further responsible for the safe conduct of work by subcontractors and has the authority to stop work whenever it is determined that unsafe conditions exist or are likely to develop. Work can only recommence with the concurrence of the RPOSO or the PM.

The OSHO is also responsible for: locating, inspecting, and maintaining project first aid supplies; inspecting and maintaining inspection records for cranes, and all lifting and rigging equipment; and, shall verify all subcontractor equipment is properly certified and marked where required prior to its use. The OSHO will train workers on project Industrial Safety Procedures, issue safe work permits, when required, and close out all Industrial Safety permits and forms at completion of specific work activities.

The qualifications for the Industrial Safety Officer include:

- Two years of directly applicable experience as a safety engineer
- Knowledge of and demonstrated proficiency in the technical aspects of industrial safety programs, worker's compensation insurance, industrial hygiene, and environmental regulations
- An accredited four-year college degree.

Health Physics Supervisor

The Health Physic Supervisor reports to the Radiation Safety Officer, and is responsible for supervising the day-to-day activities of the health physics technicians. He is also responsible for assisting with the preparation and implementation of radiation related procedures, radiation work permits, dosimetry records, and maintaining an accountability log of the special nuclear material (SNM) inventory.

Project Administrator

The Project Administrator is responsible for establishing and maintaining project master files of all documentation relating to the project schedule, project plan, procedures, radiation work permits, work plans, training and medical records, survey measurements, incoming and outgoing project correspondence and assessment reports.

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Cost and Schedule Planner

The Cost and Schedule Planner reports to the Decommissioning PM and is responsible for establishing and maintaining project costs and performance utilizing the computerized Primavera system.

Minimum experience and education requirements for the Project Controls Manager include:

- Experience in project cost estimating, scheduling, tracking, and management reporting
- Prior experience with project field activity tracking for remote jobsites
- Knowledge of engineering, construction and business management techniques customarily acquired by prolonged course of specialized instruction. Knowledge of current industry and technical developments.

Quality Assurance Engineer

The QA Engineer receives direction from the PM regarding priorities and responsibilities and reports to and receives overview from the QA Manager. The Quality Control Engineer is responsible for performing assessments and surveillance of site activities; inspections of selected site activities; assisting in training site personnel; concurrence of the disposition of non-conformance reports and reviews of project procedures for quality requirement by providing quality related input. The Quality Control Engineer is also responsible for initiating discrepancy reports, non-conformance reports, corrective action requests, and reviewing worker training records to ensure workers are appropriately trained.

The qualifications for the Quality Control Engineer include:

- An accredited four-year college degree
- Certified Lead Auditor, ANSI/ASME N45.2.23
- Two years experience as a project quality engineer on related projects

QA Manager

The QA Manager is responsible for developing and maintaining the QA Program for the Decommissioning Program and coordinating its implementation with the PM. This function will be independent of the PM and will have direct access to upper management on matters related to quality. The QA Manager will have the authority to stop work which is in noncompliance with approved procedures. The specific decommissioning responsibilities of the QA Manager include:

- Developing, implementing, and maintaining QA Program Documents
- Reviewing and approving decommissioning procedures and changes thereto for conformance with quality related requirements, and providing quality-related input in accordance with the work activity control process
- Providing QA indoctrination and training to project personnel
- Supervising/performing audits and surveillance to verify conformance of decommissioning project activities to written operating procedures and decommissioning project requirements and to verify the effectiveness of the Decommissioning QA Program

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- Advising project management on quality -related inquiries from internal and external sources and on the results of QA audits and surveillance
- Reviewing and approving completed Corrective Action Requests (CARs) and monitoring decommissioning activities to verify that approved corrective actions are effectively implemented

The qualifications for the QA Manager include:

- An accredited four-year college degree
- Two years experience as lead QA representative on related projects
- Knowledge of radiation protection, nuclear safety, and industrial safety programs and past experience in interfacing with the DOE Compliance organization
- Certified Lead Auditor, ANSI/ASME N45.2.23

Project Engineer (PE)

The PE is responsible for engineering activities on the decommissioning project. The PE is responsible for complying with Engineering Department Procedures applicable to the project scope of work. He/she receives daily project direction from the PM and reports to the Engineering Manager for technical overview. Responsibilities include the following:

- Reviewing and approving reports and studies for technical quality
- Reviewing and approving project specifications and material requisitions
- Approving disposition of non-conformance reports
- Approving design changes (Field Change Requests/Field Change Notices, FCR/FCN) required during the decommissioning project
- Exercises operational supervision over the engineers of all disciplines assigned to the project or in support of the project
- Directing and coordinating engineering activities for the project
- Establishing or assistance in establishing the detailed scope project work plans and procedures

Minimum experience and education requirements for the Project Engineer include:

- Prior experience as a senior engineering staff member
- Two years experience as a senior engineer or project engineer on a decommissioning project
- Previous involvement in the detailed preparation of a decommissioning program
- A technical knowledge of related engineering systems, engineering calculations, and applications of engineering and construction methods and materials

Nuclear Safety Engineer

This is an overview function which reviews and approves proposed activities and changes in processes, equipment, and procedures involving SNM for nuclear safety considerations, performs inspections, and monitors operations to ensure implementation of the required nuclear safety controls. This function approves all determinations of criticality limits, provides and obtains independent verifications thereof, and approves the content of training programs for nuclear safety.

The Nuclear Safety representative shall have demonstrated his/her proficiency in activities of nuclear safety and outside reactor criticality safety. Demonstration of this proficiency shall be based on qualifications which shall include an accredited four-year college degree in science, engineering, or other related field and a minimum of two years experience and/or training in nuclear safety activities related to nuclear fuel fabrication operations, or one year of such experience and/or training plus two years of other nuclear safety experience and/or training.

Nuclear Material Accountability

This is an overview function which ensures compliance with source material and SNM custody and control regulations and practices. It implements the program for accountability, custody, and control of SNM. This organization maintains a manual of accounting control procedures to ensure compliance with safeguards and material control and accountability regulations and license requirements.

Nuclear Materials Accountability representative shall have demonstrated his/her proficiency in activities relevant to the functions assigned. Demonstration of this proficiency shall be based on qualifications, which shall include an accredited four-year college degree in a relevant field and a minimum of two years applicable work experience and/or training in nuclear material accountability and control activities.

2.7.3 Integrated Work Control Packages

Written work packages will be used to perform and provide day-to-day control of decommissioning activities. The IWCP packages will establish the methodology for performing specific tasks and will be reviewed and approved by the Operations Manager. Approval of DOPs, which govern the procedures and subordinate work packages implies approval of the work packages.

The decommissioning project will control it's day-to-day work activities, as described in Section 8.0. The work package will invoke Decommissioning Program approved procedures to perform specific tasks or work activities. These work packages will be reviewed/approved by the RPOSO, QA Engineer, and the Project Engineer or their designees.

The work packages shall contain all the information required by the field staff to perform the work. The work packages will include information such as the following:

- Disassembly, dismantling, and demolition methods
- Detailed sequences
- Radioactive waste collection, processing, temporary storage, and shipment
- Contamination control techniques
- Equipment operation and maintenance
- Methods for ensuring industrial safety
- Security procedures
- Activity specifications
- Equipment operations
- Training procedures

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- Systems operation
- Environmental monitoring procedures
- Health Physics procedures
- Reporting requirements
- Emergency procedures
- Procurement procedures
- Work instructions
- Toxic and hazardous materials control, if any

Procedures and work instructions will be controlled so that worker qualifications are defined, QA hold points are an integral part of the program, and management reviews occur throughout the entire process.

2.7.4 Decommissioning Performance Review

A review will be accomplished by RMRS Decommissioning management and the project team prior to commencement of work activities on each project. When determined by the Decommissioning PM/designee, a more detailed assessment may be performed by conducting a QA assessment. The purpose of the review is to evaluate the status of the prerequisites for starting field activities and to formulate an action plan to complete the prerequisites prior to starting work.

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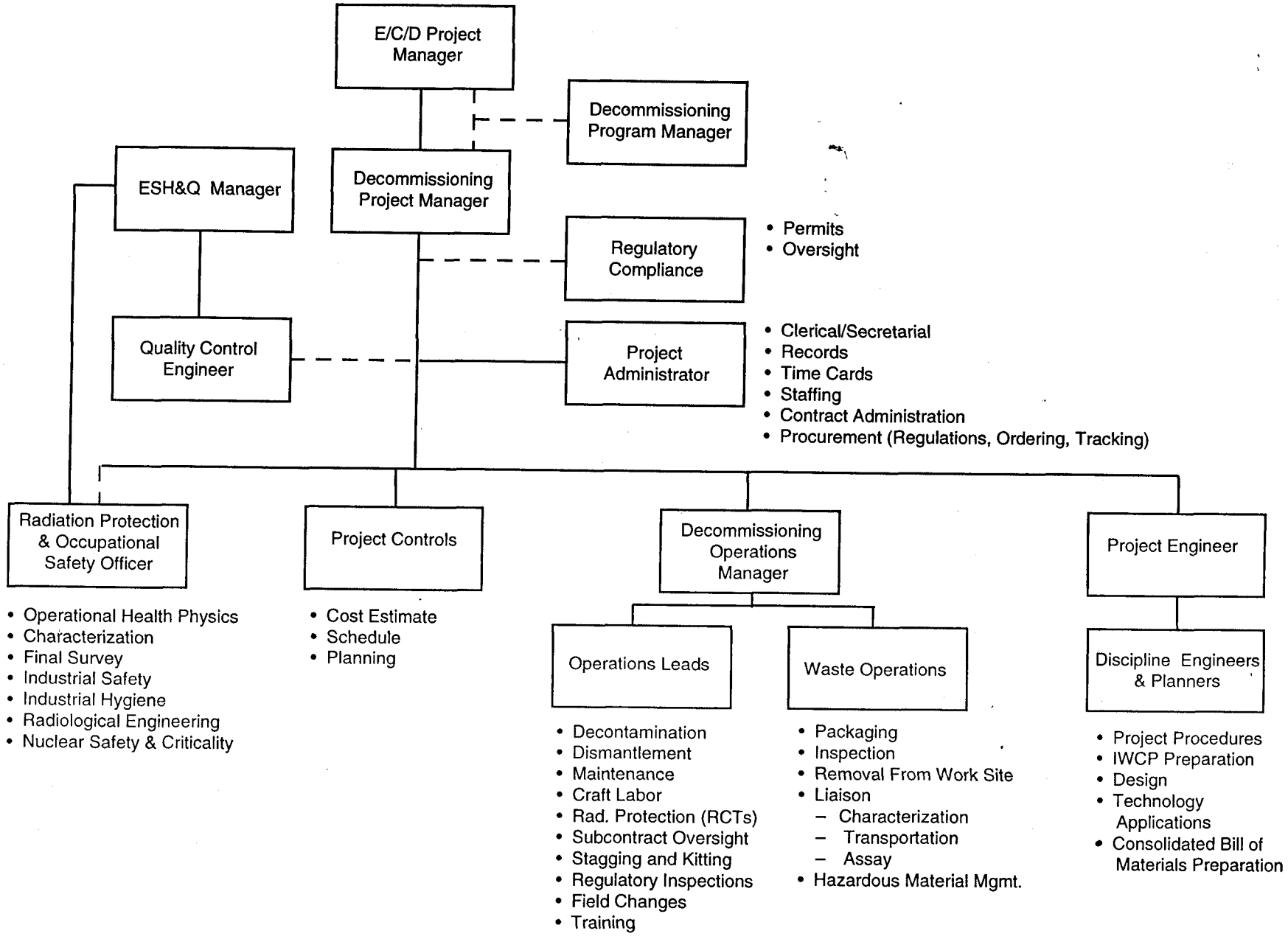

Figure 2.7.1 Decommissioning Project Organization

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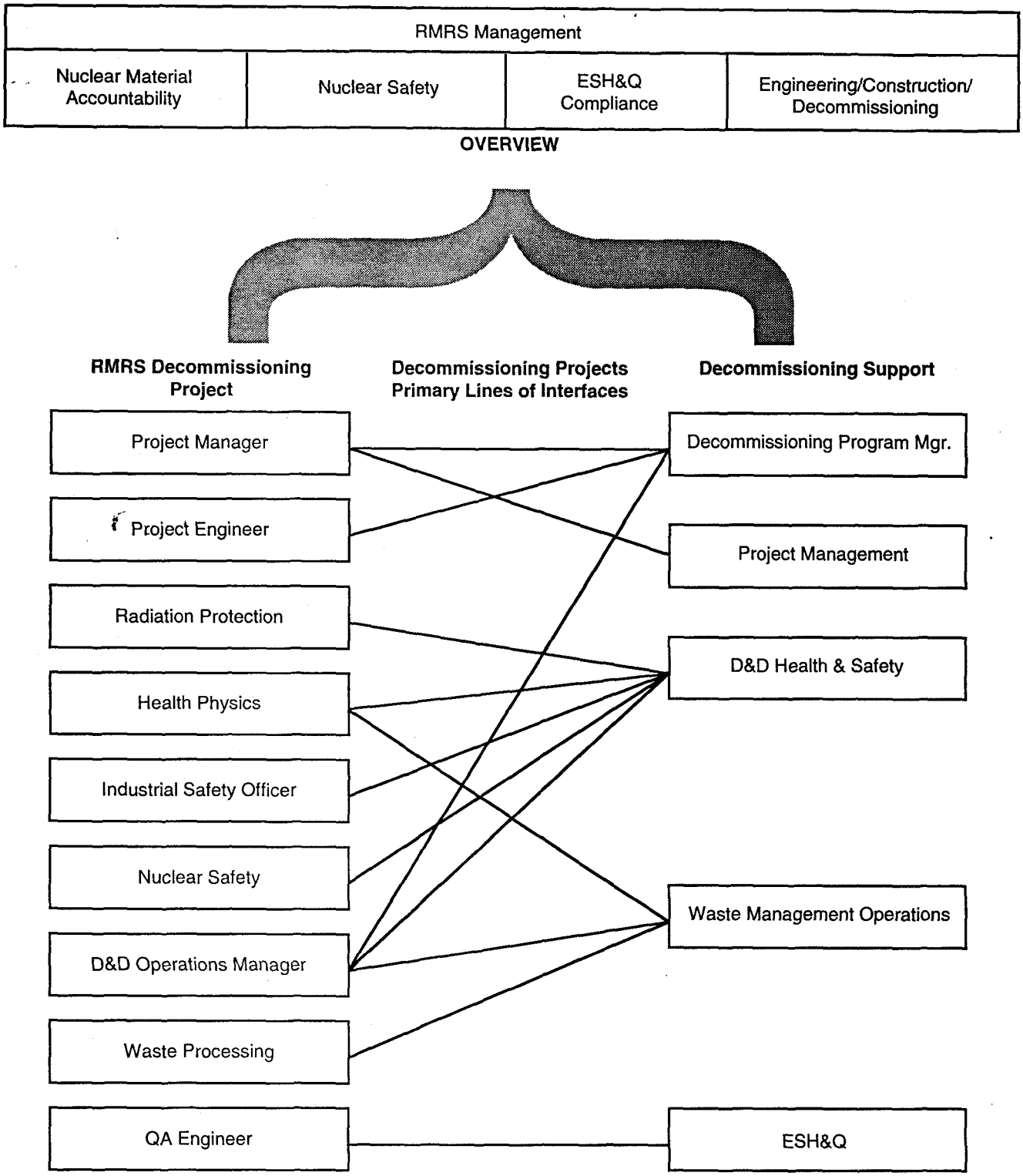

Figure 2.7.2. Functional Management Interfaces for Decommissioning Projects

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3.0 REGULATORY REQUIREMENTS

The decommissioning program is an integral part of the final disposition of Rocky Flats Facilities. All decommissioning actions, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action. The decommissioning program and this Decommissioning Program Plan (DPP) are designed to achieve a high quality and compliant decommissioning process; and protect workers, the public and the environment.

The DPP is the implementing regulatory document for all of the decommissioning actions at the Rocky Flats Environmental Technology Site (RFETS). This DPP was developed to manage a wide range of planned projects, from tearing down a large building including all its internal components, to removing a single above-ground tank. It has been designed to allow for management of several simultaneous projects while the overall program is on-going.

Decommissioning actions, planned for completion at RFETS, will be conducted as a CERCLA action. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) decommissioning actions will be conducted in accordance with those requirements identified in the "removal actions" sections of the National Contingency Plan (NCP), 40 CFR 300.415.

The CERCLA decommissioning action is utilized for actions in which there exists a threat or potential threat of release to the environment. These actions deal with conditions of higher risk or conditions where a source, containerized or not, of hazardous substances or contamination is present. CERCLA requires that all specific environmental state and federal regulations are identified through the Applicable or Relevant and Appropriate Requirements (ARAR) process for those actions. These CERCLA decommissioning actions are non-time critical removal actions that are intended to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or threat of release to the environment of any hazardous substance. Most CERCLA decommissioning actions will be conducted to correct situations or factors that may pose a threat to the public health, welfare, or the environment. This process is documented in the regulatory decommissioning process, in Section 3.1.

The Decommissioning Program Plan integrates these two types of actions and their numerous requirements. The DPP satisfies the requirements of the Engineering Evaluation and Cost Analysis (EE/CA) for the CERCLA removal actions and the non-CERCLA actions. It standardizes decommissioning actions to prevent accidents or inefficiencies. It documents actions that are protective of human health and the environment and contains the National Environmental Pollution Act (NEPA) principles.

3.1 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The US DOE and US EPA recently (May 22, 1995) issued the Policy on Decommissioning of DOE Facilities under CERCLA. This policy applies to all decommissioning projects to be conducted by DOE. This policy encourages streamlined decommissioning by establishing that decommissioning activities will be conducted as "non-time critical removal actions." Use of non-time critical removal actions for conducting decommissioning activities effectively integrates EPA oversight responsibility, DOE lead agency responsibility, and state and stakeholder participation. Decommissioning projects are to

retain sufficient flexibility to tailor activities to meet specific site needs and achieve risk reduction and environmental restoration expeditiously.

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Any activity that reduces risks or potential risks in a relatively short time-frame and can be identified as appropriate with a relatively limited amount of analysis of alternatives may be performed under removal action authority. CERCLA requires that removal actions should, to the extent practicable, contribute to the efficient performance of any long term remedial action conducted at the site.

The Statutory time and maximum dollar limits of $2 million and 2 years do not apply to removal actions conducted by DOE. This increases the scope of projects that may be addressed by a DOE removal action. Non-time critical removal actions will provide benefits more rapidly and cost-effectively than remedial actions.

Note: The CERCLA removal process provides a limit for maximum funding and time requirement for fund-assisted cleanups. The Department of Energy is not eligible for the fund-assistance cleanup and is therefore not held to this requirement.

DOE is exercising removal action authority to conduct decommissioning as authorized by CERCLA, and Executive Order 12580. DOE Operations Offices will determine what removal action is appropriate for a particular project before proceeding.

3.1.1 Removal Actions

Non-time critical removal actions were created under the National Contingency Plan (NCP) to address cleanup to reduce the threat to the public health or welfare or the environment. The lead agency (DOE) may take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or threat of release to the environment. Unlike a Remedial Action, Removal Actions are not necessarily meant to complete a cleanup. Removal actions, as implemented by the DPP facilitate a portion of a larger action to disposition the RFETS. The major elements of a removal action that are relevant to decommissioning are:

- Preparation of an Engineering Evaluation/Cost Analysis (EE/CA) or its equivalent; and

- Community involvement and dissemination of information.

The Decommissioning Program has incorporated these major elements into the Facility Disposition Process (Figure 2.1.1). The Decommissioning Program Plan contains the elements of an EE/CA with a discussion of the removal alternatives in Chapter 5, 7, and 8. Risk is discussed in Chapter 4. A sampling and analysis plan needs to be approved by the designated regulatory oversight agency if environmental sampling is planned during a removal action. Public involvement is identified in detail in Section 6 of this document. It includes review of the Decommissioning Program Plan (DPP), periodic briefing, and providing a status of all jobs underway. The Decommissioning Program Plan and its identified actions are implemented in compliance with all applicable State and Federal environmental requirements and laws for cleanup/remediation actions.

Note: The "designed regulatory oversight" for CERCLA actions is the Environmental Protection Agency. The daily oversight is being coordinated by the State of Colorado for specific areas at the Rocky Flats Environmental Technology Site (RFETS) through a Memorandum of Agreement. This document once completed and signed will identify the oversight agency for decommissioning activities at RFETS and will be included in this section.

3.1.2 ARARs

The National Contingency Plan (NCP) requires the use of current regulations if they are applicable or relevant and appropriate to the planned action. Applicable or Relevant and Appropriate Requirements (ARARs) are the environmental regulations and requirements from state and federal laws used to govern the cleanup. Applicable requirements are those requirements that directly apply to the action to be completed. Relevant and Appropriate requirements are those that do no directly apply but deal with similar issues. "To be considered" or TBC is guidance which is not law but are industrial or professional standards that are used if no ARARs exist for the work to be completed. DOE Orders can be TBC and may be included to document necessary and sufficient requirements for the handling of radioactive material and personnel exposure levels.

Removal actions comply with ARARs to the extent practicable. To wave an ARAR, it must be established that compliance is not practicable. Two factors that are primarily considered for waivers are:

1. If an immediate response is required, or

2. The scope of the project is a removal action.

ARARs must also be substantive requirements not administrative requirements. Substantive requirements are requirements that pertain directly to actions or conditions in the environment which are one of three types of requirements: chemical, action, or location specific. Chemical specific ARARs include quantitative health or risk-based restrictions based upon exposure to types of hazardous substances (e.g., MCLs for drinking water standards for a specific contaminate). Action specific ARARs are technology-based requirements for actions taken upon hazardous substances. Location specific ARARs are restrictions upon activities in a certain location, such as, wetlands or endangered species habitats.

3.1.3 ARARs Associated With Decommissioning Actions That Include Tanks/Equipment/Structures

The removal of tanks, equipment and structures have been identified within the scope of the decommissioning action in the DPP. The regulatory process involving the decommissioning of tanks, equipment and structures is to characterize any hazardous source remaining and to determine if there is a threat of release. The potential ARARs for decommissioning are identified in table 3-1. Not all ARARs apply to all jobs. The proper selection for each project will be identified in the decommissioning administrative record. These ARARs may change to reflect the regulations which are current at the time of the decommissioning action.

Characterization ARARs include identifying the presence of asbestos, radiological contamination, and hazardous material (such as lead-based paint). Air permit modification must be received prior to generating any air emissions from structures, stacks, ducts, or vents. Modification to existing Air Pollutant Emission Notices (APEN) must be received prior to modifying any emissions from tank vents or producing any new releases. Typically, air emissions may be generated when the walls are breached or through the usage of portable equipment. Colorado has state emission standards for fugitive dust emissions that should be evaluated if excavation or demolition of buildings is required. Ground water ARARs will be required if there is evidence of breaches and a release of contaminants to the environment. If treatment of any hazardous material is planned during decommissioning, action specific ARARs will be identified.

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If the scope of the decommissioning action includes high risk elements a decommissioning operation plan (DOP) will be prepared. This plan is discussed in detail in section 3.3.2. If cleanup needs to go beyond the scope of the decommissioning action, a memorandum of understanding (MOU) with the environmental restoration group will be prepared identifying who will conduct the cleanup of newly identified sources.

3.1.4 The Interim Measures/Interim Remedial Actions (IM/IRA)

The Interim Measures/Interim Remedial Actions (IM/IRA) process was established to simplify the regulatory overlap between Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA). THis type of CERCLA/RCRA action was set in motion by the Interagency Agreement (IAG) to facilitate the State of Colorado and EPA's concerns on RFETS cleanup efforts. This regulatory process was to implement remedial actions taken at the Operable Units (OU's) located at RFETS. Decommissioning actions will not be conducted in accordance with IM/IRA requirements other than to follow the approval process which will be applied to the Decommissioning Operations Plan (DOP), as defined in 3.2.2 of this DPP.

TABLE 3-1 - POTENTIAL FE. .AL AND STATE ARARs
FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
ATOMIC ENERGY ACT (AEA) [42 USC 2200 et. seq.]			
RADIATION PROTECTION OF THE PUBLIC AND THE ENVIRONMENT • Radiation Protection Standard - All Pathways • Radiation Protection Standard - Airborne Emissions • Radiation Protection Standard - TRU Waste Storage/Disposal • ALARA Process • Effluent Discharges to Surface Waters • Effluent Discharges to Sanitary Sewer Systems • Residual Radioactivity Levels (Real Property, Materials, and Equipment) • Monitoring and Surveillance	DOE Order 5400.5 {10 CFR 834, Proposed} Chapter II.1a and III {834.101} Chapter II.1b {834.102} Chapter II.1c {834.109} Chapter II.2 {834.11} Chapter II.3a {834.201} Chapter II.3d {834.203} Chapter II.5 and IV {834, Subpart D} Chapter II.6 {834.10}	TBC	This DOE Order establishes criteria for the protection of human health and the environment to ensure radiation exposure resulting from DOE activities does not exceed an effective equivalent dose for 100 mrem per year. This radiation dose limit also forms the basis for the release of radionuclides to the environment and the release of properties for unrestricted use. State Regulations, 6 CCR 1007-1.1 et seq, are not applicable to decommissioning actions but are identified for reference. State exposure level for workers and the public, 6 CCR 1007-4, also are for other types of actions.
ENVIRONMENTAL RADIATION PROTECTION STANDARDS FOR MANAGEMENT AND DISPOSAL OF SPENT NUCLEAR FUEL, HIGH LEVEL, AND TRANSURANIC RADIOACTIVE WASTE - Radioactive Dose Standards	40 CFR 191 .03	C	Standards apply to TRU waste only.
RADIOACTIVE WASTE MANAGEMENT • Management of Transuranic Waste - Temporary Storage at Generating Sites • Management of Low-Level Waste - Performance Objectives - Performance Assessment - Waste Characterization - Disposal - Disposal Site Closure/Post Closure - Environmental Monitoring	DOE Order 5820.2A Chapter II 3e Chapter III 3a 3b 3e 3i 3j 3k	TBC	
STATE OF COLORADO LOW LEVEL WASTE	6 CCR 1007-14	A	
OCCUPATIONAL RADIATION PROTECTION	10 CFR 835	C/A	

TABLE 3-1 - POTENTIAL FE .AL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
CLEAN AIR ACT (CAA) [42 USC 7401 et. seq.]			
AMBIENT AIR QUALITY STANDARDS • Sulfur Dioxide • Particulate Matter (PM10) • Carbon Monoxide • Ozone • Nitrogen Dioxide • Lead • Total Suspended Particulates	5 CCR 1001-14 [40 CFR 50]	C	Ambient air quality standards are considered to be chemical- specific ARARs to assess the quality of ambient air and the need to remediate a particular IHSS to maintain the quality of the ambient air. RFETS is located in a non-attainment zone for particulate matter and ozone. Ambient air quality standards are not effluent discharge limitations; they are used in conjunction with air dispersion modeling to establish discharge limits that are protective of air quality.
COLORADO AIR POLLUTION REGULATIONS • Emission Control Regulations for Particulates, Smokes, Carbon Monoxide, and Sulfur Oxides - Particulates - Emission Monitoring Requirements for Existing Sources - Sulfur Dioxide Emission Regulations • Odor Emissions • Air Contaminant Emissions Notices • Standards of Performance for New Stationary Sources • Emissions of Volatile Organic Compounds • Control of Hazardous Air Pollutants • Emissions of Ozone-Depleting Compounds	5 CCR 1001 [40 CFR 52, Subpart G] [5 CCR 1001-3] [5 CCR 1001-4] [5 CCR 1001-5] [5 CCR 1001-8] [5 CCR 1001-9] [5 CCR 1001-10] [5 CCR 1001-19]	A	Regulation No. 1, Section III.D(2)(b), (e), (f), and (h) requires control measurements to be implemented for construction activities, haul roads, haul trucks, and demolition activities, respectively, to prevent the emission of fugitive particulates in excess of air standards. Other portions of Regulation No. 1 would be an ARAR only if the remedial action involves the specific emission source regulated.Regulation No. 2 prohibits odorous air contaminants from any single source to be emitted in detectable odors which are measured in excess of the air standards.Regulation Nos. 6, 7, 8, and 15 would be an ARAR only if the remedial action involves the specific emission source regulated.
NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS • National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities - Standard - Compliance and Reporting	40 CFR 61, Subpart H .92 .93	C/A	Demonstration of compliance with 40 CFR 61.92 is performed on a sitewide basis taking into consideration all RFETS sources. Stack monitoring is required for all release points which could contribute greater than 0.1 mrem/yr.

A - Action-Specific ARAR
C - Chemical-Specific ARAR
L - Location- Specific ARAR
TBC To Be Considered

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TABLE 3-1 - POTENTIAL FE .AL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
FEDERAL WATER POLLUTION CONTROL ACT {aka Clean Water Act (CWA)} [33 USC 1251 et. seq.]			
COLORADO BASIC STANDARDS AND METHODOLOGIES FOR SURFACE WATER • Antidegradation Rule • Water Quality-Based Designations • Basic Standards Applicable to Surface Waters of the State - Descriptive Standards for Substances from Point and Nonpoint Sources - Standards for Radioactive Materials - Standards for Organics • Salinity and Suspended Solids • Testing Procedures - Introduction - Numeric Levels - Standard Test Procedures - Bioassay Procedures	5 CCR 1002-8 3.1.8, 3.1.11 3.1.12 3.1.16	C	Non-AEA radionuclides that have Statewide surface water standards will be considered potential ARARs. Site-specific standards not associated with a use classification and AEA regulated radionuclides are not ARARs because they do not meet the criteria of "general applicability" and/or enforceability in 40 CFR 300.400(g)(4) and are, therefore, not "promulgated." When permanent structures are put in place so that surface waters from RFETS no longer flow into, or have the potential to flow into, immediate downstream drinking water supplies. DOE intends to file a petition with the Colorado Water Quality Control Commission to change the use classification.
COLORADO BASIC STANDARDS FOR GROUND WATER • Classifications of Ground Water - Ground Water Classifications - Criteria Used to Identify Classifications for Ground Water - Specified Area • Ground Water Quality Standards - Narrative Standards - Numerical Standards - Statewide Standards • Point of Compliance	5 CCR 1002-8, 3.11.4 3.11.5 3.11.6	C	

A - Action-Specific ARAR
C - Chemical-Specific ARAR
L - Location- Specific ARAR
TBC To Be Considered

TABLE 3-1 - POTENTIAL FEDERAL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
FEDERAL WATER POLLUTION CONTROL ACT {aka Clean Water Act (CWA)} [33 USC 1251 et. seq.]			
DOE COMPLIANCE WITH FLOODPLAIN/WETLANDS ENVIRONMENTAL REVIEW REQUIREMENTS • Floodplain/Wetlands Determination • Floodplain/Wetlands Assessment • Applicant Responsibilities	10 CFR 1022 .11 .12 .13	A/L	
Requirement	**Citation**	Type	Comment
SAFE DRINKING WATER ACT (SDWA) [42 USC 300f et. seq.]			
COLORADO PRIMARY DRINKING WATER REGULATIONS • MCL for Microbiological Contaminants • MCL for Turbidity • MCLs for Inorganic Chemicals • MCLs for Organic Chemicals - MCL for Volatile Organic Chemicals (VOCs) - MCL for Total Trihalomethanes (TTHMs) - MCLs for Synthetic Organic Chemicals (SOCs) • MCLs for Radioactivity - MCLs for Radium-226, Radium-228, and Gross Alpha Particle Activity in Community Water Systems - MCLs for Beta Particle and Photon Radioactivity From Man-Made Radionuclides in Community Water Systems	5 CCR 1003-1, [40 CFR 141] 3.1.2 4.1.1 5.2.1 5.2.2 5.2.4 5.2.3 6.1.1 6.1.2	C	These regulations may be relevant and appropriate to surface water and ground water under their current use classifications. When permanent structures are put in place so that surface waters from RFETS no longer flow into, or have the potential to flow into, immediate downstream drinking water supplies, then DOE intends to file a petition with the Colorado Water Quality Control Commission to change the use classification. If these structures are in place, the MCLs (MCLGs) may not be relevant and appropriate.
MAXIMUM CONTAMINANT LEVEL GOALS • MCLGs for Organic Contaminants • MCLGs for Inorganic Contaminants • MCLGs for Microbiological Contaminants	40 CFR 141 .50 .51 .52	C	Non-zero MCLGs would also be relevant and appropriate to surface water and ground water possessing drinking water supply use classifications. MCLGs equal to zero establish unattainable goals and are therefore not ARARs according to the NCP.

A - Action-Specific ARAR
C - Chemical-Specific ARAR
L - Location- Specific ARAR
TBC To Be Considered

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TABLE 3-1 - POTENTIAL FE. .AL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENT [Colorado Hazardous Waste Act (CRS §§ 25-15-101 to -217)]			
The State of Colorado is authorized to administer portions of the hazardous waste management program (e.g., RCRA) to regulate the generation, treatment, storage, and disposal of hazardous waste within Colorado. As such, the Colorado regulations would be applicable to the management of hazardous waste. These regulations may also be relevant and appropriate in situations where a remediation waste is "sufficiently similar" to a RCRA-listed waste (e.g., waste which was generated and disposed of prior to the effective date of regulation) or when the proposed remedial action is similar to a RCRA-regulated activity and would be appropriate to ensure that the activity is protective of human health and the environment. Although the Colorado hazardous waste management regulations are similar to the federal requirements, both the federal and state regulatory citations are provided for reference purposes and to denote that both federal and state requirements were considered in establishing the identifying the ARAR requirement adopted for the remediation of the RFETS. Only substantive portions of the regulations are required under CERCLA actions for onsite activities.			
IDENTIFICATION AND LISTING OF HAZARDOUS WASTES	6 CCR 1007-3, 261 [40 CFR 261]	A	
GENERATOR STANDARDS • Hazardous Waste Determinations • Record Keeping and Reporting Requirements - Record Keeping and Reporting	6 CCR 1007-3, 262 [40 CFR 262] .11 .40 to .43	A	Persons who generate solid wastes are required to determine if the waste is hazardous. The definition and procedures contained in 6 CCR 1007-3, 261 [40 CFR 261] are to be followed to make this determination.
CONTINGENCY PLAN AND EMERGENCY PROCEDURES • Purpose and Implementation • Content of Plan • Emergency Coordinator • Emergency procedures	6 CCR 1007-3, 264, Subpart D [40 CFR 264 Subpart D] .51 .52 .55 .56	A	The existing RFETS contingency plan will be reviewed and revised accordingly to ensure that the procedures are adequate to respond to any new conditions posed by the remedial actions and/or the operation of new hazardous waste management facilities.
MANIFEST SYSTEM, RECORDKEEPING, AND REPORTING • Applicability • Operating Record • Availability, Retention, and Disposition of Records	6 CCR 1007-3 Part 264, Subpart E [40 CFR 264, Subpart E] .70 .73 .74	A	

A - Action-Specific ARAR
C - Chemical-Specific ARAR
L - Location- Specific ARAR
TBC To Be Considered

TABLE 3-1 - POTENTIAL FE. .AL AND STATE ARARs
FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] **SUBTITLE C: HAZARDOUS WASTE MANAGEMENT [Colorado Hazardous Waste Act (CRS §§ 25-15-101 to -217)]**			
CLOSURE AND POST-CLOSURE • Closure Performance Standards • Disposal or Decontamination of Equipment, Structures and Soils • Maintenance, Monitoring, Security, and Care • Post-Closure Use of Property	6 CCR 1007-3, 264, Subpart G [40 CFR 264, Subpart G] .111 .114 .117	A	
USE AND MANAGEMENT OF CONTAINERS • Condition of Containers • Compatibility of Waste with Containers • Management of Containers • Inspections • Containment - Containment System Design and Operation - Containment for Ignitable or Reactive Wastes - Containment for Incompatible Wastes • Closure	6 CCR 1007-3, 264, Subpart I [40 CFR 264, Subpart I]	A	
TANK SYSTEMS • Containment and Detection of Releases - Secondary Containment - Secondary Containment Devices -- External Liner -- Vault System -- Double-Walled Tanks -- Ancillary Equipment • Inspections • Response to Leaks or Spills and Disposition of Leaking or Unfit-for-Use Tank Systems • Closure and Post-Closure Care	6 CCR 1007-3, 264, Subpart J [40 CFR 264, Subpart J]	A	Either existing or new tank systems will be used to treat or store hazardous waste generated as a result of remedial activities. Existing tank systems will only be used if it is determined that the tank system is adequate and has sufficient integrity to prevent failure of the tank system during the proposed new use. Existing tank systems will be closed in accordance with approved closure plans or IM/IRA documents.

A - Action-Specific ARAR
C - Chemical-Specific ARAR
L - Location- Specific ARAR
TBC To Be Considered

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TABLE 3-1 - POTENTIAL FE. .AL AND STATE ARARs
FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENT [Colorado Hazardous Waste Act (CRS §§ 25-15-101 to -217)]			
CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS • Corrective Action Management Units - Standards for Designating a CAMU - Requirements for Groundwater Monitoring - Closure Requirements for CAMUs • Temporary Units - Requirements for TUs - Factors for Establishing Standards for TUs	6 CCR 1007-3, 264, Subpart S [40 CFR 264, Subpart S]	A	Colorado has adopted a CAMU/TU rule. The provisions for designated CAMUs and TUs will be followed to facilitate implementation of a corrective action.
IDENTIFICATION AND LISTING OF HAZARDOUS WASTE	40 CFR 267	A	Waste management plans will be developed to ensure compliance with the specific classes of hazardous waste (i.e., Recyclable Materials Used In a Manner Constituting Disposal, Burning for Energy Recovery, and Spent Lead-Acid Batteries Being Reclaimed) identified in this regulation.
LAND DISPOSAL TREATMENT STANDARDS	6 CCR 1007-3, 268 [40 CFR 268]		
• General (Subpart A) - Dilution Prohibition as a Substitute for Treatment - Waste Analysis - Special Rules Regarding Wastes that Exhibit a Characteristic	.7 .9	A	Waste management plans will be developed to ensure compliance with the Land Disposal Restrictions. The performance requirements for hazardous waste treatment systems will be based on the LDR Treatment Standards contained in Subpart C.
• Prohibitions on Land Disposal (Subpart C) - Waste Specific Prohibitions - Solvent Wastes - Waste Specific Prohibitions - Dioxin-Containing Wastes - Waste Specific Prohibitions - California List Wastes - Waste Specific Prohibitions - First Third Wastes - Waste Specific Prohibitions - Second Third Wastes - Waste Specific Prohibitions - Third Third Wastes - Waste Specific Prohibitions - Newly Listed Wastes	.30 .31 .32 .33 .34 .35 .36	A	

A - Action-Specific ARAR
C - Chemical-Specific ARAR
L - Location- Specific ARAR
TBC To Be Considered

Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE I: REGULATION OF UNDERGROUND STORAGE TANKS [CRS §§ 8-20-501 to -608; CRS §§ 25-18-101 to -109]			
UNDERGROUND STORAGE TANK REQUIREMENTS	7 CCR 1101-14 6 CCR 1007-5 [40 CFR 280]	A	

Requirement	Citation	Type	Comment
TOXIC SUBSTANCES CONTROL ACT (TSCA) [15 USC 2601 et seq.]			
LABELING OF PCBs AND PCB ITEMS	40 CFR 761.40 and .45	A	
STORAGE REQUIREMENTS FOR PCBs • Time Limits • Facility Criteria • Temporary Storage • Inspections • Container Specifications • Marking • Laboratory Sample Exemption From Manifesting	40 CFR 761.65	A	
DECONTAMINATION • Containers • Movable Equipment	40 CFR 761.79	A	

A - Action-Specific ARAR
C - Chemical-Specific ARAR
L - Location- Specific ARAR
TBC To Be Considered

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TABLE 3-1 - POTENTIAL FEDERAL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
TOXIC SUBSTANCES CONTROL ACT (TSCA) [15 USC 2601 et seq.]			
PCB SPILL CLEANUP • Requirements for PCB Spill Cleanup - Disposal of Cleanup Debris and Materials - Determination of Spill Boundaries - Spills of <500 ppm PCBs, Involve <1 lb of PCBs by wt. - Spills of ≥500 ppm PCBs, Involve ≥1 lb of PCBs by wt. - Time Limits and Actions Within the First 24 Hours - Requirements for Decontaminating Spills in Outdoor Electrical Substations - Requirements for Decontaminating Spills in Restricted Access Areas - Sampling Requirements	40 CFR 761.125	TBC	40 CFR 761 Subpart G is entitled *PCB Spill Cleanup Policy* and thus many of the sections in Subpart G, specifically for spills after May 4, 1987, are "to be considered" (TBC); 40 CFR 761.125 contains PCB cleanup requirements that may be considered enforceable substantive environmental standards and thus potential ARARs.

A- Action-Specific ARAR
C- Chemical-Specific ARAR
L- Location- Specific ARAR
TBC To Be Considered

3.2 Documents

The following is a description of the major documents to be used on a Decommissioning project. Documents may be combined or deleted as appropriate for the planned action.

3.2.1 Decommissioning Program Plan (DPP)

The DPP is the implementing regulatory document for all decommissioning actions at the Rocky Flats Environmental Technology Site (RFETS). This document and responsiveness summary will be part of the decommissioning administrative record. The DPP is the equivalent of an EE/CA and identifies applicable ARARs.

The approval process for this document will start with the opening of a 30-day public comment period. A public notice will be published 5 days prior to the commencement of the review and comment period. During that time, the lead regulatory agency (LRA) and the support regulatory agency (SRA) will review and comment. At the end of the comment period, DOE shall have 14 days to incorporate the comments as appropriate. DOE will submit the revised DPP to LRA. LRA will then have seven calendar days to approve, disapprove with comments, or provide areas of concern and request an additional seven calendar days. If LRA does not respond within the seven calendar day review period, the DDP and responsiveness summary are approved.

3.2.2 Decommissioning Operation Plan (DOP)

Decommissioning Actions may be implemented by utilizing a DOP to address high risk concerns not addressed in sufficient detail in the DPP. This document will follow the approval process as identified in the DPP.

These actions shall be implemented in a manner in compliance with the applicable requirements of CERCLA, RCRA corrective actions, CHWA and other environmental laws.

The DOP shall contain a summary description of the building or unit of interest; a summary of risks; a discussion of approaches; a summary of the selected methodology; identification of standard procedures to be utilized; a summary schedule without enforceable milestones; completion criteria; and identification of the Applicable or Relevant and Appropriate Requirements (ARARs) that are specific to this action. DOE may propose to combine several similar actions in one DOP to facilitate a more efficient process. Similar actions are defined as actions which involve similar contaminants and similar response techniques. The Decommissioning Operation Plan is meant to be a management plan. The hierarchy which illustrates the DOP relationship to detailed actions or procedures is shown in Figure 2.1.4. The DOP may utilize other documents by reference.

The approval process for the DOP will follow one of two paths; Proposed Action Memorandum (PAM) process for action of 6 months field activity or less and the Interim Measures/Interim Remedial Actions (IM/IRA) for more than six month field actions.

For decommissioning actions requiring less than six months for completion, a draft DOP will be created for that project with the assistance from the Lead Regulatory Agency (LRA). DOE will issue the draft DOP to the LRA for it's review and simultaneously make it available for thirty days of public comment. Within two week after the closure of the public comment period, DOE shall incorporate public comments, as appropriate, and prepare a responsiveness summary, and submit the revised DOP and the summary to the LRA. The LRA shall have seven calendar days to approve, disapprove with documented steps to reach approval, or request an additional seven calendar days. The document is deemed approved as submitted if the LRA does not respond to this last step.

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For decommissioning action requiring more than six months, a draft DOP will be prepared. DOE will issue the draft DOP to the LRA and Support Regulatory Agency (SRA) for their review and comment, while simultaneously making it available for thirty days of public comment. LRA will consolidate the comments received by the SRA with their own and shall submit one set of comments to DOE prior to the end of the public comment period. Following the closure of the review and comment period for the draft document, DOE shall prepare a proposed final decision document. This document shall give full consideration to the comments received during the draft document review utilizing clarification from the LRA, if necessary. The LRA shall review the proposed final decision document and shall approve or disapprove it. If disapproved, LRA will document steps to reach approval.

3.2.3 Decommissioning Project Plan

For the majority of facilities which will be decommissioned, a DOP will not be required. For these facilities a project specific Project Plan will be prepared. This Plan may be very simple and will reference existing site procedures for implementation of the work.

3.2.4 Completion Reports

The completion report shall be prepared for each project when all work is completed and the analytical data is validated. The report will consist of a brief description of the work completed, including any variations from what was initially planned, and a summary of how the completion criteria were met. Examples may include a summary of analytical results or a description of the results of final survey completed.
The completion Report will be placed in the project file. Additional copies will be put in the public reading rooms.

3.2.5 Closure Documents

The majority of the closures of RCRA units will be conducted prior to the decommissioning phase. If a unit is not closed then, decommissioning or environmental restoration will close it using the standard format for closures of RCRA units provided by the State of Colorado Hazardous Waste Act. The Rocky Flats Cleanup Agreement (RFCA) format will be utilized.

3.2.6 Characterization Plan

The purpose of characterization is; 1) to quantify the physical and chemical characteristics of radiological and hazardous material contamination and the extent of contamination; 2) to quantify parameters that affect potential human exposure from existing and residual radiological or chemical contamination; and 3) to support evaluation of detailed decommissioning planning including decontamination, land disposal restrictions, treatments, and waste disposal.

3.2.7 Reconnaissance Characterization Report

The Reconnaissance Characterization Report identifies and documents the conditions found during the implementation of the characterization plan. Results from the sampling will include estimated volume and type of waste to be generated which will be dispositioned by the Waste Management Plan.

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3.2.8 Waste Management Plan

The decommissioning group, with the assistance of Waste Management, will prepare input to a waste management plan that will identify the approximate volumes and manner of recycling/disposal of all waste generated by decommissioning actions. These actions are discussed in more detail in Section 9 of the DPP.

3.2.9 Administrative Record

The decommissioning process, which is documented in the DPP, supports the decommissioning action decision. These documents will be placed in an administrative record. Informational copies of the administrative record will be kept at the Rocky Flats public reading rooms located off-site.

3.2.10 Sampling and Analysis Plan

If any environmental sampling is planned as part of the removal action, a sampling and analysis plan (SAP) must be prepared. The SAP must be approved by EPA before the action can commence. Public comment is not required for the SAP. It is not anticipated that any environmental samples will be required during decommissioning.

A SAP is made up of two parts: the field sampling plan and the quality assurance program plan. The field sampling plan identifies how many samples; location of samples; method for handling, collection, and storage of samples; and method of analysis. The quality assurance program plan documents the quality actions associated with the project.

3.2.11 Notification Letter

A notification letter will be transmitted to the Lead Regulatory Agency prior to the start of field work. This will include the Reconnaissance Characterization Report.

3.3 Public Involvement

When a DOP is generated for a planned action, it will be placed in the Rocky Flats Public reading rooms. A public notice will be published, 5 days prior to commencement of the review and comment period. These comments will be addressed in the final decision document.

Periodically, a briefing will be provided for the public on which decommissioning actions are slated for the following period. Additionally, the status of any on-going decommissioning projects will be given.

3.4 Occupational Safety and Health Act (OSHA)

OSHA requirements are for the protection of workers in their work places. Decommissioning will utilize these requirements, found in 29CFR 1910 & 1926, to protect personnel working on the decommissioning actions and other personnel impacted by the actions. OSHA requirements include training on hazards in their area, protection equipment and clothing, and personnel safety.

3.5 Radiological Release Criteria

Note: The specific radiological release criteria and methods to demonstrate compliance with criteria for the unrestricted or restricted release of Rocky Flats Facilities are currently being developed. In the interim the following criteria will be utilized.

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Generally, in order for a facility or material to be released for unrestricted use, the residual radioactivity must satisfy criteria which the regulator has determined to be environmentally acceptable. These criteria, known as release criteria, include numerical guideline levels for radioactivity in soil and on surfaces, and establish a set of conditions for application of the guidelines. If the residual activity concentrations and amounts are below the release criteria, a site is considered acceptable for unrestricted use, without the need for future radiological controls. The release criteria being used by regulators include those found in the following:

- DOE Order 5400.5, Radiation Protection of the Public and the Environment June 1990) - See Appendix C
- Regulatory Guide 1.86, Termination of Operating License for Nuclear Reactors (1974) - See Appendix C
- Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Materials (NRC 1987)

DOE guidelines for the release of property are defined in DOE Order 5400.5, Chapter IV and 10 CFR 835 Appendix D. Residual concentrations for radium and thorium in soil are defined in 40 CFR Part 192. Airborne radon decay products concentration limits are defined in 40 CFR Part 192, as are guidelines for external gamma radiation. DOE Order 5400.5 is in the process of being issued as 10 CFR 834; however, this regulation, as currently proposed, does not include the surface contamination guidelines found in the Order. DOE and NRC are developing surface contamination guidance to replace those guidelines (DOE/EA-0559). It should be noted that DOE Order 5400.5 allows for release of volumetrically contaminated materials pursuant to DOE-EH-1 approval of the criteria and survey techniques used to determine that the release criteria are met. Decommissioning release criteria will be proposed in this manner.
The release guidelines for NRC regulated facilities are defined in Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Facilities. These limits apply to facility surfaces or premises, and equipment. These limits do not apply to induced radioactivity, which is considered for release on a case-by-case basis. Release criteria for soil is not addressed in Regulatory Guide 1.86, as the NRC evaluates this on a case-by-case basis.

The U.S. Nuclear Regulatory Commission (NRC) is considering an expansion of its current criteria governing the release of slightly radioactive property for unrestricted use. Current NRC staff criteria are in two forms: (1) acceptable volumetric concentrations of source material contamination in soil, provided in pCi/g (Federal Register 1981), and (2) acceptable levels of surface contamination, provided in units of dpm/100 cm2 for average, maximum, and removable contamination conditions (NRC 1974). Both of these NRC staff criteria for release of slightly radioactive material have limitations. The criteria for volumetric concentrations in soil, for instance, are limited to the uranium and thorium chain of radionuclides and are only applicable to current contamination resulting from past operations.

The NRC staff criteria governing surface contamination, although appropriate for all radionuclides, are often difficult to apply because of the wide variation in surface and volumetric contamination conditions and the varying mixture of radionuclides usually found in many licensed facilities. In addition, the values found in both sets of criteria are not consistent with the dosimetry system recommended by the International Commission on Radiological Protection (ICRP Publication Nos. 26 and 30). The ICRP has issued ICRP 60 and 61 to replace Publications 26 and 30; however, they are not commonly used by regulators.

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For the development of revised guidance, the NRC proposes to use a generic pathway model to derive the potential total effective dose equivalent (TEDE) to an average individual in a given population group from unit radionuclide concentrations of residual contamination. The methodology to calculate doses from unit concentrations of radionuclides is consistent with the recommendations of the ICRP in Publication No. 30 (1979-1988). The input parameters for each exposure pathway and scenario are selected to provide a reasonable estimate of the likely radiation dose to an average individual in a limited population exposed to residual contamination in buildings or soil. They are not selected to perform a worst case (overly conservative) analysis of the potential radiation dose, and do not represent the average dose to all members of the public.

States and individual projects may also have release criteria specific to their individual needs. These criteria must be equal to or more stringent than those specified by the Federal regulations. When releasing material for unrestricted use, the most stringent regulations generally apply.

Contamination limits for cleanup of DOE sites on the National Priorities List (NPL) are negotiated among DOE, EPA, and the affected state. This negotiation is in accordance with the CERCLA provision that cleanup standards adhere to all regulations that are applicable or relevant and appropriate (ARARs) under the circumstances.

Other guidance documents include:

Dose to the General Public

- NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," August 1988.
- NUREG-0707, "A Methodology for Calculating Residual Radioactivity Levels Following Decommissioning," October 1980.
- NUREG/CR-5512 (Draft for Comment), "Residual Radioactive Contamination from Decommissioning," January 1990.

Soils

- 46 FR 52061, NRC "Branch Technical Position for Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations," October 23, 1981.
- 40 CFR 192, Subparts B and E, "U.S. Environmental Protection Agency, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," 1991.
- Memorandum to W.E. Cline, Chief, Nuclear Materials Safety and Safeguards Branch, NRC Region II, from J.W.N. Hickey, Chief, Operations Branch, Division of Fuel Cycle, Medical, Academic, and commercial Use Safety, "Evaluation of Acceptability of Proposed Decommissioning Activities," May 5, 1987.

Groundwater

- 40 CFR 141, U.S. Environmental Protection Agency, "National Primary Drinking Water Standards."

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Survey Methodology

- NUREG/CR-2082, "Monitoring for Compliance with Decommissioning Termination Survey Criteria," 1981.
- NUREG/CR-5849 (Draft for Comment), "Manual for Conducting Radiological Surveys in Support of License Termination," 1992.
- EPA-600/4-83-020, "Preparation of Soil Sampling Protocol; Techniques and Strategies," May 1983.
- EPA 230/02-89-042, "Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and Solid Media, February 1989.

3.6 Stakeholder Involvement

Decommissioning activities will be conducted in full compliance with the community relations and public participation requirements established by CERCLA, the NCP, and DOE policies. The nature and scope of these stakeholder involvement requirements will depend on the type of removal action taken. All non-time critical removal actions will comply with the public participation requirements applicable to such actions outlined in the removal section of the National Contingency Plan (NCP). In addition, stakeholders will be provided notice and an opportunity to submit comments on the analysis of removal alternatives. Written responses to public comments will be prepared.

DOE will establish an Administrative Record as provided by CERCLA section 113 and the NCP for non-time critical removals. The Administrative Record will include the results of the removal site evaluation and other factual information and analyses upon which the decision to conduct response action was based. As additional information is developed that forms the basis for selection of the response action, such information will be included in the Administrative Record. The administrative Record will be accessible to the public, consistent with the requirements of the NCP. Public comments, and DOE's response, will be included in the Administrative Record.

Use of non-time critical removals for conducting decommissioning activities effectively integrates DOE lead agency responsibility, EPA oversight responsibility, and stakeholder participation. The DOE Decommissioning Program will utilize DOE expertise in devising and implementing appropriate solutions to decommissioning projects.

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4.0 RISK

A Decommissioning Hazards Analysis will be conducted to assess the risks from Decommissioning activities. The results of the analysis will be reviewed by the DOE, the U.S. Environmental Protection Agency (EPA), the Colorado Department of Public Health and the Environment (CDPHE) and applicable stakeholders.

The analysis will be part of the basis for the Decommissioning Operations Plan. All decommissioning operations will be based on these two documents. Day-to-day control of decommissioning activities will be managed under and Integrated Work Control Package (IWCP). The IWCP will establish the methodology for performing specific decommissioning tasks.

4.1 Hazards Analysis

For decommissioning to proceed at a nuclear facility, it is necessary to address the potential hazards to human health and the environment from decommissioning activities. The primary hazards to human health and the environment are from radioactive and other hazardous materials referred to as "hazardous materials" at these nuclear facilities. Should these hazardous materials be handled in an unsafe manner or released due to an accident, workers, the public and the environment would be at risk. Evaluation of this potential hazard is a decision-based approach which focuses on maximum use of the graded approach and the condition of the facility after completion of deactivation activities.

The first step in a hazards analysis is to examine the potential sources of hazardous material that may be a risk to workers, the public and the environment. This is called the hazard identification step. In this step, hazardous materials are identified and inventoried in terms of their quantity, form, and location. Also, these hazardous materials must be categorized by the process and/or operation within a facility. Possible sources of such information include fire hazard analyses, health & safety plans, activity hazards analyses, occurrence reporting histories, etc. The location of hazardous materials in a facility must be defined so that decommissioning of these materials can proceed. It is expected that the majority, if not all, hazardous materials will have been removed from the facility prior to turnover of the facility to decommissioning.

The next step, if required, is called hazard evaluation. The hazard evaluation characterizes the identified hazards in the context of the actual facility and process. A hazardous material is therefore examined in light of its use in the facility. Decommissioning will proceed in a manner that will minimize the potential risk to workers, the public, and the environment from all sources of hazardous material. Potential abnormal events due to normal operations, normal decommissioning operations as well as specialized decommissioning operations would be examined with respect to the hazardous materials that are present. Mitigative measures would also be examined in the hazard evaluation.

The above analysis is called a hazard analysis. The extent of the hazard analysis will be commensurate with the potential hazard present. This graded approach dictates a more thoroughly documented assessment of complex, higher risk facilities than simple, lower risk facilities since grading is a function of both hazard potential and complexity. The graded approach for hazard analysis is a function of selecting techniques for hazard evaluation. The technique selected need not be more sophisticated or detailed than is

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necessary to provide a comprehensive examination of the hazards associated with the facility operations and decommissioning operations.

4.2 Hazard Identification

The decommissioning project scope will be the basis for all hazards assessments. First, the hazardous materials inventories within a facility will be defined. A facility description that describes containment systems and safety features will be reviewed. Potential energy sources will be examined, and operations that use any inventory of hazardous material will be listed for future evaluation. The compilation of existing information on a facility is a key factor in developing a defensible, thorough hazards assessment that can be used for decommissioning operations.

It is also important in this initial stage to review information on current programs such as the emergency preparedness program, the health and safety program, the criticality safety program, the radiation protection program, and the waste management program.

4.3 Hazard Evaluation

Hazard evaluation characterizes the identified hazards in the context of the actual facility, processes within the facility, and projected decommissioning operations. Public and worker safety issues are the traditional focus of hazard evaluations. For the worker, the main concerns are from routine as well as specialized decommissioning operations. For the public, those incidents where large quantities of hazardous material could be released are of main concern.

For decommissioning operations where an activity is routinely performed, an Integrated Work Control Procedure (IWCP) is usually drafted for use. Where a specialized activity will be performed, a Decommissioning Operations Plan (DOP) will be prepared. A hazard evaluation for routine and specialized activities is initiated by first defining the types of hazardous materials involved in the operation. The steps within the IWCP or DOP are then closely scrutinized to see where an abnormal event may occur.

If a large amount of hazardous material is being handled in an operation, an accident analysis may be required. The nature of the accidents to be analyzed will vary depending upon the facility and processes considered. The number of accidents requiring formal analysis will not be large. The types of accidents that should be examined for evaluation are those associated with decommissioning operational accidents. Operational accidents could occur within a facility during decommissioning operations and may include system and/or operator failure.

Protective and mitigative systems need to be identified. These systems may include air monitoring devices, emergency procedures, or fail-safe engineered systems. For each abnormal event, there should be some type of protective or mitigative system in place. Engineered systems should be present so there are one or more barriers to contain an uncontrolled hazardous material release.

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Potential pathways to the environment from hazardous material releases and the consequence to the environment from this release will be assessed. The potential for a hazardous material release to cause significant environmental insult should not exist. Engineering designs and operational procedures will be in place so that the potential for contamination is minimized.

4.4 Application of the Hazard Analysis

A hazard analysis plays a crucial role in assessing the risks to the worker, the public, and the environment during decommissioning operations. If these risks are unacceptable, engineering designs and operational procedures must be changed so that risks are minimized.

It is projected that a hazard analysis will be needed before decommissioning operations commence. During the decommissioning planning and characterization stages, the hazard analysis can be performed to assure that activities being planned will be conducted in a safe manner. As experience is gained at a facility, potential abnormal events become easier to identify.

Waste management activities will also need a hazard analysis. Waste from decommissioning operations has the potential to contact the worker, the public, or the environment if an abnormal event occurs. The hazard analysis will assess all facets of radioactive and chemical waste management including liquid waste handling and disposal, solid waste handling and disposal, and waste packaging and storage.

4.5 Risk Associated With Facility Decommissioning Activities

Jobs involving decommissioning activities and remediation have additional risks to those associated with conventional engineering and construction. Specific risks that should be evaluated prior to committing to any decommissioning activities are:

(1) Injury to or death of workers or third persons
(2) Damage to property
(3) Subsurface or other unknown conditions
(4) Unusual liabilities such as those relating to nuclear facilities, hazardous and radioactive waste, etc.
(5) High risk engineering services such as those involving or relating to hazardous and radioactive waste, etc.

Risk management must be part of any project management plan. The purpose of this section is to identify the risks and to show that they can be reasonably managed such that the risk of loss bears a reasonable relationship to the benefits gained. Of these 5 risks, listed above, damage to property of third persons, although unlikely, is probably the greatest potential nuclear risk. This would occur if contaminants were released off-site. The decommissioning contractor would be responsible for the costs to the extent that third-party property would have to be cleaned up. The risk of occurrence is unlikely; however, should it occur, the cost of remediation could be quite high.

Injury to or death of third persons, due to decommissioning and remediation activities, is extremely remote. This could occur if the person received a high radiation dose or ingested significant amounts of contaminants. This is mitigated by characterization of the site prior

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to beginning work, radiological and hazardous material monitoring before, during, and after work, and by providing the worker with appropriate protection.

The real personnel risks associated with decommissioning come from the possibility of chemical or radiological exposure to either the workers or to the general population through unexpected releases. Although extremely remote, these are risks which, theoretically, could result in death or injury to workers or third parties. These risks can be controlled as well as quantified.

Two types of release situations can occur during decommissioning, depending on the decommissioning alternative selected. If the decision is made to leave the contamination in place, then any potential release will be essentially continuous, subject to day-to-day or year-to-year variations. This could occur through either wind resuspension or discharge through leaching to groundwater. This risk would also be of concern when performing work resulting in either the safe-storage or entombment decommissioning alternatives which leaves radioactive and hazardous materials on the site for an extended period. This risk would take the form of radionuclides migrating off-site and affecting third parties or their property.

If any other decommissioning alternative is selected, the release would be of short-period releases associated either with one event or with a short series of events. These releases may occur during digging, dismantlement, or demolition operations which are under control of the decommissioning workers. This is the type of release which would be of concern while performing decommissioning work.

The presence of contamination presents certain risks which can be evaluated in terms of exposure either to the public or to the decommissioning worker. The dose limit to man is based on the Environmental Protection Agency, National Response Center, and the Department of Energy (DOE) position; and is taken to be 15 mrem per year, whole body, above local background radiation for the general public, using realistic exposure pathway conditions.

Items to be considered with respect to risk during decommissioning, in order of increasing concern, are:

(1) Potential construction hazards

(2) Exposure to decommissioning workers

(3) Irreversible contamination of equipment

(4) Possibility of recontamination of the area following decontamination activities

(5) Increased exposure to the public

Much of the risk can be minimized by determining pre-existing conditions of the workers, of the work site, and of the area surrounding or adjacent to the work site. This is accomplished by characterization of the site and nearby areas and medical examinations of the workers. Measurement of changing radiological and chemical conditions during operations and control of contamination spread is a relatively routine practice for all decommissioning activities.

SECTION 5

DECOMMISSIONING OPTIONS

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5.0 DECOMMISSIONING OPTIONS

5.1 PURPOSE

The purpose is to safely and effectively decommission these facilities as efficiently as possible. This will require a combination of options based on the complexity of the facility and its associated hazards. Trailers, industrial structures, and administrative facilities may be simply moved offsite for reuse or demolished as fill material. Additionally, excess equipment from these facilities will be removed offsite, or dispositioned as waste. The contaminated facilities may be decontaminated, dismantled, and/or demolished to provide for the most effective minimization of the risks associated with these facilities.

It is planned that decommissioning will be conducted as a commercial project. Therefore the terminology used in the subsequent options analysis is that typical of commercial industry practices. The final decommissioning of the facilities will include a combination of dismantlement, demolition, and removal of the facilities and equipment.

5.1.1 Options Development

Alternatives should vary in their assessment of several topics, including decontamination versus disposal as-is, decontamination for dose reduction during dismantlement versus remotely operated dismantlement, decontamination methods appropriate to the contaminants present, special constraints such as space limitations and utilities available, and ability to meet cleanup standards. Other items that should be considered in the development of alternatives include secondary waste generation and its treatment, storage and disposal, cost/benefits, schedule for startup and operation, special health and safety concerns such as criticality, special nuclear material (SNM) handling, worker exposure, exposure to the public, and environmental protection during operations.

Each alternative should be developed in sufficient detail to allow objective evaluation and ranking against several evaluation criteria. Order-of-magnitude costs and schedules should be developed for comparison of the alternatives. When developing costs for each alternative, a common basis should be used and all costs, including surveillance and maintenance, engineering, capital equipment, waste treatment, storage, and disposal, secondary waste management, decontamination, and dismantlement operations should be included in the cost estimates. Life cycle cost analysis principles should be utilized.

5.1.2 Options

The four decommissioning options which are generally considered for decommissioning are (1) Continue with current action, (2) Safe storage, (3) Dismantlement, and (4) In place stabilization. Combinations of these options will be considered for each facility.

1. Continue with current action. Continue with work as outlined in the Baseline Environmental Management Report (BEMR). This is a 70 year project estimated to cost approximately $10 billion.

2. Safe Storage (SAFSTOR) - This option leaves the facility in place with surveillance required. Loose contamination is removed, temporary but rigid barriers are provided, and protective systems remain operational. The facility is unavailable for other uses. Eventually the building would require dismantlement.

3. Dismantlement (DECON) - The facility is totally dismantled with contamination removed to allow for unrestricted use.

4. In Place Stabilization - The facility is encased, covered, or removed to an entombed location. Contamination is fixed, physical barriers are provided, and surveillance is required in perpetuity. The site has restricted use.

The Criteria by Which Options will be Evaluated are:

- Cost to complete project for the given option
- Long term surveillance and maintenance (S&M) costs
- Schedule duration
- Risk associated with conducting activities
- Feasibility to complete activities (e. g., technology, waste, regulatory)

Using one option for all the site is likely not practical nor desirable. Rather, several features of the various options will likely be utilized to decommission some facilities. It should be recognized that options will be more specifically defined to consider the differences in degree of effort required to dismantle plutonium, uranium and clean facilities.

Table 5.1.1 Decommissioning Alternative Characteristics

Alternative	Facility status	Contamination Control	Potential use of site
Safe storage (SAFSTOR)	Leave facility in place	Remove loose contamination, provide temporary but rigid physical barriers, operate passive protective systems, surveillance required.	Restricted use of most of exclusion area around the immediate vicinity. Site is unavailable for other uses.
Dismantlement (DECON)	Fully decontaminate or remove facility	Reduce contamination to unrestricted level, no surveillance.	Unrestricted site
In Place Stabilization	Facility encased, covered, or removed to an entombed location.	Fix loose contamination, entomb facility, provide permanent physical barriers, surveillance required in perpetuity.	Restricted site

5.2 PROJECT PRIORITIZATION

When the decommissioning program has more surplus facilities available for decommissioning than the expected funding or execution workforce can accomplish, a priority system will be utilized to determine which projects should proceed first. The priority system that will be utilized is described below. It should be noted that the system is heavily weighted to accomplish the decommissioning of the facilities that will enhance regulatory compliance and risk reduction.

This priority system is for use by the decommissioning program to determine which project should receive priority over another decommissioning project. This system does not attempt to evaluate which of the plant facilities should be decommissioned first since the programmatic missions must determine which facilities can best meet their needs and in most cases the facilities that would be high on the decommissioning list would be the facilities that will have a programmatic need for the longest time.

The factors that will be considered when determining priority ranking of the decommissioning projects are:

Regulatory Compliance/Drivers

- DOE, Public, and Management Requirements
- Rocky Flats Compliance Agreement (RFCA)
- DOE Orders
- RCRA, CERCLA, NEPA

Reuse of Facility

- Economic Development
- Operation
- Interim Plan

Risk Reduction

- Current Hazards - (Water, IHSS, Contaminated Bldg. on Clean Area, Condemned Bldg.)
- Worker Hazards
- Potential Offsite Releases
- Weather Effects

Cost/Benefit

- Low Costs
- Rapid Success
- Cost Avoidance/Reduction
- Surveillance and Maintenance Costs After Deactivation

Available Resources

- Training
- Labor
- Technology/Approach

Site Visual Enhancement

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Site Specific

- Location (Inside/Outside PA)
- Compatibility with Site Plan/Deactivation/Interdependency
- Access to Facility (Physical and Radiological Constraints)
- Facility Status (Surplus, Near to Surplus)
- Waste Generation

In addition to consideration of these factors, if it becomes desirable to implement a weighting system that places more or less emphasis on certain factors a priority weighting guidance as provided by Table 5.2.1 can be used.

These guidelines can be used for assigning priorities to decommissioning projects, recognizing that the results are subjective and are based on available facility data and the experience of decommissioning personnel. The priorities identified in this manner are subject to change. In the interval between facility identification as a surplus facility and the initiation of decommissioning operations, a facility may be evaluated several times for alternate uses, or factors previously considered may change, for example, regulatory changes in law.

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Table 5.2.1 Priority Weighting Guidance

Consideration	Determination	Weighting Factors (a)
Facility or Space Reuse	Programmatic Need	Go/No Go
Regulatory Compliance/Drivers	DOE, Public, Site Mgmt.	10
Risk Reduction	Risk Analysis	10
Available Resources	Funding, Labor	8
Site Specific Requirements	Characterization	7
Cost	Cost-Benefit Analysis	6
Site Visual Enhancement	Programmatic	5

(a) The weighting factor is an arbitrary scale from 0 - 10, with 10 being the highest priority. A Go/No Go decision overrides any weighted evaluation.

PRIORITIZATION NUMERICAL RANGE EXPLANATIONS

Regulatory Compliance/Drivers
7-10 CERCLA non-time critical or RCRA closure
3-5 No CERCLA or potential liability

Risk Reduction
7-10 High Potential of Personnel Exposure
4-6 Good-Fair Facility Condition/Low Exposure
1-3 No Exposure/Underground

Cost (Annual)
5-6 <$1 million, Decommissioning; >$2 million S&M
1-5 >$10 million, Decommissioning; <$500K S&M

Available Resources
7-8 Funding available, labor available
6-7 Funding available, labor requires training
3-5 Funding available, labor temporarily unavailable
0 Funding unavailable

Site Visual Enhancement
4-5 Work site visible to offsite population
3-4 Work site visible to onsite workers
1-3 Underground or low visual enhancement

Site Specific Requirements

6-7 Work in process for previous year
4-6 Characterizations complete
2-4 Non Decommissioning Operations occurring

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6.0 TECHNOLOGY

In general, decommissioning at RFETS can be accomplished with existing technology. However, this technology can always be improved upon and new technology is continually developing. Decommissioning will be supported by a Technology Applications Group. The role of the Technology Applications Group will be to identify decommissioning technologies that will lower costs by reducing waste, increasing productivity, reducing personnel protective equipment requirements, lowering radiation levels, and improving worker safety. The overall strategy will be to constantly look at costs associated with decommissioning and identify areas for continual improvement.

Numerous technologies are required for decontamination and decommissioning. The required technologies can be grouped into the following areas:

Specialized Decommissioning Equipment
Size Reduction
Decontamination
Contamination Control
Non-Destructive Assay

Many studies have been performed outlining potential technologies for these areas. The following is a short summary of some of these technologies and in some cases the secondary waste generation associated with using the technology.

6.1 Specialized Decommissioning Equipment

In addition to the use of a large number of standard decommissioning and dismantlement tools, materials, equipment, and services, some specialized equipment is typically required for decommissioning activities. Some of the specialized equipment available is described in the following sections:

1. High Efficiency Particulate Air (HEPA)-Filtered Ventilation Systems

Decontamination operations and the disassembly/segmentation of radioactively contaminated items will require the application of contamination control devices and methods.

Existing facility HEPA-filtered systems, if they exist and are operational, should be maintained to provide contamination control coverage. When the facility system is no longer needed, it is dismantled, using its own filtering capability to control the spread of contamination during its dismantlement.

Existing facility HEPA systems may not always provide adequate contamination control for localized uses. Portable HEPA-filtered ventilation units are then used to provide additional contamination-control and ventilation, either in conjunction with the facility systems or as independent systems. Unless monitored for contamination in their exhausts, these units are exhausted into the existing facility HEPA-filtered ventilation system to ensure against the release of contamination to the building interior. High-efficiency HEPA-filtered vacuum cleaners will also be utilized for small volume contamination control, as well as for loose surface decontamination operations. These units normally exhaust to the building interior without monitoring of their exhaust.

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2. Abrasive Decontamination Equipment

Surface decontamination operations are a major part of the overall decommissioning effort. Aggressive decontamination methods are generally required to remove existing surface coatings, such as paints, varnishes and similar fixatives, as well as base layers of the surface material, which may also contain embedded contamination. The following decontamination equipment is recommended on the basis of efficiency, production rates, and contamination control. Depending on the specific application, equipment may require modification to assure that contamination control is fully implemented. The use of decontamination liquids should be strictly controlled to minimize the volume of liquids requiring processing. Used decontamination liquids generated in areas that are contaminated with fissile material will be collected and stored in criticality-safe containers.

Blastrac Machine - The Blastrac machine is an all-purpose cleaning tool for concrete floors. It can efficiently remove materials such as paint, dirt, grime, and embedded chemical contaminants. The delivery system consists of an enclosed centrifugal blast wheel in the cleaning head. As the wheel spins, metallic abrasive shot are fed into the center and hurled from its blades to blast the floor surface. The abrasive media and contaminants rebound into a separation system which removes the contaminants to an attached dust collector and automatically recycles the abrasive media for reuse. The travel speed of the unit and the shot size both may be adjusted, depending on the required depth of removal. The slower the machine travels, the deeper the etch it creates. Since the shot and dust are collected, a radiological survey of the surface being decontaminated may be performed immediately. Any residual metal shot remaining on the floor should be collected quickly with a magnetic broom.

Experience using the shot blasting technique (Blastrac), has shown that concrete floor surfaces can be removed at a rate of 80-100 ft. per hour. The success of removing contaminants on a first pass is about 80% of the surface area. Further, the remaining 20% takes approximately the same amount of time to complete as the first pass took for the entire area. This will leave some random hot spots which should take approximately 20% of the total time spent, to complete.

The removal rate for a complete area is then: approximately 30-40 ft./hr. using this technique. To date this technique has shown to be the most efficient and least costly.

Using this technique to decontaminate walls is not practical due to the size and weight of the Blastrac unit. There are smaller hand-held units which can efficiently be used to decontaminate small areas (i.e., hot spots). This is not efficient for use on large scale or complex geometric wall surfaces.

Vacu-blast Machine - The Vacu-blast machine uses compressed air to convey abrasive media from a pressure generator via an adjustable feed valve through a hose and blast nozzle to discharge against the surface of the item being cleaned. The media is concurrently vacuum-recovered at the point of impact. Air then conveys the media, dust, and debris to the reclaimer where it is air-washed and the media is returned to the system for recycling. The dust and debris particles are drawn to a secondary cyclone separator and deposited in a collection cylinder. The depth of sabrasion is controlled both by adjusting the shot size and travel speed of the unit. This equipment can be used on vertical surfaces.

Scabbling - Scabbling, as a decontamination technique for concrete surfaces, has a long history of success. It was used extensively in the Three Mile Island accident recovery program. This technique utilizes tools that have 1-, 3-, or 7-bit piston heads, equipped with multipoint tungsten carbide bits. The pneumatically operated tool drives the bits against the concrete surface, which causes the surface to abrade. The pistons for the larger units are mounted in a wheeled chassis to accommodate extensive and unimpeded surfaces. A hand-held unit can be utilized for edging near wall surfaces and other obstructions. Scabbling also has limited application on vertical surfaces. This is used in conjunction with a HEPA filtered vacuum system.

Abrasive Decontamination of Piping Internals - For abrasive honing of pipe interior surfaces, a 'roto-rooter' device, such as the Flex-hone honing machine, is used in rotationally driving a honing device, which utilizes a choice of abrasive materials and grit sizes and is moved through the pipe to be cleaned. The abraded material can be simultaneously or post-operationally flushed.

High Pressure Water - Internal pipe surfaces are cleaned by a combination of aggressive abrasion and high-pressure water flushing. Washing and flushing operations are performed with a hydroblaster which delivers up to 10,000 psi water through nozzles specially designed to move themselves through the pipe by virtue of their water jet directions. Nozzle design choice includes rotational capability.

Ultra High Pressure Water - Ultra-high pressure (UHP) water can be used to scarify concrete and to remove oxidization, paint, and waxes from contaminated surfaces. Water is applied to the contaminated surface with a hand-held lance. The operating pressures can be varied from 10,000 to 50,000 psi. Removal rates depend on the standoff distance from the surface being cleaned, the physical properties of the contaminated material, the roughness of the surface, and the rate of movement. This technique requires the collection and treatment of contaminated water.

Water Treatment Support Equipment - Water treatment is required to minimize the accumulation of contaminated liquids from decommissioning tasks. Particulate filtration is accomplished with cartridge-matrix multiple filter units, sized to provide water of sufficient quality to permit its reuse in subsequent decontamination tasks. Additional water treatment can also be provided by the use of appropriately sized ion exchange resin columns.

CO_2 High Velocity Blasting - The process delivers a variable, high-velocity stream of solid CO2 pellets to clean or strip a substrate. By adjusting the pellet parameters (size, hardness, velocity and quantity) it is possible to clean a wide spectrum of surfaces ranging from plastic films to steel. Upon impact, these pellets sublime and thus disappear as they return to their natural state in the atmosphere, while the contaminant falls from the cleaned surface.

Crystalline Ice Blasting - This technology uses low pressure air and ice chips to remove loose and fixed contamination by the process of impaction, and crack formation/propagation. The process generates approximately 10-15 gallons of water per hour which must be collected and processed.

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Fibre Media Blasting - This process delivers a variable, high-velocity stream of fibre media to remove loose and fixed contamination. A vacuum system collects the spent media, reconstitutes the media and then recycles it. Of all the "blasting" technologies this creates the least amount of secondary waste. System can be used with vapor injection which produces a cloud of high temperature moisture particles that provide dust control, and rapid evaporation of the moisture.

6.2 Size Reduction Equipment

Volume reduction of radioactive waste is a major part of the economics of decommissioning projects. Three volume reduction methods for solid radioactive waste are briefly described below.

Plasma Arc Cutting - Segmentation of large metal pieces, including process equipment, can be accomplished with plasma arc cutting equipment. This technique creates smoke and fine particulates that tend to clog HEPA fillers.

Mechanical Cutting Equipment - If modification or removal is required, it can be efficiently accomplished by utilizing powered equipment. The waste from using this technique consists of metal fines, saw blades and the saw itself. The following specialized equipment is often used:

- Power tear-off machine
- Power-bladed covering removal (e.g., tile, roofing, tar paper)
- Sectioning saw

Laser - New technology. This method is considerably faster than the sawsall and produces considerably less smoke than the plasma arc. The laser has a finer cutting kerf than the plasma arc. Its draw back is in the upfront capital cost, size of the laser generator and poor portability.

Shredder - This equipment will shred an appreciable percentage of the contaminated materials associated with the decommissioning project. The following are typical shreddable materials: electrical conduit, small-diameter piping, desks, chairs, benches, stud-and-plaster walls, sheet metal, and masonry block.

Compactor - This equipment, which can be a subassembly to the shredder, compacts waste into boxes, obtaining volume reduction factors of up to 10:1, depending on material.

Baler - This equipment compacts waste at a reduction ratio up to 17:1, depending on material, and produces a baled waste form. This is typically used for clothing, paper, filters, and other soft compatible materials.

6.3 Decontamination Processes

6.3.1 Decontaminating Embedded/Underground Radioactive Waste Drains

Radioactive waste drain lines buried below the floor level may be internally decontaminated by applying high-pressure water through hydro-driven nozzles. The nozzles are directed into the opening of each drain until it is cleared. The water utilized in the decontamination operation will require treatment with a filtration/holding system and/or water treatment

equipment and will be recycled for reuse in subsequent operations. When this decontamination operation is complete, the clean condition of the piping interior can be verified with a radiation detection instrument remotely manipulated through the piping. If necessary, a flex-hone can be inserted into the pipe (at each trap including vent-lines) and the pipe further decontaminated. The pipe will again be examined for radioactivity with a remotely-manipulated detector. Any residual contamination present will be assumed to be fixed. If the lines have no detectable contamination after the above two operations, they could be considered for plugging and abandoning in-place. If fixed contamination is still present, the lines will require excavation and removal for disposal as radioactive waste.

6.3.2 Chemical Milling

Cerium IV is a chemical milling process that removes the radioactive contamination located on the surface and trapped in the pores of the metal. The secondary waste is radioactively contaminated acid solutions containing nickel, chrome, and radioactive particles. The secondary waste solution will be considered Low Level or potentially Low Level Mixed. The solutions will have to be neutralized and subsequently processed through Liquid Waste Operations in Building 374 or 774.

BNFL plc decontamination process like Cerium IV is a chemical milling process for removing both smearable and fixed radioactive contamination from metal surfaces. The process allows for recycling of the chemical solution, thus lowering the amount of secondary waste generated during decontamination.

6.3.3 Strip Coatings

Strippable coatings are used to remove surface contamination. The coatings are non-hazardous and are disposed of as line generated plastic waste. The waste generated from a Building 707 test using TLC strip coating turned out to be Low Level.

6.3.4 Electro Decontamination

Electro decontamination (also called electro-polishing) involves the oxidation and removal of the top surface layers of the metal substrate. The radioactive contamination is thus removed along with a very thin layer of the metal surface. The type of waste generated depends on the electrolyte and how much of the surface of the metal is removed.

6.3.5 Solidification, Absorption and Filtration of Liquids

Small amounts of liquid may be generated during operation. Most liquid wastes resulting from these activities will contain relatively small quantities of radioactive and/or chemical contaminants.

Low-level aqueous wastes from which it would be too expensive to remove the radioactive contaminants should be solidified prior to disposal. These liquids will be primarily water that was utilized for decontamination of piping and surfaces. Solidification can be performed by placing approximately 30 gallons of waste in a 55-gallon drum and neutralizing it with an acid or base, if necessary. The contents of the drum are mixed while adding cement and expanded mica (filler) until the mix level is within a few inches of the top of the drum. Each drum requires approximately 100 pounds of concrete and 50 pounds of filler. The mix is

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allowed to set up for one to two days. The contents of the drum will become a monolithic mass containing a negligible amount of liquid.

As an alternative to solidification, some low-level aqueous wastes may be decontaminated by treatment with a filtration/holding system or with water treatment equipment. After certification for unrestricted release, the treated water can be discharged into the sanitary sewer system in accordance with local, state, and federal regulations. The captured residue from the water treatment will be solidified as described above. Contaminated organic liquids such as pump oil, solvents, etc. can be absorbed with appropriate solidification agents which are acceptable for disposal at radioactive waste disposal sites. The resultant solid material is then packaged in 55-gallon barrels. This operation can be performed using a motor-driven cement mixer.

6.4 Specialized Services

Specialized services are required to support decommissioning activities and include:

(1) Medical services to supply emergency services and to perform pre-employment, periodic, and termination physical examinations.

(2) Health physics coverage to monitor all work activities. Analytical capabilities will support the Health Physics technician's daily activities, as well as specific sample evaluation.

(3) Analytical services for industrial hygiene and radiological safety.

(4) Employee training, instrument calibration, and emergency preparedness.

(5) Respirator Cleaning Service - Self-contained breathing apparatus (SCBA), supplied air/airline and negative pressure respirators are commonly used on decommissioning projects when airborne contamination is expected or present. Respiratory devices must have been tested, approved and certified by the National Institute for Occupational Safety and Health (NIOSH), and meet the requirement of ANSI Z88.2.

Frequently used respiratory protection devices are to be cleaned, disinfected, filters replaced, and repaired, as often as necessary. This activity should take place in a clean, controlled area at the job-site. The work station is generally manned by one or two laborers, depending on the workload, and a health physics technician who monitors the radiological conditions of the equipment. This is generally a part-time operation. Contractors who provide health physics technicians generally provide this service as well.

(6) Laundry Service - Considerable laundry is generated by decommissioning workers. Clothing will be shipped offsite to facilities that are licensed to process contaminated laundry. As an alternative, a portable laundry can be brought to the site. The choice is generally determined based upon the location of the job-site and the proximity to the laundry and the capabilities of other subcontractors on site.

(7) Bioassay - Requires a laboratory with specialized low-level counting capabilities. Helgeson Scientific Services provides a mobile system which must generally be scheduled up to six months in advance. DOE laboratories and utilities generally have

a whole body counting capability. When working in uranium contaminated facilities, it is necessary to have a uranium lung-count. Bioassay samples from decommissioning workers are also collected and must be analyzed routinely and whenever contamination through inhalation or ingestion is suspected.

(8) Asbestos Abatement - Because of the vintage of the facilities being decommissioned, the presence of asbestos is virtually a certainty. The removal of asbestos requires a licensed abatement contractor and they will be required to undergo radiation training prior to beginning their work.

6.5 Contamination Control Equipment

Good radiological control practices require containment of loose contamination. During decommissioning, certain work evolutions will require the segmentation of components, the demolition of concrete, and the opening of process systems, which may disturb residual contamination. Typical contamination control measures, including containment envelopes, surface fixatives, and localized ventilation, are described below.

Tents - Containment tents are effective for controlling the spread of airborne and surface contamination with larger work pieces and equipment. The enclosures are usually fabricated from reinforced plastic fabric attached to externally framed aluminum pipes and scaffolding clamps or to structural framework. Personnel and equipment entrances are controlled with self-latching fabrics or zippers. Clear plastic panels can be added for surveillance purposes or to reduce the need for internal lighting. These enclosures are maintained under negative pressure. Standard practice is to evacuate the enclosure through HEPA filters, using either the building's ventilation system or an appropriately sized auxiliary system.

Glove Bags - Glove bags can be selected from vendor catalogues or fabricated at the jobsite from Herculite or similar materials. These bags can be equipped with glove ports and sleeves for HEPA-filtered ventilation and for pouch transfer. A variation of the glove bag, plastic sleeving, or tubing can be used for segmenting contaminated piping. Immediately after segmentation, the sleeving is extended over the cut surfaces and sealed. The bags may also be equipped to utilize drains and other external devices or functions. Their use has consistently proven to be both cost effective and in accordance with ALARA principles. Their utilization establishes a contamination control barrier between the worker and the work environment, as well as limiting that environment to a minimum volume. The manufacturers of these products provide detailed instructions for their use. In addition, their proper utilization will be ensured through training programs and procedures.

Surface Fixatives - It is sometimes prudent to protect clean work area surfaces before radiological work is initiated, or to fix other transferable contamination on surfaces to be handled. A good quality fixative on porous surfaces is helpful in contamination control. Wrapping items with plastic sheeting and applying strippable coatings are additional means of adequate surface protection which may be utilized.

Spray application of strippable coatings, such as ALARA 1146 and ISOLOCK 300, can be used with subsequent physical peeling of the coating from the surface with

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any loose or weakly adhering contamination. These coatings are approved for disposal at low-level Radioactive Disposal sites and do not generate a mixed waste.

Electrophoresis - This process is proposed for removing airborne contamination by charging the airborne particals and then collecting them on an oppositely charged plate/conductor. The secondary waste will be a radioactively contaminated, carbon impregnated polyethylene foam pad (Low Level, plastics).

6.6 Non-Destructive Assay (NDA)

Radiological Assay is necessary to quantify the amount of radioactive contamination that is present as either fixed or smearable. In addition, gamma and neutron scans are required to determine the quantity and location of radioactive holdup in process equipment. For equipment that has suspected hazardous constituents, destructive analyses may be required. The secondary waste generated during characterization will consist of smears (Low Level, combustibles), alpha probes and instrumentation (Low Level, light metals) and analytical laboratory waste (Low Level Mixed, liquids and solids).

Long Range Alpha Detector - A new technique for determining alpha contamination level in pipes, ducts and closed systems is the Long Range Alpha Detector development by Los Alamos National Laboratories with industrial partners. The technology consist of flowing calibrated gas through a piping system and measuring the ionization of the gas. This technology has promise for radioactive characterization of piping, ducts and conduit systems prior to size reduction.

SECTION 7

DECOMMISSIONING PROJECT ACTIVITIES

7.0 DECOMMISSIONING PROJECT ACTIVITIES

7.1 Decommissioning Planning

7.1.1 Decommissioning Operation Plan (DOP)

Decommissioning Actions may be implemented by utilizing a DOP to address high risk concerns not addressed in sufficient detail in the DPP.

The decommissioning process for high risk facilities, as illustrated in Figure 2.1.1, indicates that a facility/site specific Decommissioning Operations Plan (DOP) will be prepared for regulatory review.

It is intended that the DOP contain sufficient information that regulators can be satisfied that the project can proceed with a high certainty of success. The characterization report, safety analysis and risk assessment will be incorporated as appendixes to the DOP.

These actions shall be implemented in a manner in compliance with the applicable requirements of CERCLA, RCRA corrective actions, CHWA and other environmental laws. This document will reference the health and safety plan.

The DOP shall contain a summary description of the building or unit of interest; a summary of risks; a discussion of approaches; a summary of the selected methodology; identification of standard procedures to be utilized; a summary schedule without enforceable milestones; completion criteria; and identification of the Applicable or Relevant and Appropriate Requirements (ARARs) that are specific to this action. DOE may propose to combine several similar actions in one DOP to facilitate a more efficient process. Similar actions are defined as actions which involve similar contaminants and similar response techniques. The Decommissioning Operation Plan is meant to be a management plan. The hierarchy which illustrates the DOP relationship to detailed actions or procedures is shown in Figure 2.1.4. The DOP may utilize other documents by reference.

Contents for the DOP

- Description of building or unit. This is a summary description, detailing the areas involved.
- Characterization Report Summary - This will include information on characterization and process knowledge.
- Summary of approaches and selected methodologies. This section will identify the decommissioning process and document the selection criteria.
- Summary of risk, hazards analysis and Health and Safety Plan.
- Procedures. This section identifies procedures to be used to complete the action.
- Schedule. This is a proposed schedule without enforceable milestones.

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- Completion criteria. This documents the cleanup level and identifies the final site condition.
- Final survey Plan
- ARARs. The ARARs will be specific for the action to be taken.
- QA/QC process pertaining to the review of procedures.
- Waste handling
- Cost

7.1.2 Decommissioning Project Plan

For the majority of the facilities to be decommissioned, a DOP will not be required as they are considered to be low risk and in many cases are not contaminated. For these facilities, a project specific plan will be prepared. This plan may be very simple and will reference existing site procedures for implementing the work.

7.1.3 Project Health and Safety Plan

The Health and Safety Plan (HASP) establishes the appropriate Health and Safety Program and Procedures which will allow the decontamination and decommissioning project to proceed in a quality manner while minimizing the potential for employee exposure to incidents/risks. A single Program level HASP will be developed to cover all decommissioning projects. Project specific health and safety issues will be addressed by the Decommissioning Safety Analysis and a job specific health and safety plan.

It is company policy to provide to all employees and subcontractors information and procedures for the safe and healthful conduct of projects. Employees working on decommissioning projects are required to follow the procedures set forth in the HASP plan. Subcontractors are also required to abide by the health and safety procedures outlined in the plan. Each employee will be encouraged to bring to the attention of his/her supervisor any unsafe or hazardous condition that is observed while carrying out project responsibilities so that the situation can be corrected and project employees advised of an improved procedure.

It is impossible to anticipate all specific safety and health hazards beforehand; therefore, all field personnel must exercise common sense and good judgment in their approach to a given situation. Personnel training will assist in preparing individuals to recognize hazards. The HASP Plan incorporates appropriate rules, guidelines, and recommended work practices.

Advice on health matters (occupational health, radiation protection, industrial hygiene and safety) is available through the RMRS EHS&Q Manager. If there is any doubt about the safety or health impact of any situation, and information is not readily available from the Radiation Protection and Occupational Safety Officer (RPOSO) advice should be sought from the EHS&Q Manager.

The H&S plan will be consistent with applicable guidelines, regulations, and consensus standards provided by the Department of Energy (DOE), Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), National Institute of Safety

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and Health (NIOSH), American Industrial Hygiene Association (AIHA), American Conference of Governmental Industrial Hygienists (ACGIH), and the ES&H Manual. The Health and Safety Plan shall address the following:

1. Name key personnel and alternates responsible for site environment, health and safety;
2. Describe the hazards associated with each decommissioning operation at the site;
3. Require that personnel are adequately trained to perform their responsibilities and to handle the specific hazardous situations they may encounter;
4. Describe the protective clothing, respiratory protection and other equipment to be worn during various site operations;
5. Describe any site specific medical surveillance and bioassay requirements;
6. Describe the program for periodic air monitoring, personnel monitoring, and environmental sampling;
7. Describe the actions to be taken to mitigate existing hazards to make the work environment less hazardous;
8. Define site control measures and include a site map;
9. Prescribe decontamination procedures for personnel and equipment; and
10. Prescribe Safety Procedures for site activities.
11. Emergency Response Procedures

7.1.3.1 Decommissioning Safety Analysis

A decision-based approach for documentation of safety analysis for decommissioning facilities which focuses on maximum use of the graded approach and the condition of the facility after completion of deactivation activities will be approved for each facility. For facilities approaching decommissioning, the safety documentation will be based on the activities remaining during decommissioning field activities. Documentation provided on facility operations that were terminated will be the minimum necessary to demonstrate the safety of the facility during decommissioning field activities. Figure 7-1 shows the decision-based approach for safety documentation of facilities scheduled to undergo decommissioning. Elements of the decision-based approach, along with a comparison of the proposed approach to existing guidelines, is presented below.

Step 1 - Review Existing Operational Hazards/Safety Documentation

The first step of the decision based approach consists of reviewing the existing operational hazards/safety documentation. The review of existing safety documentation will focus on the factors used to formulate the existing Hazard Category to determine whether they are appropriate to support initiation of deactivation activities. Generally, the safety documentation for the operational facility will not have to be revised prior to initiation of deactivation activities; the operational envelope should be sufficient to address accidental conditions that may occur during deactivation.

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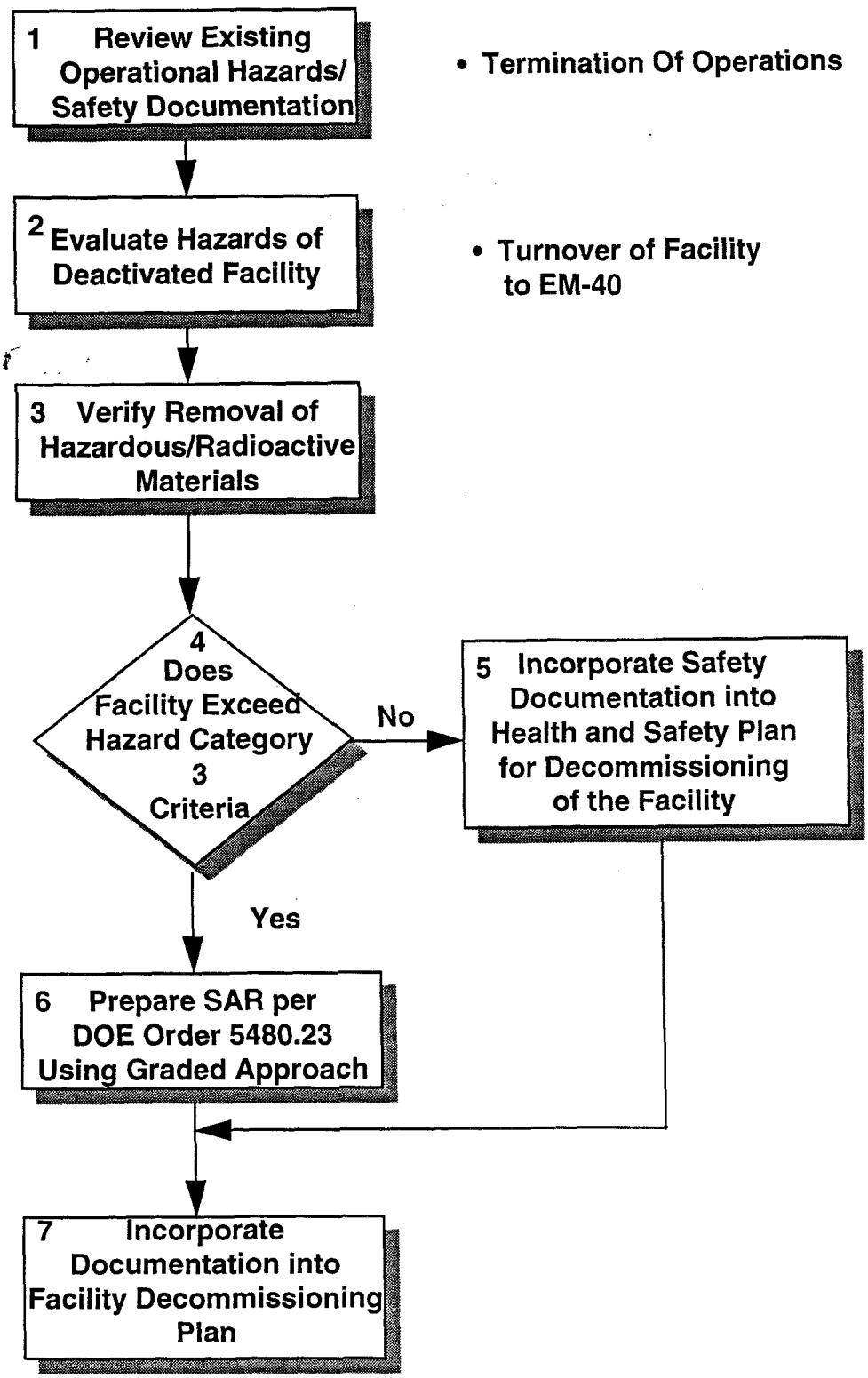
Figure 7-1

DECISION-BASED APPROACH FOR SAFETY ANALYSIS FOR DECOMMISSIONING ACTIVITIES



Step 2 - Evaluate Hazards of the Deactivated Facility

The second step of the decision-based approach encompasses evaluating hazards of the deactivated facility. As discussed earlier, deactivation activities address removal of nuclear and hazardous material from the facility. The types of hazards that are expected to be encountered after completion of Deactivation consist primarily of radiological exposure and occupational hazards (i.e. physical hazards). A thorough review of the remaining hazards is needed to ensure proper classification of the facility.

Step 3 - Verify Material Inventory

The third step of the decision-based approach includes verifying that the majority of radioactive and hazardous materials have been removed from the facility. This step should be performed at the time of acceptance of the facility by EM-40. There may be instances where EM-40 accepts a facility prior to completion of deactivation activities. As such, the material inventories of the facility should be documented accordingly for identification of potential accidental conditions and proper classification of the facility.

Step 4 - Determine Whether Facility Exceeds Hazard Category 3 Criteria

The fourth step of the decision-based approach focuses on determination of the Hazard Category of the facility. The Hazard Category of the facility will determine the type and level of safety documentation to be completed for a facility scheduled to undergo decommissioning and will use the graded approach to the maximum extent possible. Because of the removal of nuclear and hazardous materials during deactivation, it is anticipated that the majority of facilities to undergo decommissioning will qualify as less than Hazard Category 3. The hazards of the facility are evaluated and subsequently documented in the remainder of the decision-based approach.

Step 5 - Incorporate Safety Documentation Into Health and Safety Plan

The fifth step of the decision-based approach encompasses documenting results of the hazard classification process in the Health and Safety Plan for decommissioning of the facility. The Health and Safety Plan for decommissioning of a facility addresses the occupational hazards and radiological exposure issues that would be encountered during decommissioning activities. In addition, the Health and Safety Plan addresses administrative requirements associated during implementation of field activities. If the facility does not exceed the Hazard Category 3 threshold, the Hazard Classification is documented in the Health and Safety Plan and addressed as necessary to support decommissioning field activities. For facilities that still exceed the Hazard Category 3 criteria the safety analyst will perform the sixth step of the decision-based approach; preparing a SAR. The fifth step would not be applicable for those facilities that exceed the Hazard Category 3 threshold of the decision-based approach.

Step 6 - Prepare Safety Analysis Report Per DOE Order 5480.23

If, at the beginning of decommissioning the facility exceeds hazard category 3 criteria, then the sixth step of the decision-based approach will be implemented which entails documenting results of the safety analysis process in a SAR prepared in compliance with DOE Order 5480.23 using the graded approach. The review of safety conditions for the facility, radioactive and hazardous material inventories, Hazard Classification, and other elements of the safety analysis process, as required, will be integrated into formal documentation. The level of detail associated with the 21 elements of a SAR should be based upon the graded approach.

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Step 7 - Incorporate Safety Documentation into Project Documentation

The seventh, and final step of the decision-based approach consists of incorporating the safety documentation into the decommissioning project documentation. Both the Health and Safety Plan and the SAR should be incorporated into the Decommissioning Operations Plan for the facility. It is anticipated that for a majority of the facilities to undergo decommissioning only a Health and Safety Plan will be required; a SAR will not be required to be completed due to the level of hazards to be encountered during decommissioning field activities.

7.1.4 Quality Assurance Project Plan

A Single Program Level Quality Assurance Program Plan (QAPP) is developed to cover all decommissioning projects. The QAPP includes the following: organizational structure; responsibilities and reporting relationships, periodic review of the program for effectiveness; management reporting; planning; project team and client interfaces; design control; operations control; health and safety; personnel selection qualification, indoctrination and training; document control; procurement and subcontractor control; material identification and control; radioactive and toxic waste monitoring and control; equipment calibration and maintenance; inspections and tests; control of nonconforming items; procedures and instructions; special process and test control; corrective action; audits; and records.

The QAPP is implemented by detailed project, design, health physics and safety, procurement, quality assurance, administrative, and field operations and training procedures.

7.1.5 Characterization Plan

A Decommissioning Characterization Plan will be developed and implemented to assure adequate characterization of all facilities planned for decommissioning. The purpose of characterization is; 1) to quantify the physical and chemical characteristics of radiological and hazardous material contamination and the extent of contamination; 2) to quantify parameters that affect potential human exposure from existing and residual contamination; and 3) to support evaluation of detailed decommissioning planning including decontamination and waste packaging.

The Characterization Plan describes the methods used for characterization of contaminated sites and facilities. Characterization activities include a review of the site historical, process and construction records; a site walkdown; collection of background samples/data; collection of samples in selected areas for analysis; drainage path samples/data; systematic and bias surface chemical and radiological readings including alpha, beta, gamma, and specific chemicals; documentation of prominent landmarks and room obstructions; and collection of surface smear samples.

The Characterization Plan provides the framework for all field work necessary to evaluate the current radiological and hazardous waste conditions of the site. If the activities associated with radiological characterization indicate a potential for the presence of either hazardous chemical or biological agents, full characterization for the contaminants must be planned prior to commencement of decommissioning field activities. The Characterization Plan will be implemented in accordance with Section 7.2, Characterization.

7.1.6 Waste Management Plan

A Waste Management Plan will be developed and implemented to assure the efficient disposition of waste materials generated from the decommissioning effort. This plan will ensure proper classification, treatment, volume reduction, storage, transportation, and disposition of waste materials in accordance with applicable regulatory requirements. This plan will also provide the basis for documentation requirements.

7.1.7 Alternative Assessments

Assessments may be required from time-to-time to evaluate alternative approaches to decommissioning, alternative technologies, alternative processing techniques, etc. Selection of alternatives will be supported by cost-benefit analysis.

7.2 Characterization

The decommissioning of a nuclear facility requires that the radiological and chemical condition of the facility be assessed. Characterization can be achieved through a combination of direct measurement, sample taking with laboratory analysis, and physical observation. Because of the vintage of the RFETS, characterization must also include identification of hazardous materials, asbestos, mixed waste (radiological and hazardous combined), and, in some cases, biological waste.

Characterization performed to support decommissioning activities will have as its basis the characterization results determined at the close of facility deactivation. This condition will identify any quantities of residual SNM and its location, gross presence and location of loose and fixed contamination, and location and content of any stored material, if any. The location and structure of RCRA units which have not been closed will also be identified prior to turnover to decommissioning.

The results of the characterization activities will be used to support decision making both prior to beginning a decommissioning action as well as throughout the decommissioning process. As such, this data must be readily available to decision makers and decommissioning workers. The characterization results will be included as part of Decommissioning Operation Plans (DOP) for high risk facilities and will be included as part of IWCPs for those projects not requiring DOPs.

Decommissioning operational decisions will be based upon the characterization data obtained. Radiological and hazardous waste characterization of facilities, internal systems and support facilities is required to provide a basis for the development of the technical approach to decommissioning and to develop detailed cost estimates.

Characterization will be an ongoing program throughout the decommissioning process. The result will be used as a general performance indicator to assess the effectiveness of the overall facility decommissioning. The data will also be utilized for radioactive waste management, assessing potential hazards, during the decommissioning work, and supporting the unconditional release of waste material.

Characterization will include the following:

1. Review drawings, specifications, and facility documents.
2. Review operational history, including process upsets or unusual events, and type of radiological and hazardous materials used.
3. Interview site personnel.
4. Prepare procedures and conduct radiological and hazardous material surveys.
5. Identify hazardous materials.
6. Identify asbestos-containing materials.
7. Collect samples for laboratory analysis.
8. Review and interpretation of data results.
9. Implementation of a data quality management program.
10. Preparation of a characterization report.

7.2.1 Radiological Characterization

The radiological characterization survey will be designed such that areas with higher potential for contamination receive a higher degree of survey effort, thus the process will be both effective and cost effective. The radiological characterization will be conducted to determine the extent, volume, and nature of contamination. An important secondary objective of the characterization is to identify any routes by which contamination may have migrated into the soil or beneath concrete floors.

Two classifications of areas will be used to design the characterization survey. These classifications are defined as follows:

- Affected Areas: Areas that have potential radioactive contamination (based on process history) or know radioactive contamination (based on past radiological surveillance).

- Unaffected Areas: All areas not classified as affected. These areas are not expected to contain residual radioactivity, based on knowledge of the facility and previous survey information.

Surveys will be performed by trained individuals who will follow standard written procedures and use properly calibrated instruments that are sensitive to the suspected contaminants. All aspects of the survey, including survey package preparation, actual sampling, recording of sampling information, and the analysis of samples will be proceduralized.

7.2.2 Sampling Protocols

The characterization will be performed at biased sample locations, selected to estimate worst case conditions. These locations will be selected on the basis of suspected contamination as determined from operational and unusual events revealed by historical review. Samples of media will be taken in accordance with a written plan for each project. A review of IHSS and sampling processes will be performed and further actions, if required, will be coordinated with the Environmental Restoration Organization. A few samples may be taken at below-surface depths to assess the extent of contamination penetration, particularly where wet operations were conducted or where there are expansion joints or cracks in the floor. Since most operations were conducted dry, there were few mechanisms for penetration into structural materials. The sampling effort will be geared to locating hidden contamination.

Specific sampling and measurement requirements, sample locations, and measurement documentation will be specified in individual characterization packages.

7.2.3 Portable Survey Instrumentation

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Portable survey meters and radiation counting systems used for analysis of the characterization samples will be calibrated using sources traceable to the National Institute of Standard and Technology (NIST), or equivalent. This approach to instrument calibration will continue throughout the decommissioning effort. Specific procedures for the operation of field instruments and data collection will be issued prior to characterization.

7.2.4 Data Quality Objectives

Data Quality Objectives (DQOs) will be established during the design of project specific characterization plans in accordance with approved procedures. The fundamental questions that must be considered when establishing DQOs include the types of contaminants suspected, what level constitute "contamination," current state of analysis sensitivity, and how the data will be used. Based on project specific needs DQOs will be established and typically include kinds of samples or measurements required, required instrument sensitivities, sample sizes, number of samples/measurements, QA requirements and data reduction, validation and reporting requirements.

7.2.5 Quality Assurance/Quality Control

Analyses of characterization samples will be performed under an approved Quality Assurance/Quality Control (QA/QC) program. The QA/QC program is needed for the following reasons: (1) to identify deficiencies in the sampling and measurement processes to those responsible for these operations so that corrective action can be taken, and (2) to obtain some measure of confidence in the results of the monitoring programs in order to assure the regulatory agencies and the public that the results are valid.

Written procedures will be used for sample collection; packaging, shipment, and receipt of samples for off-site analysis; preparation and analysis of samples; maintenance, storage, and use of radioactivity reference standards; calibration and checks of radiation and radioactivity measurement systems; and evaluation, and reporting of data. Data will be reviewed and compared to the Data Quality Objectives (DQOs) and project specific requirements to determine their use to support project decisions.

7.2.6 Background Radiation Determination

Residual radioactivity will be presented in terms of activity levels above normal background, therefore it will be necessary to determine the background radioactivity levels from naturally occurring radioactive materials and global fallout from the testing of nuclear devices. Because the background levels will be subtracted from total radioactivity levels to determine the net residual activity from facility operations, it will be necessary that the backgrounds be determined with a detection sensitivity and accuracy equivalent to data from which it will be subtracted.

Background levels of radiation will be determined principally by taking radiological measurement, at an area (or areas) that have not had a history of radioactive material operations. Backgrounds will be determined for similar building construction materials. The sampling scheme (sample locations, number of samples, etc..) will be based on guidance from U.S. DOE Decommissioning Handbook, Office of Environmental Restoration, March 1994 (DOE/EM-0142P).

7.2.7 Physical Characterization

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An investigation will be performed to compile available historical data and process knowledge of the facility to be decommissioned. This will include a walkdown of the facility, record reviews, interviews with current and retired facility employees to determine and estimate as best possible, the type, form, quantity, and location of radioactive and hazardous contaminants which were processed, handled, stored or disposed of and where spills, fires, or other incidents occurred which may have released or spread contaminants.

The physical characterization will review facility drawings for locations of piping, drains, sewers, sumps, tanks, and other components of liquid handling systems; penetrations into floors and walls for piping, conduit, anchor bolts, etc; wall/floor interfaces and other similar building construction materials which are potential sites for accumulation of contaminants and pathways for migration into subfloor soil and hollow wall spaces. Porous construction materials will be identified for possible leaching of contaminants into the subsurface. The dates and sequence of the facility construction will be reviewed to determine if any system, structure or wall/floor coverings were installed after the facility was operational and if so, did any incidents or spills occur prior to the installation of the system or building structure. The location of underground piping, ventilation ducts, and utilities where corrosion or breakage could have occurred will be evaluated.

Based on historical information, current radiological survey data and facility walkdowns maps will be developed identifying the locations of known or suspected contamination. These maps will be used for characterization and decommissioning planning.

7.2.8 Hazardous Materials Characterization

The purpose of hazardous constituent characterization activities is 1) to quantify the physical and chemical characteristics of hazardous constituent contamination and the extent of contamination distribution; 2) to quantify potential exposure from existing and residual hazardous contamination; and 3) to support detailed decommissioning planning including a preferred approach for decontamination and waste disposal.

One of the main objectives associated with hazardous constituent evaluation for planning is to identify surfaces, structures, equipment and other items that could potentially become mixed waste when removed from the facility if they are both hazardous and radioactive. Identification of areas or components contaminated with both radioactive and hazardous constituents (i.e. mixed) is part of characterization because the process identifies surfaces, structures, equipment and other items that are contaminated now, but once removed from the facility (i.e. generated), will be required to be managed as mixed waste. For example, scabbling from certain floors known to contain both radiological and hazardous contamination will be segregated and handled as mixed waste.

The information obtained during facility walkdowns and physical characterization will be used to target areas from which sample media will be collected in order to evaluate hazardous constituents. All areas of the facility will not have the same potential for residual contamination

and therefore do not require the same level of characterization survey coverage. The classifications for hazardous constituent evaluations are defined as follows:

Affected Areas: Areas that have potential hazardous constituent contamination (based on process knowledge) or known hazardous contamination (based on historical information, past surveys or material information).

Unaffected Areas: All areas not classified as affected. Areas which are known to be free of

hazardous materials or constituents based on site history and structural information existing for the facility.

Hazardous materials characterization for Affected Areas will typically include:

- A 100% visual survey performed utilizing a Hazardous Constituent Survey Form
- Sampling of areas having the highest potential for hazardous contaminants
- pH field testing of surfaces suspected to be contaminated with acid or caustic solution residue.
- Removal of construction sample materials suspected of containing hazardous constituents.

Field Screening Methods

Various methods for screening hazardous constituents will be used during visual inspections and sampling activities to determine areas and equipment that would require construction media and other types of samples to be taken. Paint, fixtures, equipment and tooling suspected of containing contaminants will typically be field tested for lead, PCB's and pH prior to taking physical samples. Positive results will be documented.

Laboratory Analytical Methods

Wipe samples, water samples, grab samples, construction materials, and equipment decontamination samples will be collected and analyzed for potential hazardous constituents as specified in individual characterization survey procedures. Before implementation of characterization, specific certified analytical laboratories will be identified to analyze the samples. The custody of samples will be tracked from sample collection, transporation, analysis and archieving, and/or disposal.

7.2.9 Asbestos Material Characterization

The primary objective of asbestos material characterization is to determine the type, quantity and location of asbestos containing building material (ACBM). The asbestos information gathered during characterization is intended to be used to estimate costs of asbestos abatement and disposal. Asbestos material characterization will include a review of documents detailing facility history, facility construction drawings, a facility walkdown, sample collection and analysis, and evaluation and documentation of laboratory results.

Facility drawings will first be reviewed to identify facility construction sequence and type of construction materials used. Construction materials identified on facility drawings known or suspected of containing asbestos will be located and noted on a map. A facility walkdown will then be conducted to locate potentially ACBM not listed or represented on facility drawings such as pipe insulation, wallboard materials, ceiling and floor tiles, thermal system insulation, etc.

Sample collection will be performed following selection of sample locations identified during the review of facility drawings and the facility walkdowns. Surveys will be performed by trained individuals who will follow standard written procedures. The custody of samples will be tracked from sample collection, transport and analysis. All samples will be analyzed at a certified laboratory. Data will be recorded in an orderly and verifiable manner and will be reviewed by the ESH&Q Manager for accuracy and consistency. A report will be prepared

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summarizing laboratory results including sample locations, sample descriptions, asbestos types and percents, non-asbestos fiber types, matrix types and sample colors.

7.2.10 Data Management

Survey data will be managed and presented in a manner that will allow the condition of the facility to be completely and accurately depicted. Clear and accurate documentation will be prepared to present the levels of radiological and hazardous materials without further analysis of the data. Procedures will provide guidance in the documentation of measurements and analytical results. Survey maps will be used when considered appropriate, or survey information will be documented on survey Forms. Information that will be typically be included on the survey maps or forms is:

- Location of the measurement or sample
- Date and time of the measurement or sample
- Name of surveyor, sampler or analyst
- Description and purpose of survey or sample
- Description of survey/sampling equipment, including calibration dates
- Units of measurement or analysis

All original survey data will be retained and placed in archives at the completion of the project.

At the completion of the characterization survey a report will be prepared to document the findings and conclusions of the survey. The characterization report will contain and overview of the physical and chemical characteristics of radiological and hazardous material contamination and the extent of contamination distribution. Characterization data will be presented in the form of tables and figures and include interpretation of results relative to decommissioning release criteria.

7.3 Decommissioning Operations/Activities

7.3.1 Decontamination

Decontamination activities are performed to remove loose and fixed radioactive contaminants from surfaces (external and internal) of nuclear facilities and the equipment items and systems contained therein. Decontamination activities may be either remedial or preventative in nature, that is: remedial where decontamination is required to reduce existing radiation and/or contamination levels so that necessary operation, inspection, maintenance, dismantlement, disposal, or similar activities can be performed within acceptable guidelines for personnel occupation radiation exposure; or preventative where decontamination is performed routinely to control radiation levels so that conditions mandating remedial decontamination do not occur or are significantly delayed/retarded.

Removal of radioactive contaminants from surfaces (decontamination) frequently necessitates simultaneous removal of much larger amounts of non-radioactive materials also present on the contaminated surfaces. The composition and properties of these non-radioactive materials frequently differ considerably from those of the radioactive contaminants. Thus, considerable information is required to characterize the nature and amounts of all materials present on surfaces to be decontaminated.

Decontamination activities result in transfer of radioactive and hazardous contaminants from the surfaces treated into a secondary medium(s) which then becomes a by-product, radioactive waste(s) from the decontamination process. Production of these wastes can potentially create worse problems in final dispositioning of the radioactive contaminants, and/or subsequent operation or dispositioning of the facility and/or equipment, than existed initially due to the

contaminants presence on the facility/equipment surfaces (i.e., generation of mixed wastes or large volumes of hazardous waste to be processed). Thus, selection and use of decontamination methods and equipment must include careful consideration of the impacts on radioactive waste management requirements and on subsequent activities to be performed within the facility.

A wide variety of both chemical and physical methods (and combinations thereof) can be-and have been-used to achieve desired decontamination results in various applications. Operations range from simple janitorial-type functions (e.g., vacuuming, wiping, and mop-and-bucket scrubbing) to sophisticated chemical processes capable of dissolving adherent corrosion product oxides. Each method and equipment item used for decontamination work has inherent capabilities and limitations. For this reason, and because of the wide variation in the nature and function of the surfaces to be decontaminated (in addition to the aforementioned variations in the nature and compositions of the contaminants on these surfaces), judicious selection and careful deployment of decontamination methods, equipment, and personnel is crucial to achievement of successful decontamination results.

Finally, planning of decontamination activities must include assessment of whether or not the benefits forecasted (e.g., reduced radiation levels and costs of equipment/materials disposal) justify the dollar costs and personnel occupational radiation exposure incurred to perform the decontamination and resultant waste management/disposal activities. Such assessments require ALARA-type cost-benefit analyses of alternative scenarios to determine whether decontamination activities are justified and, if so, which alternative is preferred.

7.3.2 Dismantlement/Demolition

Process equipment in facilities being decommissioned will not be salvaged for reuse. Consequently, the dismantlement objectives exclude reassembly concerns and include only efficiency of decontamination, volume reduction, and final handling based on safety and cost-effectiveness considerations.

In some cases equipment, because of its size or weight, will require special handling equipment in conjunction with the proper training to assure its proper use. Generally, equipment dismantlement will require standard disassembly and segmenting methods which include powered and manual tools, pneumatically operated tools, and flame cutting tools.

After the majority of the process and support equipment has been removed, the remaining interior structures are evaluated for compliance with release criteria. The interior structures

which are contaminated are subjected to volume-reduction measures and prepared for final packaging/transportation as radioactive waste.

External structures (roof, walls, floor) are removed using standard demolition techniques only after all contamination has either been removed from the facility or is fixed in place. If the external structures are themselves contaminated, then additional measures must be taken to prevent the spread of radiological contamination during removal.

7.4 Objectives

The hierarchy of documents which govern the Decommissioning Program are illustrated in Section 2.1.4 (Figure 2.1.4). The objective of this section is to delineate the process by which hands-on work is to be directed and controlled.

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7.4.1 Work Activity Control Program

A work control process is necessary to carry out decommissioning operations for a number of reasons:

- to ensure the safety of operations
- to effectively utilize resources
- to avoid operational conflicts among work teams, and the Integrated Management Contractor (IMC) building management
- to plan for the use of IMC resources
- to record progress of work activities to satisfy reporting requirements

The decommissioning work control process depicted in Figure 7.2, is made up of four main elements: instructions, permits, performance, and closure. Together, these elements constitute the entire work control process that will be followed for any hands-on decommissioning work.

Closely related to the work control process is the scheduling process. Decommissioning Project Performance Measurement personnel have created an overall schedule for decommissioning operations. All identified work appears as an activity on that schedule. The schedule is modified as required by the appropriate Decommissioning Project Manager with the schedule maintenance carried out by the Performance Measurement personnel.

The list of proposed or scheduled work packages that will be controlled by the work control process is maintained by the Configuration Management Manager. It is expected that unscheduled activities will also occur due to additional work being identified. Unscheduled activities are discrete work packages that, for some reason, have not been foreseen and incorporated into the formal work schedule. Activities may be unscheduled due to the scope of known work expanding, less work being achieved by the IMC or simply an omission from the schedule. Work packages for unscheduled activities broadly follow the same process as work packages for scheduled activities with minor exceptions:

- The activity, by its nature, was not scheduled so it does not appear on the work schedule. The requirement for an unscheduled work package is initiated by the Decommissioning Project Manager responsible for the work, who will request the generation of a Work Package Status Tracking Form for the activity from the Configuration Management Manager.

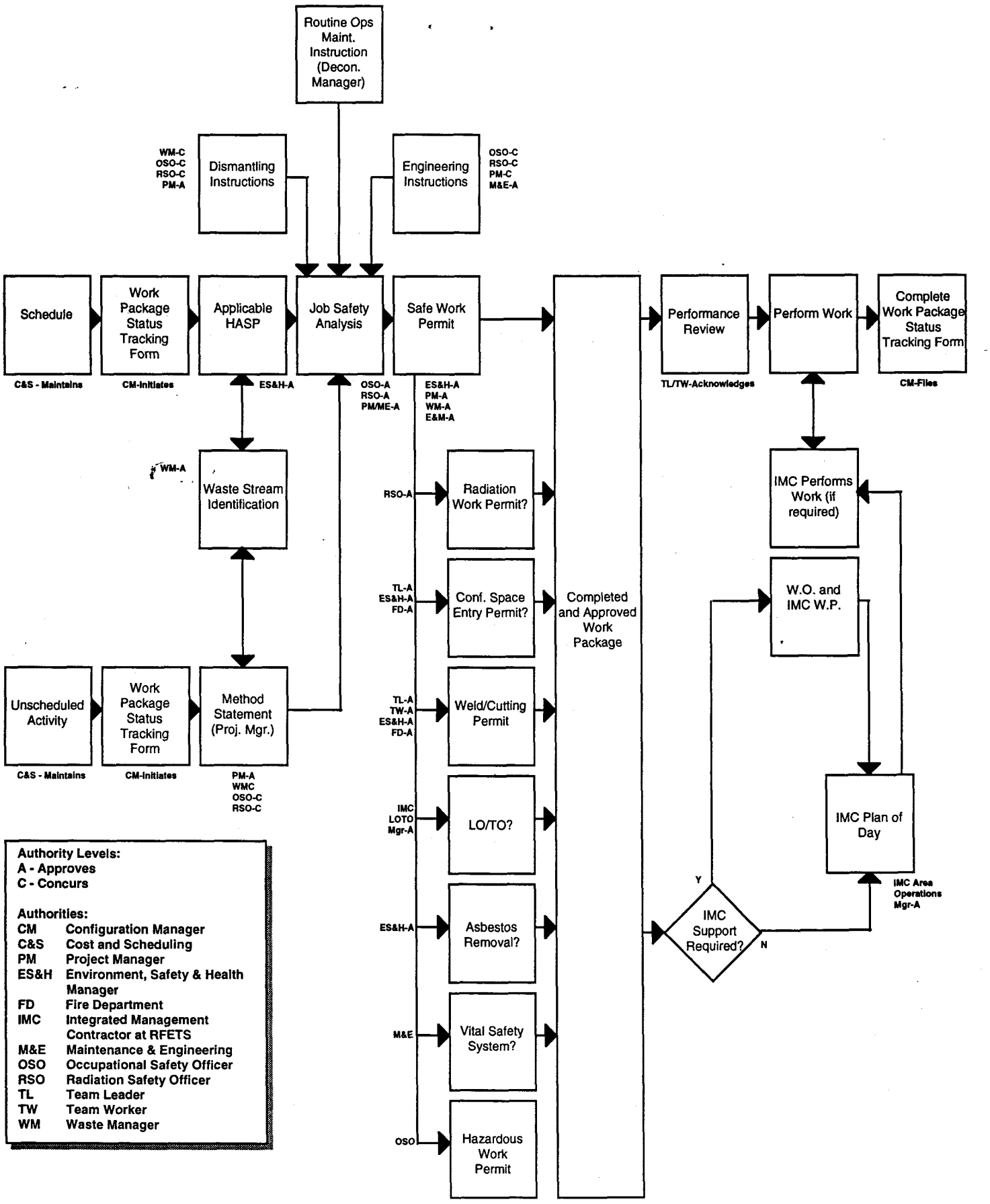

Figure 7.2 - Work Control Process

- In order to apply the same level of control to this work, a work package will be developed which details the scope of work. Refer to Method Statement in Section 7.4.3 for further discussion.

These usually minor, unscheduled activities will be included in the work control process as they are identified. If the duration of the work is long enough to warrant including it on the schedule, the schedule will be modified accordingly. For extremely short turn-around jobs (e.g., less than a day) the schedule will not be modified, and the work package will serve as the record of the work performed.

One more concept needs to be defined before explaining the work control process elements; this is the Cognizant Manager. The Cognizant Manager will be referred to throughout this document. The Cognizant Manager is simply that Manager who has primary responsibility for the work covered by a particular work package. In some work packages, the work to be performed is strictly equipment dismantling and/or decontamination. In this case, the Decommissioning Project Manager is the Cognizant Manager. Other managers, such as the Maintenance, Engineering or Construction Manager may be designated by the Project Manager as the Cognizant Manager for some work packages.

7.4.2 Decommissioning Procedures

Each decommissioning project requires procedures which have been approved by a variety of individuals including management, regulatory oversight specialists, quality assurance, criticality specialists, health and safety, security and safeguards, technical peers, etc.

The decommissioning procedures consist of six categories of controlled procedures which form a Decommissioning Project Control Manual. The system of procedures which are subordinate to the Project Plans and which will be used for administering a decommissioning project follow:

1) Project Control Procedures
2) Administrative Procedures
3) Engineering Procedures
4) Decommissioning Operations Procedures
5) Radiation Protection Procedures
6) Industrial Safety Procedures

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PROJECT CONTROL PROCEDURES

Project Control Procedures - are the highest level of procedure in the Project Control Manual. Their function is to provide instructions for the content, format, and scope of the other project procedures and instructions. PCPs require approvals by the Project Manager and a Project Engineer/designee.

ADMINISTRATIVE PROCEDURES

Administrative Procedures - are provided to control the administrative functions, both internal and external, of the project. They are designed to comply with administrative policies and requirements and they provide methods by which project documents are distributed, filed, and in specific cases, archived for historical purposes. ADMs require approvals by the Project Administrator and the Project Manager.

ENGINEERING PROCEDURES

Engineering Procedures - comprise the system of procedures used to govern the activities of the project engineering personnel performing work on the project. These procedures are self-sufficient in controlling specific elements of the Project Engineer's responsibilities.

DECOMMISSIONING OPERATIONS PROCEDURES

Decommissioning Operations Procedures - are provided to control the operations of equipment, tools and techniques consistent with safety, quality and production considerations. They are prepared for various tasks to be performed on the project and are a key element in the personnel training program for decommissioning personnel. Decommissioning Procedures require approvals by the Project Manager, the Project Engineer, and the Operations Manager.

RADIATION PROTECTION PROCEDURES

Radiation Protection Procedures - are provided to implement the requirements of 10CFR 834 & 835 during field operations. These procedures will be used to ensure the work is conducted in a manner consistent with the health and safety of the employee, the general public, and the environment. Radiation Protection Procedures require approval by the Project Manager and the RPISO/designee.

OCCUPATIONAL SAFETY AND HEALTH PROCEDURES

Occupational Safety and Health Procedures - are provided to implement the industrial safety policies and objectives of the Health and Safety Plan during field operations. These procedures will be used to ensure the work is conducted in a manner consistent with the health and safety of the employee, the general public, and the environment. Industrial Safety Procedures require approvals by the Project Manager and the Radiation Protection and Industrial Safety Officer (RPISO).

7.4.3 Integrated Work Control Packages (IWCP)

For each work activity there is one document developed that contains the steps to be followed to perform the desired work. Each IWCP emphasizes a different aspect of the work. The IWCPs are approved by the Cognizant Manager for the work covered in the work package. Since the IWCPs contain the work steps to be performed, they are used as the basis for developing the permits, which are discussed in Section 7.4.4.

This section contains descriptions of documents which support the IWCP process and include the Work Package Status Tracking Form, the Health and Safety Plans (HASP) for Cleanup,

and the Waste Stream Identification. Although none of these documents are actually an IWCP, they are included in this section because they are applicable to the entire work control process or because they, too, are used as inputs in developing the permits.

Work Package Status Tracking Form - As the time approaches for an activity to begin, the Configuration Management Manager issues the Work Package Status Tracking Form for the planned activity to the Cognizant Manager. This form will accompany the IWCP from start to finish and will document the status of the work. It is a tool used to identify progress of a work package.

Applicable HASP - The Health and Safety Plans (HASPs) examine each scheduled work task and include a hazard assessment for the proposed work. In writing the IWCP, the Cognizant Manager will consult the appropriate section of the HASP and refer to the sub-tasks, hazards and precautions identified. These will form the basis for the directions contained within the IWCP. In addition, the hazards identified in the HASP, as well as the steps in the IWCP will be used to produce the Job Safety Analysis.

Waste Stream Identification - With the IWCP in draft form, the Waste Management Manager will review the proposed IWCP and confirm that wastes produced from the work are compatible with waste handling processes. Data on waste handling supplied by the Waste Management Manager will be incorporated into the IWCP.

Once the assembly of the IWCP has begun, there are a number of different types of activities that can be included as follows:

The method of dismantling equipment during decommissioning will be specified by the IWCP. This IWCP will form the basis to be followed by Work Teams in dismantling or cutting up an item of equipment. It will describe in detail the scope of the work and the method to be adopted in carrying out the dismantling.

In addition to the tasks directly associated with the cleanup of the buildings, there will be a number of repetitive tasks for which an IWCP will be required. These tasks may include housekeeping, training, and fork lift truck and tool maintenance. General Access and tours of the Radiological Area will be covered by a general RWP. Routine IWCPs will be written to cover all routine inspections, operations and maintenance to be carried out during decommissioning operations. The Decommissioning Project Manager is responsible for approval of IWCPs. In some cases, the Maintenance Manager, the Technical Support Manager, or the Training Manager may initiate and resource IWCP preparation. The Decommissioning Project Manager will approve any IWCPs initiated by Maintenance.

The IWCP is used in those cases where unscheduled work is identified. Once a previously unscheduled task has been identified, the schedule is revised to include the task (unless the task is of extremely short duration, e.g., less than a day). The IWCP contains the instructions necessary to carry out the work; however, the document may not be as detailed as normally required since the work covered is expected to be of a less complex nature. The document is largely free-format to allow for the expected varying nature of the work and may reference/utilize other documents that already exist. This process will usually be used for unforeseen tasks of low complexity and low risk, and when the instruction needs to be written and issued at short notice. The Decommissioning Project Manager is responsible for approval (other staff/contractors will contribute to preparation also).

7.4.4 Permits

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Based on the work to be performed, which is described in the Work Activity Instructions, each work package will contain a set of controls that is applied to ensure the safe performance of the work. This section describes the Job Safety Analysis and the associated work control permits and considerations that are developed for each work package.

Job Safety Analysis - With the Instruction(s) approved after incorporation of information from the HASP and concurrence from the Waste Management Manager, the Radiation Safety Officer, and the Environment, Safety & Health Manager, a Job Safety Analysis (JSA) specific to the work described in the Work Activity Instruction(s) is developed by the Cognizant Manager and the Occupational Safety Engineer and/or technical staff/contractor. The JSA is then reviewed and approved by the Environment, Safety & Health Manager. The JSA will identify the hazards associated with the work, and the precautions necessary for the safe execution of the work package. The JSA requires a rigorous analysis of each step of the Instruction, identifying hazards that may exist. The JSA then specifies the safety measures required for mitigating each hazard. The front sheet of the JSA allows for the summary of the safety equipment required, the tools and equipment required, and the hazardous materials encountered in the work (all as identified in the analysis).

Safe Work Permit - Each work package to be carried out during decommissioning operations will require a Safe Work Permit (SWP). This document follows the approval of the JSA and specifies the requirements necessary for the safe conduct of the work. A SWP is necessary for every package as every job carries an element of risk concerning, at a minimum, occupational safety.

Completion of the SWP involves consideration of the need for supplementary permits, a summary of the results of any pre-job surveys, the requirement for protective clothing (from an occupational safety viewpoint) and the identification of expected hazards by category (radiological, pressurized systems, electrical, etc.) in the workplace. The SWP also includes space for daily sign-on by each worker working under the SWP which indicates that the worker has read the SWP and agrees to comply with the precautions imposed by the Occupational Safety Engineer.

The Occupational Safety Engineer will, on the basis of the steps contained within the Instruction and the information in the JSA, determine the required personal protective equipment (PPE), procedures, and occupational exposure sampling for non-radiological hazards. If the job can safely be completed with the occupational safety restrictions imposed under a SWP then, following approval of the SWP, the work package is considered complete and it passes to the next stage of control. However, if there are other hazards involved in the proposed work which cannot be adequately covered under a SWP, then other permits or considerations are required to further define the precautions necessary to ensure safe working conditions.

The SWP includes a section for the Occupational Safety Engineer to identify any other permits or considerations necessary for the work package. Other permits or considerations required may include any of the following:

- Radiological Work Permit
- Confined Space Entry Permit
- Welding/Cutting Permit
- Lock Out/Tag Out Permit
- Asbestos Removal
- Vital Safety Systems

These supplementary permits and considerations are described below.

Radiological Work Permit - The Radiological Work Permit (RWP) is required for all work taking place inside a Radiological Buffer Area (RBA). This requirement informs the radiological worker of the hazards and helps keep radiological exposures within regulatory limits and As Low As Reasonably Achievable (ALARA). The RWP is a specialized permit dealing exclusively with safety issues associated with radiological considerations. The RWP is completed by the Radiation Safety Officer using the information supplied in the Instruction(s), the JSA, and the SWP.

The RWP includes a list of the PPE necessary for safe completion of the job from a radiological point of view, a summary of the results of any pre-work surveys that exist, and a sign-on sheet for each worker working under the RWP that indicates that the worker has read the RWP and agrees to comply with the precautions imposed by the Radiation Safety Officer. These RWP precautions may specify the requirement for PPE, radiological containments or barriers or any other equipment or system which will reduce radiological risks to levels that meet the Decommissioning Program ALARA goal.

Confined Space Entry Permit - The Confined Space Entry Permit (CSEP) is a specialized permit for work taking place in areas defined as confined spaces where there is a risk of injury or death due to a hazardous environment (e.g., chemical, mechanical, or electrical hazard). The completion of the CSEP requires the consideration of the atmospheric and other hazards in the confined space, the need for additional ventilation systems, and methods of entry and exit under normal and emergency conditions.

Welding/Cutting Permit - The Welding/Cutting Permit (WCP) is required for any operation that creates a risk to safe operation from fire potential. Welding and hot cutting (oxy-acetylene or plasma arc) have the potential to cause fire due to the risk of hot or burning debris contacting flammable materials. Cold cutting, too, can increase the fire risk by allowing sparks caused by, for example, grinding operations to fall onto flammable materials. Completion of the WCP will require consideration of the use of non-flammable materials in the vicinity of these operations and of methods necessary to control the spread of hot or burning debris.

Lock Out/Tag Out Permit - Any utility or process line serving the equipment involved in the work package will need to be isolated from its supply if execution of the work package involves any risk from contact with a hazardous energy or substance carried through the utility or process line. Risks may involve electrocution from an electrical supply line, injury caused by the release of a pressurized gas, vapor or liquid, or injury caused by operation of an item of equipment during work (e.g., a pump or motor). The Lock Out/Tag Out (LO/TO) Permit is a specialized permit used to control work that involves any of the above risks (or other similar risks).

Asbestos Removal - The suspected or proven presence of asbestos or asbestos-containing materials in a building will require special consideration if any work is proposed that may disturb the asbestos materials. Work by decommissioning employees that deal with asbestos-containing materials will be limited to maintenance and custodial work. No RMRS decommissioning employee will be involved in any form of asbestos abatement. Any asbestos abatement will be carried out by a Colorado licensed contractor. The Project Manager will coordinate the use of an asbestos contractor. If the work package identifies asbestos as a potential hazard, then the work package cannot progress beyond this step until an asbestos survey has been performed by a certified asbestos inspector. Additionally, whenever material that is suspected to contain asbestos is uncovered during work activities, all work will stop,

and the Environment, Safety & Health Manager will be notified. The presence of asbestos and the form in which it is present will determine the course of action to be followed. The Project Manager will determine the action to be taken. All asbestos removal will be performed in accordance with State, OSHA, and DOE rules and regulations.

Vital Safety Systems - Any work involving one or more of the vital safety systems in a building (for example, building ventilation, stationary air sampling, emergency power backup and fire protection) will not proceed without the approval of both the Environment, Safety & Health Manager and the Building Manager. Work involving these systems will be approved on a case-by-case basis with other IMC groups involved as necessary.

Integrated Management Contractor (IMC) at Rocky Flats Work Packages - With the SWP and all necessary supplementary permits approved, unless the work involves support from other IMC organizations, the IWCP will be returned to the Decommissioning Configuration Manager for implementation. The work will be registered on the IMC's Plan-of-the-Day for the building to minimize potential for conflict between decommissioning and other IMC activities. If the proposed work involves a resource input from other IMC organizations, then a Work Order will be issued to them for their part of the work. These organizations, in turn, would initiate an IWCP for the IMC input to the job. That work package would also be registered in the IMC's Plan-of-the-Day for the building.

Technical Staff Review - Once all of the IWCPs and permits have been developed and approved, the IWCP undergoes a review by the decommissioning project technical managers. This review ensures that no aspect of the job has been overlooked, and that all of the pieces of the IWCP support each other.

7.4.5 Decommissioning Work Performance

At this point, the work package is approved for implementation. Before the actual work can begin, the decommissioning team members and any other IMC groups involved in the work are notified that the work package is ready to be worked.

Decommissioning Work Team Review - The complete, approved work package will be reviewed by the personnel who will carry out the proposed work. This review will be led by the Team Leader involved and will cover the proposed work, the safety clothing and equipment required, any special tooling needed, and the hold points identified in the JSA. When all personnel who will be working under the work package have read the scope of the work and the precautions to be taken during the work, each will sign the original of the SWP and the RWP (if required) indicating that they have read the work package and agree to comply with the precautions imposed. The work package can then be carried out (in conjunction with other IMC organizations, if they are required to carry out any part of the overall work package).

Coordination with the Integrated Management Contractor - Some of the work packages to be performed will require support from the IMC. In the event that support is required from other IMC organizations, the Cognizant Manager will coordinate with the appropriate groups within the IMC's organization. Regardless of whether or not support is required, the IMC's Operations Manager will be notified of the work package for inclusion on their Plan-of-the-Day.

Performance of Work Package - Once all of the above notifications have been made, the Team Workers will perform the work described in the work package under the guidance of the Team Leader. As the work progresses, support will be provided to the Team Workers by the

Occupational Safety Engineer, the Radiation Safety Officer, and the Waste Management Manager. The Occupational Safety Engineer will assist with any questions or problems concerning safety or environmental issues. The Radiation Safety Officer will assist with any questions concerning radiation safety, and will ensure that surveys of newly exposed surfaces are performed as the dismantling of equipment progresses. The Waste Management Manager will assist with the waste generated as a result of the work, and oversees the handling of the waste.

During the performance of the work package, there may be issues encountered that are outside the scope of the work package. In some instances, the issue may require that work be stopped. In this event, the Cognizant Manager will be notified. The Cognizant Manger will, in conjunction with other Technical Managers, review the situation and rework the work package accordingly.

If the issue is of such a nature that the work can continue, with the scope of work reduced, the Cognizant Manager will be notified. The Cognizant Manager will, in conjunction with the other technical managers revise the work package, reducing the scope of work, and authorize the Team Leader to resume under the reduced scope. The Cognizant Manager will then develop a new work package for that portion of the original work that was removed.

7.4.6 Closure

When the work described in the work package is complete, the documentation associated with the work can be closed. The permits are closed out in the reverse order of their issuance. That is, since the SWP was used as the basis for any other permits issued, the SWP is not closed out until all of the other issued permits are closed out.

After the SWP is closed out, the Cognizant Manager notifies the Building Manager that the work is complete, and that the job can be removed from the Plan of the Day.

Once all of the documentation associated with the work has been closed out, the work package, including the Work Package Status Tracking Form, is forwarded to the Decommissioning Configuration Management Manager. The Configuration Management Manager verified that the work package closure is complete, and files the work package.

7.4.7 Responsibilities

Table 7.1 identifies the person or organization responsible for each step. Note that not every step will be performed in the development of every work package; for example, not every

Table 7.1 - Work Control Process-Initiation, Concurrence, Approval Responsibility Matrix

	Work Package Status Tracking	HASP	Waste Stream Identifier	Dismantling Instruction	Routine Operations & Maintenance Instruction	Method Statement	Job Safety Analysis	Safe Work Permit	Radiation Work Permit	Confined Space Entr Permit	Welding/ Cutting Permit	LO/TO	Asbestos Removal Activity	Vital Safety System Activity	IMC Plan of the Day
Configuration Manager	I/P	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D&D Project Manager	-	-	-	I/A	I/A/C	I/A/C	I/A	A	-	-	-	-	-	--	I
Waste Management Manager	-	-	P	C	C	C	A*	A*	-	-	-	-	-	-	-
Occupational Safety Engineer	-	-	-	C	C	C	P	P/A	P	P	P	I	I	I	-
Radiation Safety Officer	-	-	-	C	C	C	P	-	P/A	-	-	-	-	-	-
ESH&Q Manager	-	A	-	-	-	-	A	A	-	A	A	-	A	A	- *
Team Leader	-	-	-	P	P	P	-	-	-	C	C	-	-	-	-
Team Workers	-	-	-	P	P	P	-	-	-	-	C	-	-	-	-
Fire Department	-	-	-	-	-	-	-	-	-	C	C	-	-	-	-
D&D LO/TO Manager	-	-	-	-	-	-	-	-	-	-	-	A	-	-	-
D&D Operations Manager	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C
Maintenance & Engineering Manager	-	-	-	C	I/A/C	I/A/C*	A*	A*	-	-	-	-	-	-	-

I = Initiation of document/process A = Approves document/process P = Prepare
C = Reviews and concurs with document/process * If necessary

work package will contain a Confined Space Entry Permit. Additionally, some of the steps may be performed in parallel, such as the development of several permits for a given work package.

7.5 Subcontractor Assistance

During decommissioning project operations, the need for utilizing the services of specialty contractors will be required. Use of these contractors will increase the overall cost-effectiveness of the project by improving the efficiency of specialty operations and reducing the need for specialized staff training.

7.5.1 Scope of Work

For each subcontracted task, a comprehensive bid specification will be prepared for subcontractor quotes. The selection of the subcontractors will be made well in advance of the scheduled work, to incorporate their schedules into the overall project schedule.

The services to be provided by qualified subcontractors may include:

- Hauling of radioactive and non-radioactive materials
- Laboratory analysis and testing services
- Medical and emergency services
- Concrete cutting services
- Demolition services
- Laundry services
- Asbestos Abatement
- Bioassay

It is not anticipated that the subcontractors will possess a nuclear license.

7.5.2 Subcontractor

Potential subcontractors for each task identified will supply their qualifications as part of their bids. The qualifications will emphasize the following:

- Ability to accommodate the overall project schedule
- Experience with similar work
- Adequacy of qualified workers

7.5.3 Administrative Controls for Health and Safety

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Administrative controls for Health and Safety will be based on experience and prudent practices for protecting contractor and subcontractor personnel from known and/or suspected potential hazards. Contractor and subcontractor personnel will adhere to health and safety rules/standards set forth by RMRS in addition to applicable instructions, procedures, and directions for the performance of the work and will undergo training and qualification.

7.5.4 Subcontractor Quality Program

Subcontractors will perform their activities in accordance with RMRS quality assurance requirements. ESH&Q will perform assessments and audits of the subcontractor's activities to verify compliance with all quality and technical requirements.

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8.0 WASTE MANAGEMENT

The processes of decontamination, dismantlement and demolition of RFETS facilities will result in the generation of solid and liquid radioactive waste, mixes waste, and hazardous waste which must be managed in accordance with applicable State and Federal regulations. The purpose of this section is to address the applicable requirements for waste management activities associated with the decommissioning process and describe the program which will be implemented to insure that these requirements are met. Waste generating activities, waste characterization, and waste certification requirements, contingent upon the disposal waste acceptance criteria (WAC), identified during project assessment, will be used to develop requirements for waste processing, packaging, storage, transportation and to satisfy the WAC for final disposal. The major waste management program functions associated with the decommissioning projects will be incorporated into the Decommissioning Operations Plan (DOP) for projects classified as "high"risk (refer to Figure 2.1.6 Decommissioning Program Document Hierarchy). For projects which are considered to have a "low" risk, the Decommissioning Program Plan (DPP) will be utilized as the sole regulatory document to implement the action. Relevant information from all active projects will be integrated into the annual Waste Management Plan required by DOE Order 5820.2A, *Radioactive Waste Management.*

The technical basis for development of the approach to waste management as presented in this section is outlined in the *U.S. Department of Energy Office of Environmental Management Decommissioning Resource Manual*, dated August 1995 and is described in the sections which follow.

8.1 Decommissioning/Waste Management Integration

The decommissioning process is comprised of decommissioning planning, decommissioning engineering, and decommissioning operations phases. Waste Management activities are integrated into each phase of work as described below.

8.1.1 Facility Characterization

The decommissioning planning phase begins with the transfer of facilities to the Decommissioning Program. Once the transfer has occurred, the decommissioning program will develop a project plan to identify preliminary funding for decommissioning actions, to include costs associated with waste management activities. Also included in this phase is the planning and budgeting for further characterization activities associated with the facilities to be decommissioned. Characterization under CERCLA requires knowledge of the site and of the waste types to be generated by that action, therefore, a characterization plan will be developed for CERCLA actions for review by the responsible oversight agency. The characterization plan describes the number, type, location, and analysis methods to be used. In addition, the plan describes the quality assurance policy, project organization,and functional activities and data quality objectives and measures necessary to achieve adequate data for the planning and documentation of the removal action.

The Characterization Plan will also identify waste characterization procedures to be utilized by the project to meet requirements established by 6 CCR 1007-3, 261 and 40 CFR 261, State of Colorado Low Level Waste requirements under 6 CCR 1007-14 and requirements established by DOE Order 5820.2A. Waste characterization will be accomplished by several methods including visual inspections, use of process knowledge, sampling and

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analysis, nondestructive examination/ nondestructive assay, and radiochemistry. Where RCRA characterization is required, Test methods for Evaluating Solid Waste, Physical/Chemical Methods, U.S. EPA SW-846, 1986, Third Edition (or current version) shall be used for sampling and analysis. Process knowledge, quality control procedures, waste characterization, and WAC certification procedures will be developed to support characterization requirements for waste certification plans.

Characterization will be accomplished during the Engineering Phase of decommissioning. Once characterization is completed, activities associated with waste management and waste minimization will be developed and incorporated into the Decommissioning Operations Plan, and/or the IWCP. For Projects considered to be "high" risk, the DOP will outline the proposed organization for decommissioning waste management activities associated with each project to include the scope of the work to be performed, the objectives of the project, the personnel organizations involved with waste management and their responsibilities, and the required indoctrination and training required for waste management activities.

8.1.2 Waste Generation

The DOP/IWCP will describe the wastes which will be generated during the decommissioning operations phase, based on preliminary characterization and process knowledge obtained prior to the start of the work and the methods which will be used to characterize wastes which will be generated during the decommissioning process. Waste estimates will include a detailed description of the wastes that are to be generated by a specific project. The volumes and types of wastes to be generated, to include hazardous constituent characterization as well as radioisotope composition will be included in the volume estimates. Volumes for the amounts of LLW, mixed, hazardous, TRU, TRU mixed, recyclables, and clean waste will be projected based on engineering estimates for the project. Decontamination techniques will be used in order to reduce SNM contamination levels from waste that is initially classified as TRU to waste classified as LLW.

This section of the DOP/IWCP will also include a description of methods for segregation of wastes into appropriate IDCs and possible methods of decontamination for some waste streams. If non-routine wastes are to be generated, then appropriate documentation such as the Non-Routine Waste Origination Logs (NRWOLs) will be completed and sent to the Waste Operations Division to determine temporary storage locations and final disposition requirements. From the information collected during this phase of the project, planning can be accomplished for waste certification, treatment and storage, packaging, and off-site shipment of wastes.

The management of Decommissioning Program wastes will be accomplished in a manner that minimizes the generation of such wastes. The management program established by the DOP and IWCP includes (1) the identification of waste minimization requirements and techniques in project plans and procedures, (2) maintains awareness through training project personnel to these plans and procedures, and (3) evaluates and improves program performance through periodic assessments to these plans and procedures.

Waste minimization will be accomplished through a hierarchial approach to waste reduction by first eliminating or reducing the generation of decommissioning wastes through application of source reduction methods,including input material changes, operational improvements, process changes and administrative steps. Those potential waste materials

that cannot be eliminated or minimized through source reduction will be minimized by recycling through reuse or reclamation activities, or treating through neutralization, compaction, filtration, evaporation, and stabilization processes, or packaging through segmentation,nesting, and void space management techniques during packaging. Commercial waste processing facilities will be utilized if appropriate to minimize waste volume on a cost justification basis.

8.1.3 Waste Certification

Waste certification includes verification that waste characterization, treatment, storage and packaging have been conducted in accordance with the receiving site's WAC. Characterization of wastes requires a determination of the physical, chemical, and radiological properties of the wastes to the extent necessary to support informed decision making. Certification requirements are addressed through procedures identified in the DOP and/or IWCP. Specific procedures for certification of wastes which address individual Waste Acceptance Criteria (WACs) for the receiving sites will be used to insure that wastes are characterized, treated, packaged, stored and transported in accordance with the applicable WAC. The two main plans which address RFETS waste certification requirements include the site-wide *Low Level Waste Management Plan*, and the *TRU Waste Certification Plan.*

In addition, the certification program for decommissioning will include qualified waste inspectors who are responsible for visual inspection and certification of all waste containers. Inspectors will be integrated into the decommissioning operation to insure that waste drums and crates are packaged in accordance with approved procedures during decommissioning activities. Waste packages will be certified at the point of generation and sent to on-site facilities for content verification through non-destructive assay (NDA) and Real-Time Radiography (RTR).

8.1.4 Waste Treatment and Packaging

RFETS has several operating waste management facilities with the objectives of processing and packaging liquid and solid wastes generated at the site for safe storage, transport and disposal. These facilities were not, however, specifically designed to treat mixed wastes to meet the required LDR treatment standards. Treatment and waste handling operations involve many waste types (e.g., TRU, mixed TRU, low-level, mixed low-level, hazardous and sanitary or clean wastes) and many forms (e.g., liquids, sludges, solids, and compressible solids). Waste treatment activities are conducted primarily in four existing treatment facilities: Building 374, Building 774, Buildings 776/777 and Building 995. Treatment methodologies and waste types are described in detail in the RFETS Part B Permit Application and other site treatment plans. Treatability groupings are also established to support the RFETS Proposed Site Treatment Plan (Rev. 3, March 30, 1995).

Once decommissioning wastes are package for disposal, they are assayed prior to being transported from the point of generation to on-site storage or shipped off-site. RFETS has two (2) active units, the drum assay unit which is located in Building 371 and a crate assay unit, located in Building 569. Real-Time Radiography (RTR) is also utilized to examine the contents of drums prior to shipment. RTR provides additional information to assist in certification of the contents of a waste container prior to shipment.

8.1.5 Interim Storage, Transportation, and Final Disposition

For wastes that will not be shipped directly off-site, interim storage locations will be designated for storage of the wastes in permitted on-site storage facilities. The RFETS has storage capacity to accommodate a total of 34,403 cubic yards of radioactive and mixed wastes. Storage requirements for future generation of wastes are currently under evaluation to determine if additional storage will be required (ref. Radioactive Waste Storage Environmental Assessment, Public Draft, February 1996). Site surveillance support will be provided to insure that wastes are being managed at each storage facility in accordance with the conditions established in the current RFETS Part B Permit.

The Decommissioning Project Manager works with the Transportation Committee in evaluating the requirements for off-site transportation of waste to the selected disposal or treatment site. Procedures will be developed to address shipping requirements and insure that waste shipments meet DOT regulations and the receiving site's Waste Acceptance Criteria. The applicable sites available for disposal or treatment Low-Level wastes generated as a result of decommissioning projects are identified in section 8.5 "Low Level Radioactive Waste Disposal Alternatives."

8.2 RESPONSIBILITIES FOR PROJECT WASTE MANAGEMENT

The functional management interfaces for decommissioning projects was previously presented in Chapter 2.0 (Figure 2.7.2). This section outlines the responsibilities for waste management activities within the RMRS Engineering/Construction/Decommissioning organization.

The Decommissioning Project Manager reports to the Decommissioning Program Manager and is responsible for overall management of wastes generated by their specific project and all activities identified in the Project Decommissioning Plan. These responsibilities include obtaining volume estimates for the wastes that will be generated, procurement of proper containers for storage and transportation of wastes, characterization of wastes, identification of treatment, storage, disposal and recycling facilities, and coordination of all activities related to waste management planning and coordination for the project. The project manager coordinates activities such as meetings with the Waste Operations Group and other departments to assure decommissioning waste can be dispositioned prior to beginning decommissioning operations. Representatives from the various management groups involved are designated at the onset of the project and participate in routine meetings to discuss issues associated with waste management for the project. The meeting may include identification of appropriate Waste Acceptance Criteria (WAC) for receiving sites, container requirements, assistance for characterizing wastes including generation of Non-Routine Waste Origination Logs (NRWOLs), packaging and labeling requirements, and waste certification requirements (i.e. providing a program for waste inspectors). This group is primarily responsible for providing technical support to the generators so that the generators can properly manage the wastes associated with the specific project in accordance with 6CCR 1007-3, 261 and 262 (40 CFR 261 and 262) and DOE Order 5820.2A.

The Decommissioning Operations Manager reports to the project manager and is responsible for coordination of waste management activities which involve the decommissioning team. These activities include coordination of generator responsibilities, waste operations for on-site treatment, storage and transportation and coordination with

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other groups such as Nuclear Materials Control and Nuclear Safeguards which may become involved in the methods selected for decommissioning or decontamination. The operations manager is responsible for ensuring that waste management activities are performed in accordance with appropriate procedures and work permits.

The Decommissioning Operations Supervisor reports to the Decommissioning Operations Manager and is responsible for daily operations conducted by crew members in the field at the decommissioning site. These responsibilities include providing direct oversight for decontamination and dismantlement operations, maintenance operations, insuring that workers have received necessary training to perform tasks, conducting waste management oversight in the field, and oversight for Craft Labor. The supervisor also coordinates field activities which involve providing oversight for technicians packaging containers and obtaining waste inspectors to inspect packaged containers in the field.

8.3 LIQUID TREATMENT

Curtailment of plutonium operations at RFETS resulted in solutions of plutonium nitrate and plutonium and uranium nitrate and chloride being left in tanks, piping, and poly-bottles. These solutions will be stabilized to achieve deactivation and decommissioning of the plutonium buildings.

Liquids generated during decommissioning will be decontaminated and released in accordance to RFETS procedures and/or solidified and disposed as low-level radioactive waste.

8.4 INTERIM STORAGE FOR DECOMMISSIONING-GENERATED TRU WASTE

Decommissioning-generated, TRU waste (>100nCi/g) resulting from holdup found in process equipment and building structures will be segregated from low-level waste and treated as TRU waste. Materials (<100nCi/g of Pu) will be treated and disposed as low-level waste.

8.5 LOW LEVEL RADIOACTIVE WASTE DISPOSAL ALTERNATIVES

In November 1979, DOE issued guidance for the disposal of Low Level Radioactive Waste (LLRW) and directed all DOE field offices and nuclear reactor programs to terminate disposal of LLRW at commercial sites and ship waste to Nevada Test Site, Hanford, INEL, Savannah River Site, Albuquerque, and Oak Ridge. Exceptions to this can be approved on a case-by-case basis.

The Federal Facility Compliance Act of 1992 requires the DOE to prepare and submit Site Treatment Plans to the states which host DOE facilities that generate and store mixed waste. Although the FFC Act does not require that disposal be addressed, DOE and the states recognize that treatment of mixed low-level waste will result in treatment residues that will require disposal in either low-level waste or mixed low-level waste disposal facilities. Facilities being planned may offer some relief for disposal of DOE low level wastes generated away from the site hosting the disposal facility.

Disposal Site Availability - Disposal site selection is dependent upon the waste being either contaminated, clean or mixed.

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(a) Contaminated Waste - The options for disposal of contaminated LLRW are fairly well prescribed. Waste can be disposed at either of two commercial sites (Barnwell, SC or Richland, WA), at any of six DOE disposal sites or placed into temporary storage at its point of origin. Some bulk materials, structural debris and by-product material can be disposed at the Envirocare of Utah commercial site. For commercially generated wastes, the site in Richland will take waste only from states in the Northwest and Rocky Mountain compacts.

(b) Mixed Waste - This is waste containing both hazardous materials, as defined by RCRA, and low-level radioactive waste (LLRW). Mixed waste can be disposed at the Nevada Test Site, Hanford Site, and Envirocare of Utah.

(c) Clean Waste - Clean waste is defined here as waste whose radiation level and whose transferable contamination level is below release limits. For soils and other bulk materials the total curie content must be below release limits for the combination of all isotopes.

Disposal options for clean materials fall into two categories: place in local landfills, or send to a third party for recycling. The material is usually shipped in large open containers such as dumpsters or trucks. This material must undergo close scrutiny to assure no radioactive or hazardous material is inadvertently mixed in with the clean wastes. In some cases, especially when recycling is involved, additional separation of like material is required (e.g., ferrous metals, aluminum, copper, lead, etc.).

Site Specific Criteria - Each disposal site has its own set of criteria for accepting waste. This is driven by site demography, site lifting/handling limitations, and political pressures. Following is a brief discussion of disposal sites currently operating in the U.S. Detailed criteria descriptions are given in the referenced documents below and are not repeated here.

(a) Nevada Test Site (NTS) - The U.S. DOE Nevada Operations Office defense radioactive waste acceptance criteria and requirements for waste certification and transfer is described in NVO-325, UC-70B, Nevada Test Site Waste Acceptance Criteria, Certification, and Transfer Requirements. This establishes procedures and criteria for safe transfer, disposal, and storage of defense transuranic (TRU), low level, and mixed waste at the NTS. Mixed waste is accepted for disposal only at the Area 5 Radioactive Waste Management Site, as is Transuranic (TRU). The TRU waste can be accepted for interim storage only.

(b) Hanford Site - The Hanford disposal criteria is described in WHC-EP-0063-3, UC-721, Hanford Site Solid Waste Acceptance Criteria. This establishes procedures for solid waste, hazardous waste, and mixed waste. Hanford can also accept TRU waste for interim storage.

(c) Barnwell, SC Site - This site is commercially operated by Chem-Nuclear Systems, Inc. and can receive and store LLRW, hazardous waste, biological waste and Special Nuclear Materials (SNM).

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(d) Richland, WA Site - This site is commercially operated by US Ecology, Inc. and can receive and store LLRW waste. US Ecology also operates a hazardous waste disposal site near Robstown, Texas and near Beatty, NV.

(e) Envirocare of Utah - This shallow land burial site is licensed by the State of Utah to transfer, receive, and possess radioactive material consisting of bulk material, structural debris, Class A LLRW, and by-product material (e.g., uranium and thorium mill tailings). Additionally, the site can receive and store mixed waste and hazardous waste which is not restricted under 40 CFR Part 268 Subpart C. The site is restricted to receiving waste from the Northwest Interstate Compact signatories namely Alaska, Hawaii, Idaho, Montana, Oregon, Utah and Washington. Exceptions can be made on a case-by-case basis.

(f) Local Landfills - Clean waste can be disposed at local, city or county landfills the selection of which is dependent on where the decommissioning site is located. Individual landfills will have their own specific acceptance criteria. Some will take concrete, rebar but no organics while others may restrict certain building materials. The size of material accepted for disposal will vary from site to site also.

8.5.1 Selection Logic

Disposal option selection could be specified by a single factor, such as cost or client direction, or from a more complex evaluation as shown in Figures 8.3.1 and 8.3.1a This logic helps determine whether or not to attempt to 1) decontaminate the waste and recycle the material, 2) volume reduce the waste and dispose, or 3) fix the contamination in place and reuse with restrictions.

8.6 WASTE MINIMIZATION

A waste minimization program (WMP) is required which will be an organized, comprehensive, and a continual effort to reduce the quantity and toxicity of waste to be disposed. The WMP is mandated to eliminate or minimize pollutant releases to all environmental media by DOE Order 5400.1, "General Environmental Protection Program." These efforts offer increased protection of public health and the environment.

Waste minimization is accomplished by eliminating or minimizing the generation of waste, and by processing to achieve volume reduction. Those waste materials that cannot be eliminated or minimized but can be recycled will be used, reused, or reclaimed. Waste that cannot be recycled will be treated to reduce its volume, toxicity, and mobility before storage or disposal.

The development of waste minimization goals, waste generation information, and processes for continual evaluation of the program are primary elements of the Decommissioning Program. The WMP goal setting emphasizes avoidance of the production of hazardous and mixed wastes as well as waste minimization of all categories of waste. Pollution prevention awareness will be promoted and various waste minimization techniques will be implemented, with the support of employee training and awareness programs, to reduce waste and meet the requirements for quality, safety, and environmental compliance.

Economic consideration must be an integral part of the WMP. Therefore, cost versus benefit evaluation will be included in each proposed waste minimization effort.

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Figure 8.3.1. LLRW Disposal Alternative Selection Logic

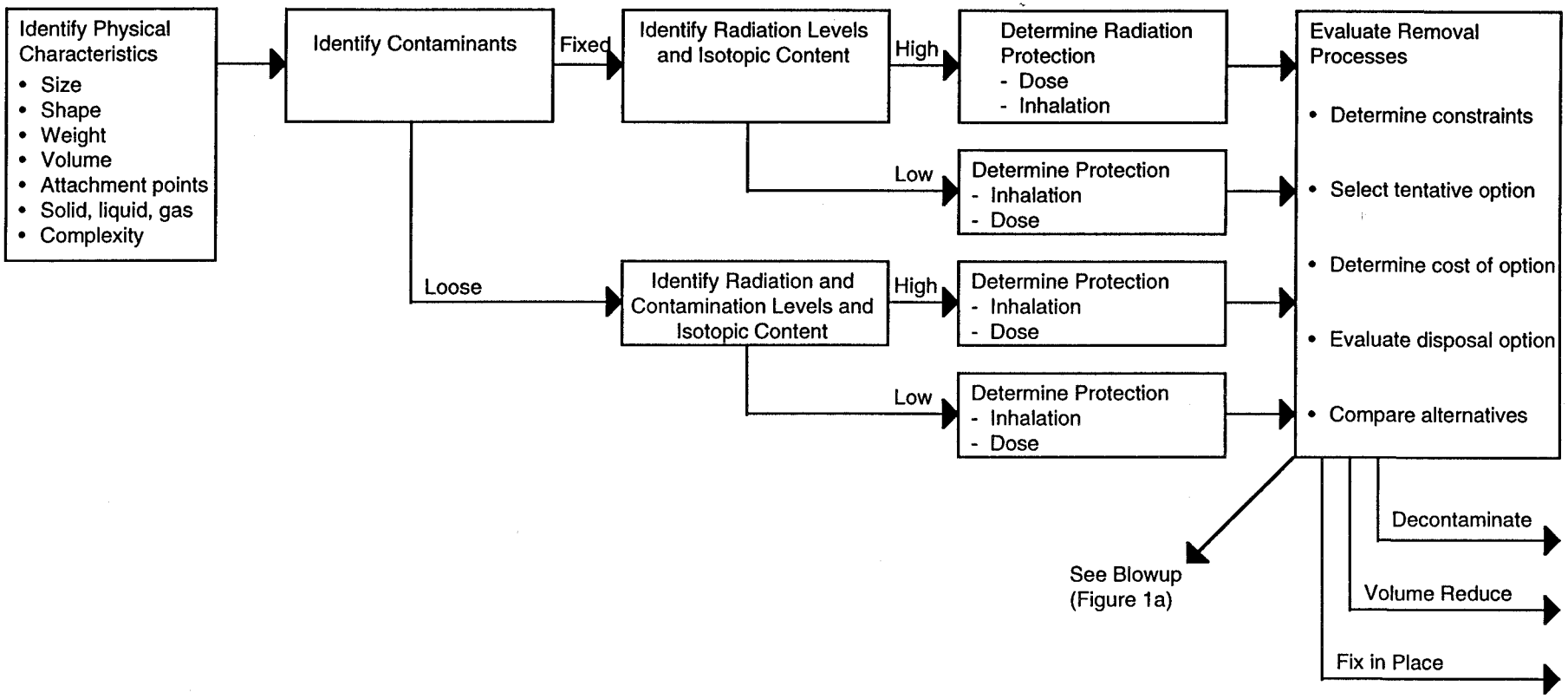
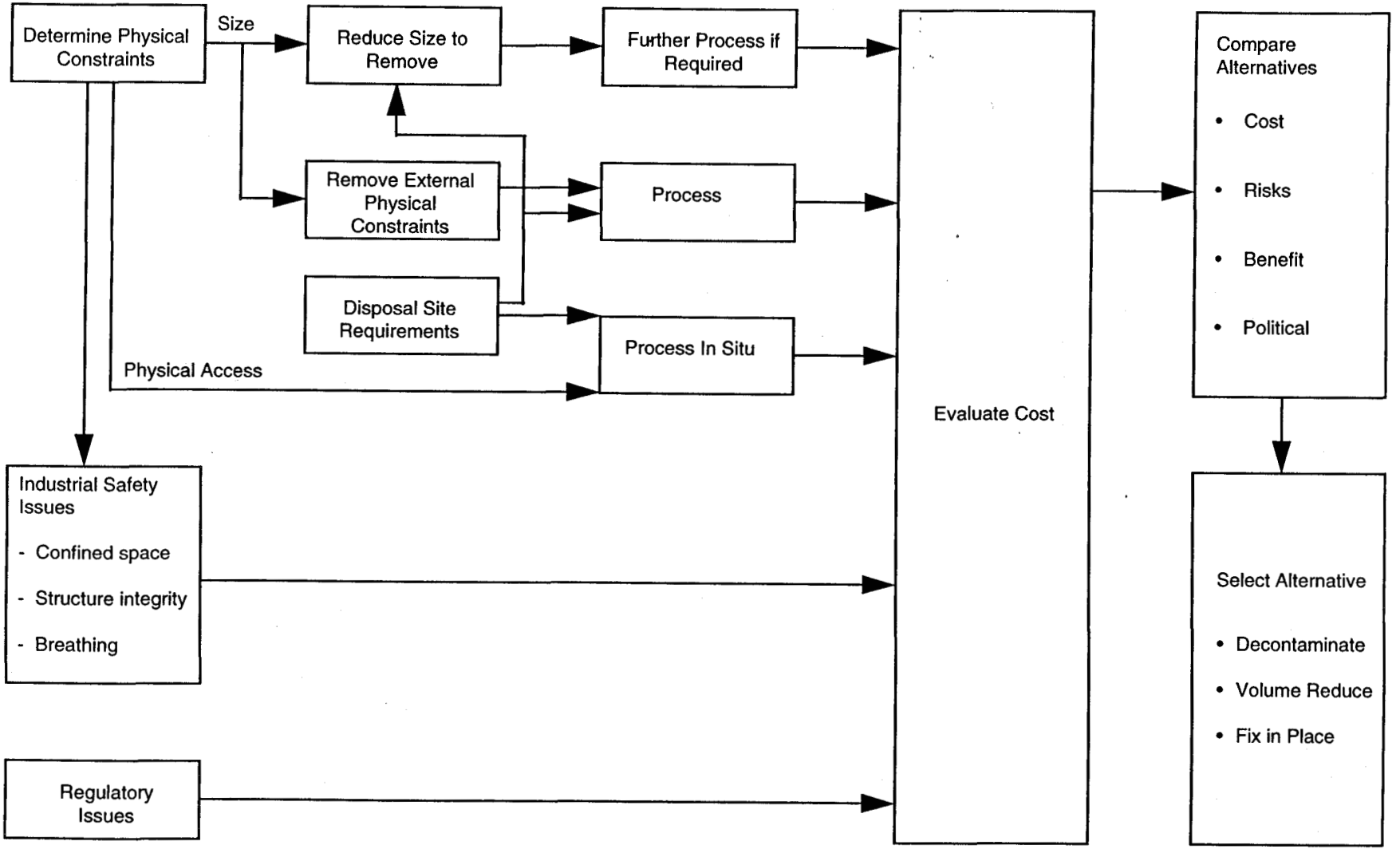


Figure 8.3.1a. LLRW Disposal Alternatives Logic
Evaluation of Removal Process



8.7 NON-CONTAMINATED WASTE DISPOSAL

8.7.1 Determination of "Clean"

The release of clean material, equipment and facilities from a radioactively contaminated site is accomplished by conducting radiological surveys to demonstrate that residual radioactive material satisfies release criteria.

The ultimate goal is to assure that future uses will not result in individuals being exposed to unacceptable levels of radiation and/or radioactive materials. The regulator establishes the acceptable radiation dose to a potentially exposed individual, based on consideration of risk and scientific data relating dose to risk. Residual levels of radioactive material that could be present and still assure that an individual would not exceed that acceptable radiation dose are then calculated by the analyses of various pathways and scenarios (direct radiation, inhalation, ingestion, etc.) through which exposure could occur. These derived levels, known as guideline values, release guidelines, or simply, guidelines, are presented in terms of direct radiation levels, surface activity levels, volume concentrations of radioactive material in soil and building materials, and site inventory limits. These guideline values refer to radiation and radioactivity above normal background levels. Guidelines for direct radiation levels are expressed in units of exposure rate, i.e. microroentgens per hour (μR/h). Surface activity guideline values, applicable to building or equipment surfaces, are expressed in units of activity per surface area [typically disintegrations per minute per 100 cm2 (dpm/100 cm2)]. Volume concentration guideline values, which apply to soil, induced activity, and debris, are expressed in terms of activity per unit mass [typically, picocuries per gram (pCi/g)]. Site inventory limit refers to the total quantity of residual radioactive material from formerly licensed operations, permitted to remain on the site following unconditional release; this value is expressed in units of activity, i.e. microcuries (μCi) or millicuries (mCi). The guideline values for direct radiation are not a function of the source of the radiation, i.e., it is independent of the specific radionuclide or its chemical/physical form. However, because of differences in environmental behavior and associated radiation doses through other exposure pathways, the guideline values for surface activity, volume concentration, and site inventory will depend upon the specific radionuclides present. If more than one radionuclide is present, the individual contributions from each radionuclide are limited, such that the sum of the radiation doses from all sources does not exceed the established acceptable dose.

Release of clean material, debris, equipment, and facilities from a site contaminated with hazardous materials is accomplished by demonstrating that the wastes or materials do not exhibit any of the characteristics of hazardous waste under subpart D of 40 CFR 261 (6 CCR 1007-3,264) or is excluded under the provisions of subpart D. Process knowledge and operating history related to the facilities can also be used to segregate hazardous contaminant areas from unaffected areas.

Further sampling and analysis will be required during decommissioning for various wastes to also determine if the wastes will be regulated as Land Disposal Restricted (LDR) wastes, or if the wastes can be exempted under the "hazardous debris rule." Under this provision, and in accordance with the debris treatment standards (40 CFR 268.45), treated hazardous debris is excluded from the definition of hazardous waste, provided that the debris is treated to the performance or design and operation standards by an extraction or destruction technology and the treated debris does not exhibit the characteristic of a hazardous waste.

The excluded debris can be disposed in an industrial landfill (subtitle D) rather than a RCRA permitted landfill (subtitle C).

8.7.2 Temporary On-Site Storage of Clean Waste

On-site storage of industrial waste from individual decommissioning projects awaiting disposal at the RFETS sanitary landfill must be controlled and documented. Individual project storage locations should be identified, with controlled access to prevent items not inspected and/or not surveyed from being placed in the area. Each waste storage location may be surrounded by a berm or curb to control runoff of rain or spilled liquids. This control ensures environmental protection while the materials await final survey and shipment. Because items placed in on-site storage have been surveyed and documented as nonradioactive, no radioactive contamination of the storage area is expected.

8.7.3 Transportation of Clean Waste

Non-radioactive, non-hazardous, clean waste will be transported to a Sanitary Landfill for disposal.

8.7.4 Records

Records describing items disposed of as nonradioactive waste must be kept. The records contain item descriptions, survey data sheets, comparisons to release criteria, and copies of release certification as required. This information may consist of one or more forms designed for collecting the required data. The nonradioactive waste disposal record also contains forms relevant to the final disposition of the waste, (e.g., shipping notice, waybill, and disposal site receipt form).

8.8 RADIOLOGICAL SURVEYS AND WASTE ASSAY

During the progression of the decommissioning projects, various instruments will be utilized to perform "Hold Up" measurements on facilities and equipment to estimate quantities of radioactive contamination present prior to and following decontamination. Measurements will be performed in-situ, where possible, using portable gamma-neutron detectors so that estimates can be made concerning the radioactive contamination levels for the equipment or wastes being removed from the facility. In some cases, instrumentation will be used to determine if waste or an equipment item is classified as TRU or Low-Level waste, depending on the in-situ measurement and resulting determination from engineering and nuclear criticality calculations, where applicable.

Once decommissioning wastes are package for disposal, they are assayed prior to being transported from the point of generation to on-site storage or shipped off-site. RFETS utilizes Gamma Spectroscopy to assay drums and crates prior to shipment to determine levels of radioactivity for waste classification purposes. When the radionuclides in a volume of bulk material, typically contained in a drum, box, or tank, emit gamma radiation, direct external measurements can identify and/or quantify the radioactive material inside. Gamma radiation is detected using plastic scintillators, sodium iodide crystals, or germanium crystals. RFETS has two (2) active units, the drum assay unit which is located in Building 371 and a crate assay unit, located in Building 569.

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Real-Time Radiography (RTR) is also utilized to examine the contents of drums prior to shipment. The container to be examined is placed between an x-ray tube and a detector (screen, image intensifier, and television camera). The image formed is viewed on a real-time basis so that motion, such as free liquids, can be detected by viewing the container. RTR provides additional information to assist in certification of the contents of a waste container prior to shipment.

8.9 QUALITY CONTROL OF RADIOACTIVE PACKAGING & RECORDS

To prevent the inclusion of hazardous materials in radioactive waste packages, waste package loading shall be witnessed by a trained and qualified waste inspector who is knowledgeable about the past operation of the facility being decommissioned. This observer will be trained to recognize hazardous materials which have been used in the facility and which may have been overlooked during decommissioning. This precaution is necessary to prevent the generation of mixed waste. Observers will document their acceptance of each container to certify that the waste packages do not contain mixed waste, and that packaging requirements have been met.

RMRS Quality Assurance and/or waste inspectors shall perform and document the following inspections, measurements, or verifications in support of radioactive waste disposal activities:

- Inspect shipping containers prior to loading. The inspection shall verify that the containers are strong and tight (i. e., have no holes or cracks through which material can escape). If a container has been stored outside, the inspection shall verify that the container contains no water.
- Witness loading of waste containers to preclude inclusion of hazardous materials.
- Inspect all waste packages to verify that the shipping containers have not been damaged during loading and that they have been properly sealed to prevent the escape of any material.
- Verify that waste packages are marked/labeled in accordance with disposal site requirements.
- Verify that radiation and contamination surveys of waste packages and transport vehicles are performed in accordance with procedural requirements.
- Verify that the measured external dose rates and contamination levels are within the applicable limits.
- Witness loading of waste packages onto the transport vehicle to verify the identity of each waste package against the shipping manifest and to verify that the packages are adequately braced and that the gross weight and Pu limitations for the shipment are not exceeded.

A checklist will be used to ensure that packaging and shipment of radioactive waste is accomplished in accordance with approved procedures. The checklist will identify required activities and the organization(s) responsible for each activity. It will include a location for sign-off for each activity by the responsible organization(s). Before a radioactive waste shipment can leave the decommissioning site, the checklist for that shipment must be reviewed for completeness and signed off by Quality Assurance.

SECTION 9

RADIOLOGICAL HEALTH & SAFETY

9.0 RADIOLOGICAL HEALTH & SAFETY

9.1 Radiation Protection Program

Title 10, Code o Federal Regulations, Part 835 (10 CFR 835), "Occupational Radiation Protection," subsection § 835.202 (a), stipulates that the Department of Energy (DOE) activities shall be conducted in compliance with a documented Radiation Protection Program (RPP) as approved by the DOE. The Rocky Flats Environmental Technology Site (RFETS) RPP, 1-Q50-RPP-0001, sets forth the radiation protection standards, limits, and program requirements for the protection of individuals from occupational exposures of ionizing radiation resulting from DOE activities at this site. Building/area decontamination, deactivation, and decommissioning are three of the many DOE activities that are covered by the site RPP.

All subcontractors who provide services on-site, or those who are engaged in an off-site DOE activity that has the potential to result in occupational radiation exposure, are contractually required to follow applicable portions of the site RPP, which implements 10 CFR 835.

9.1.1 Elements of the Radiation Protection Program

- *Standards for Internal and External Exposure*

The exposure to general employees, the embryo/fetus, minors, and members of the public, shall be controlled so the applicable limits of 10 CFR 835 are not exceeded.

The total effective dose equivalent during a year shall be determined by summing the effective dose equivalent from external exposures and the committed effective dose equivalent from intakes during the year.

Thermoluminescent dosimeters (TLDs) shall be used to measure personnel whole body external occupational radiation dose in accordance with the requirements of 10 CFR 835, the RFETS Radiological Control Manual (site RCM), and site implementing procedures. Supplementary dosimeters may be used in addition to TLDs, as necessary, for tracking personnel dose during the TLD monitoring period. TLDs are also used for extremity monitoring.

The bioassay program consists of urine and fecal monitoring, as well as lung counting to determine the dose from inhalation or ingestion of radioactive materials. The bioassay program shall be conducted in accordance with 10 CFR 835,, the site RCM, and site implementing procedures.

- *Monitoring in the Workplace*

Work area monitoring for radiation, contamination, and airborne radioactivity shall be performed and documented as required by 10 CFR 835, the site RCM, and site implementing procedures.

Personnel monitoring for contamination and radiation exposure shall be conducted and recorded in accordance with 10 CFR 835, the site RCM, and site implementing procedures.

Instrumentation used for personnel or work area monitoring shall be used, calibrated, and maintained in accordance with 10 CFR 835, the site RCM, and site implementing procedures.

- *Entry Control*

Entry controls shall be consistent with the requirements of 10 CFR 835 and implemented in

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accordance with the site RCM and site implementing procedures.

Personnel entry control shall be maintained for radiological areas and the degree of control shall be commensurate with existing and potential radiological hazards within the area.

Authorizations shall be required to perform specific work within a radiological area and shall include specific radiation protection measures. Personnel performing work in a radiological area will perform the work under the authorization of a Radiological Work Permit (RWP). The RWP shall be initiated by the individual responsible for the work to be performed. The request for an RWP shall include the specific work location, the time period during which the proposed work will be performed and a description of the work. The function of the RWP is to define radiological conditions and personnel protection measures required to perform the tasks specified in the work package.

The Radiological Control and Industrial Hygiene & Safety organizations are responsible for maintaining a protective clothing and equipment (e. g., respirator protection) program that is in compliance with U. S. Department of Labor, Occupational Health and Safety Administration (OSHA) Standard, 29 CFR 1910 and 1926, "Occupational Health and Safety Standards" and 10 CFR 835. Selection will be based on the degree of hazard presented by the contaminant(s) and the working conditions under which exposure may occur.

The protective clothing and equipment needed in a radiological work area will be dictated in the applicable work documents or in the appropriate radiological work permit. Workers are responsible for properly wearing the clothing and equipment assigned by the RWP for the specific work operations.

- *Posting and Labeling*

Posting of areas for radiation, contamination, and airborne radioactivity control shall be in accordance with 10 CFR 835, the site RCM, and site implementing procedures.

Labeling of radioactive items or containers of radioactive materials shall be performed in accordance with 10 CFR 835, the site RCM, and site implementing procedures.

- *Records*

Radiological Control records will be generated and maintained in accordance with the requirements in 10 CFR 835, the site RCM, and the site implementing procedures.

Radiological Control records include surveys, RWPs, ALARA reviews, dosimetry records, training records, instruments calibration records, material release records. Records will be organized to facilitate retrieval. Radiological Control implementing procedures establish the requirements concerning record collection, safekeeping, retention, maintenance, updating, storage, preservation and assignment of responsibility. These requirements are consistent with the potential impact on quality, radiation exposure to workers and the public, and applicable regulations.

- *Radiation Safety Training*

Visitors who enter the Controlled Area shall receive a radiological safety orientation in accordance with the site RCM and site implementing procedures.

Site personnel who routinely enter the Controlled Area and encounter radiological barriers, postings or radioactive materials shall receive General Employee Radiological Training in accordance with the site RCM and site implementing procedures.

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Workers whose job assignment requires access to Radiological Buffer Areas and Radiation Areas shall complete Radiological Worker I Training in accordance with 10 CFR 835, the site RCM and site implementing procedures.

Workers whose job assignment requires access to High and Very High Radiation Areas, Contamination Areas, High Contamination Areas and Airborne Radioactivity Areas shall complete Radiological Worker II Training in accordance with 10 CFR 835, the site RCM and site implementing procedures.

- *ALARA Design and Engineering Controls*

Measures shall be taken to maintain radiation exposures in controlled areas ALARA through facility and equipment design and administrative control.

The primary methods used shall be physical design features such as confinement, ventilation, remote handling, and shielding. Administrative controls and procedural requirements shall be employed only as supplemental methods to control radiation exposure. The design objectives for new facilities or the modification of existing facilities shall be in accordance with 10 CFR 835, the site RCM, the ALARA Program Manual (94-ALARA PLAN-0003), and site implementing procedures.

Engineering controls is a term used for the general class of devices (e. g., tents and shielding) and associated methods to reduce the exposure of personnel to radiation and radioactive material. Engineering controls should include the containment of radioactive material at the source when and wherever practicable. Engineering controls typically include temporary shielding, control of airborne radioactivity sources, control of surface contamination, process instrumentation, and other work improvement techniques. Engineering controls will be evaluated during work package preparation and will be dictated in the applicable work documents or in the appropriate radiological work permit.

Personnel exposure from external sources of radiation shall be evaluated and maintained ALARA.

Surface contamination will be evaluated and controlled to minimize the spread of contamination in radiological areas and prevent the spread of radioactive materials to uncontrolled areas.

Control of airborne radioactivity sources, to minimize and control internal exposures, will be considered for work activities that have the potential for producing airborne radioactivity (e. g., cutting, grinding, etc.).

Engineering controls should be the primary method of minimizing airborne radioactivity and internal exposure to workers. Administrative controls including access restrictions and the use of specific work practices designed to minimize airborne contamination, should be used as the secondary method to minimize worker internal exposure. When engineering and administrative controls have been applied and the potential for airborne radioactivity still exists, respiratory protection should be used to limit internal exposures.

- *Accidents and Emergencies*

The administrative and operating procedures to be used for decommissioning are designed to prevent the occurrence of accidents. However, the possibility always exists that accidents or natural disasters may occur, despite the most effective safeguards. Because of this possibility and the presence of radioactive material, RFETS maintains a DOE Radiological Contingency Plan. The plan establishes an organization capable of coping with emergencies. This organization will classify emergencies according to their severity, define and assign

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responsibilities, and clearly outline the most effective measures to mitigate the consequences of an emergency to the employees and the public.

Emergency procedures contain applicable requirements from 10 CFR 835 and the site RCM, and will be placed in effect whenever an emergency exists.

9.2 Management Positions Responsible for Radiation Protection

Management Positions Responsible for Radiation Protection and Maintaining Exposures ALARA during Decommissioning.

The Safety and Nuclear Compliance organization will be responsible for assuring compliance of decommissioning project activities with applicable regulatory requirements controlling radiological and nuclear safety and for safeguarding special nuclear material. This organization administers DOE orders, reviews and approves all Work Authorizations (WA) for compliance with applicable regulations and orders, provides interpretation of orders and regulations, determines the need for regulatory actions, coordinates the preparation and processing of applications, disseminates regulatory requirements to operating organizations, and maintains or oversees maintenance of records for DOE audit or review. This organization is also responsible for the overall planning, coordination, and administration of the Special Nuclear Material (SNM) measurement control and accounting, nuclear safety, health physics, and industrial safety functions.

The management positions responsible for radiation protection and maintaining exposures ALARA during decommissioning, as well as the specific responsibilities of these positions, are identified below.

The Decommissioning Project Manager shall be responsible for the safe operation and control of decommissioning activities for the protection of the environment from potential sources of radiation/contamination exposures from decommissioning activities. The Project Manager, with the assistance of the Safety and Nuclear Compliance organization shall ensure that the conduct of decommissioning activities is in compliance with applicable criteria and company rules and practices.

The Health and Safety Manager (HSM) shall be responsible for ensuring that all work performed by decommissioning personnel and subcontractor personnel is conducted in compliance with the Decommissioning Project Health Physics program as defined in this Plan and implemented by approved procedures. The HSM will report to the Project Manager and will interface, as required, with the Radiological Control Program Integration Division Manager on matters related to radiological health and safety.

The Radiological Control Program Integration Division Manager, or designee, will be responsible for ensuring that decommissioning activities are conducted in compliance with DOE Orders, federal regulations, and the Radiological Control Program described in this plan.

The Radiological Control Program Integration Division Manager and the HSM shall each have the authority to stop any decommissioning activity which threatens the safety and health of workers, visitors, or the public or the quality of the environment.

9.3 Nuclear Criticality Safety

The quantity of plutonium present in RFETS facilities, as holdup, in the ducting is estimated to be in the several kilo-gram quantity. It is likely that only small quantities of plutonium holdup are also present in some process equipment. Since the plutonium in the ducts is spread throughout thousands of linear feet of ducting, the potential for a criticality accident during decommissioning is extremely small. However, a criticality accident is possible in the unlikely

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event that decommissioning activities result in the concentration of much of the plutonium in the facility in one place.

Nuclear criticality safety will therefore be a primary concern. Decommissioning activities will be conducted in accordance with procedures that limit the accumulation of fissile material. These measures will include, but not be limited to, the following:

- Appropriate in-situ surveys and analyses for plutonium will be performed.
- Criticality-safe containers will be used for decontamination liquids and solid residues in areas where plutonium was processed during facility operations or where the presence of plutonium was established by characterization surveys.
- The use of HEPA-filtered vacuum cleaners, which are not criticality-safe, will be administratively controlled to prevent the accumulation of unacceptable quantities of plutonium. Work instructions will identify the specific areas and material to be vacuumed and will provide clear direction as to the procedure(s) to be followed if material other than that identified by the work instruction is discovered. The areas and the descriptions of the material to be vacuumed will be based on characterization surveys performed prior to the start of work.
- Dismantled HEPA-system ducts will most likely be volume-reduced by compaction. Shredding of the ducting will not be utilized since this technique could result in the accumulation of unacceptably high concentrations of plutonium.
- Radiological Control Technicians will monitor the filter(s) in the ventilation systems of any volume reduction equipment used on a daily basis to detect any buildup of radioactive material in the filter(s). The filter(s) will be changed if conservatively established radiation limits are exceeded.
- All prefilters or HEPA filters removed from existing HEPA systems or from portable HEPA-filtered ventilation units will be assayed for plutonium prior to disposal.
- Criticality alarms will be used in work areas where there is a potential for accumulation of plutonium in significant quantities.

In addition to these measures and others which will be invoked as necessary in particular situations, nuclear criticality safety will be emphasized through nuclear safety training for decommissioning workers.

The Manager of Nuclear Safety will review all procedures and will approve procedures involving potential nuclear criticality concerns. This review/approval will ensure the adequacy of the measures employed to ensure nuclear safety. The Nuclear Safety Program described above will continue until decommissioning of the facility progresses to a point at which the Manger of Nuclear Safety determines that a criticality accident is no longer a credible event.

9.4 Special Nuclear Material Control and Accountability

Special Nuclear Material (SNM) control and accounting during decommissioning shall be in accordance with DOE's approved Nuclear Material Control Plan.

The SNM content of each waste package generated during decommissioning will be quantified for shipping and burial purposes using one of the following methods: direct measurement by gamma spectrometry or gamma survey or radioactivity measurements. The measured quantity of SNM will be added to the SNM inventory for the facility being decommissioned. When a

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waste package is shipped, the quantity of SNM will be reported on a DOE/NRC Form 741 (Nuclear Material Transaction Report) and removed from inventory.

9.5 Potential Radiological Accidents

It is estimated that plutonium hold-up in the system ducts may be in gram quantities and the total amount in the facility may be higher, therefore the potential for a criticality accident, although extremely remote, is conservatively assumed to exist. Decommissioning activities will therefore be performed in accordance with procedures which address nuclear criticality safety. Additionally, nuclear safety training will be provided to all decommissioning employees.

The dismantling of ducts and gloveboxes which contain accumulations of plutonium could potentially result in the contamination of personnel and equipment. The disassembly and removal of ducting and gloveboxes will be accomplished using appropriate precautionary measures which will include addressing lifting and rigging and protective clothing.

There is a potential for contamination of decommissioning workers during the removal of process equipment, much of which may be internally contaminated. Contamination control measures will be in place, and workers will be adequately trained to protect themselves against such contamination potential.

The potential exists for a release of contamination to the environment during roof removal. Radiological controls will be applied during roof removal, to ensure the protection of decommissioning workers and the public from contamination.

SECTION 10

FINAL RADIATION SURVEY & SITE RELEASE

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10.0 FINAL RADIATION SURVEY

10.1 Final Survey Overview

The purpose of the final decommissioning radiation survey will be to demonstrate the effectiveness of the decommissioning and to provide documentation that contaminated materials, structures, areas and components have been successfully removed/decontaminated to acceptable levels. Demonstrating that a facility meets established release criteria requires the systematic collection of data to assess surface activity levels, direct exposure rates and radionuclide concentrations in various remaining materials. If, as part of the overall facility disposition process additional environmental remediation actions are required, the final survey data collected as part of decommissioning will be used to document post decommissioning conditions and compliance with release criteria; as appropriate. During the course of decommissioning, materials and equipment surveyed and found to meet unconditional release criteria will be released on an on-going basis. Most decommissioning removal actions will not be the final action at a location. Remedial action will follow and final release will occur after the remedial action.

All final radiological surveys will be conducted in accordance with approved procedures using equipment and techniques that will demonstrate the effectiveness of a particular dismantlement and/or decontamination effort. Because the purpose of the final survey is to demonstrate that a facility meets the established release criteria, the survey will be performed in a manner that assures the results are accurate and that uncertainties have been adequately considered.

Surveys will be performed by trained individuals who are required to follow standard written procedures and will use properly calibrated instruments which are sensitive to the suspected contaminant. The custody of samples will be tracked from collection to analysis. Data will be recorded in an orderly and verifiable way and reviewed for accuracy and consistency. Every step of the final survey process, from training personnel to calculating and interpreting the data will be documented in a manner that lends itself to independent verification.

10.2 Final Release Criteria

One of the ultimate goals of the decommissioning process is to assure that future uses of a facility will not result in individuals being exposed to unacceptable levels of radioactive materials. Another goal of the decommissioning process is to assure that future use of a facility will not result in individuals being exposed to unacceptable levels of hazardous or toxic materials (e.g., chemicals, asbestos, PCB's). This is addressed elsewhere in this document.

The final release criteria for remaining building structures and materials will limit the effective does equivalent (EDE) to 15/75 mrem from the site in any single year above background. This means: (1) Conduct remediation so that, after completion of the remedial action, radioactive material in excess of background radiation levels shall not exceed concentrations that could cause any reasonably maximally exposed member of the public to receive, through all potential exposure pathways, an EDE of 15 mrem from the site in any single year. The 15 mrem will be calculated using exposure scenarios that are consistent with the land uses contemplated in the Vision; and (2) Determine that the remediation provides a reasonable expectation that, for 1000 years after completion of the remedial action in the event of failure of the active control measures, radioactive material in excess of background radiation levels shall not exceed concentrations that could cause any reasonably maximally exposed member of the public to receive, through all potential exposure pathways, an EDE of 75 mrem from the site in any single year. Once this EPA Site Remediation Regulation is promulgated as final, necessary modifications to applicable plans and procedures will be made to comply with the requirements of the final regulation.

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Residual levels of radioactive material that could be present and still assure that an individual would not exceed an acceptable radiation dose will be calculated by the analyses of various pathways and scenarios (direct radiation, inhalation, ingestion, etc) through which exposure could reasonably occur. The derived levels, known as guideline values, release guidelines, or simply, guidelines, are presented in terms of direct radiation levels, surface activity levels, volume concentrations of radioactive material in soil and building materials, and site inventory limits. These guideline values refer to radiation and radioactivity above normal background levels. Guidelines for direct radiation are expressed in units of exposure rate, i.e. microroentgens per hour (μR/hr). Surface activity guideline values, applicable to building or equipment surfaces, are expressed in units of activity per surface [disintegration per minute per 100 cm^2 (dpm/100cm^2)]. Volume concentration guideline values, which are applied to soil, induced activity, and debris, are expressed in terms of activity per unit mass [typically, picocuries per gram (pCi/g)]. Site inventory limit refers to the total quantity of residual radioactive material permitted to remain onsite following completion of remedial action; this value is expressed in units of activity, i.e. microcuries (μCi) or millicuries (mCi).

The release of the site, facilities and materials remaining on site will be based on proper application of surface contamination, volume concentration, soil/water concentrations and exposure rate release criteria. The objective of the decommissioning process is to remove a facility from service and reduce residual radioactivity to a level that permits either:

1. Release of Facility for unrestricted use; or

2. Release of Facility under restricted conditions

The general decision flow for this process is shown in Figure 10.1, Decision Chart for Choosing Unrestricted or Restricted Release of Facility.

The criterion for Unconditional Release of RFETS Facilities is:

- The Total Effective Dose Equivalent (TEDE) to the reasonably maximally exposed member of the public does not exceed 15 mrem/year. The unrestricted release criteria for building surfaces and material are contained in Table 10.1

- No institutional or active control measures will be required.

The criterion for Restricted Release of RFETS Facilities is:

- Facilities/sites will be decontaminated until further reductions in residual radioactivity are not technically achievable, would be prohibitively expensive, or would result in net public or environmental harm. Building specific release criteria will be developed using an appropriate dose model (RESRAD) and approved as part of the Decommissioning Operations Plan (DOP).

- The Total Effective Dose Equivalent to the reasonably maximally exposed member of the public (the public), if institutional controls failed, shall not exceed 75 mrem/year.

Two basic methods for demonstrating compliance with release criteria will be used:

1. Compare final survey results directly to the values contained in Table 10.1; or

2. Compare final survey results to limits derived using the generic dose conversion factions contained in NUREG/CR 5512, or limits derived using a site/facility (e.g., RESRAD).

10.3 Background Determination

Background levels of radiation will be determined principally by taking radiological measurements of various construction materials (i.e., concrete, metal, tile, soil, etc.) within onsite, or offsite buildings of similar construction, but having no history of radioactive contamination. Background measurements will include both "instrument background" and naturally occurring background radioactive materials, including enhanced background radiation levels due to fallout.

Figure 10.1

DECISION CHART FOR CHOOSING UNRESTRICTED OR RESTRICTED RELEASE OF A FACILITY

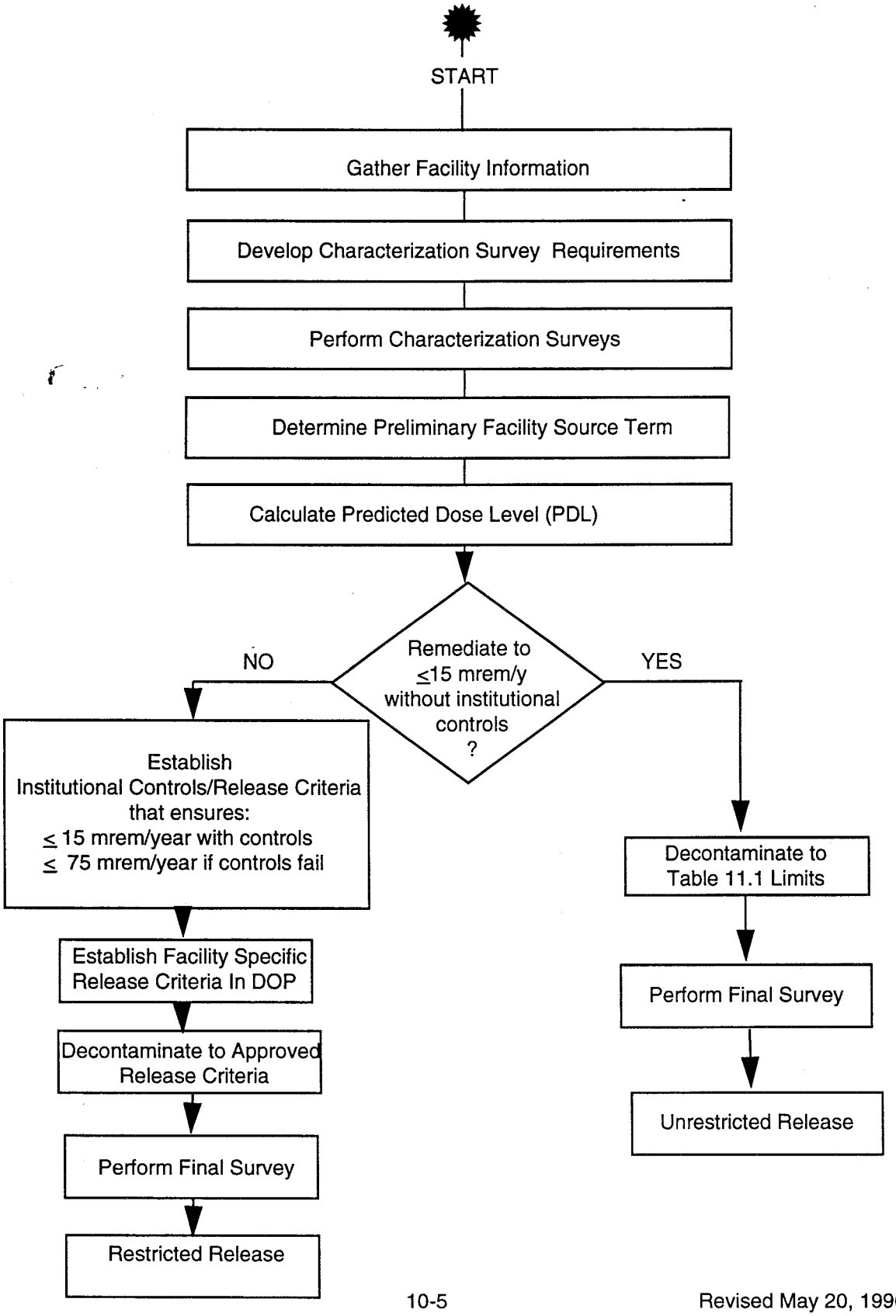

TABLE 10.1
SUMMARY OF CONTAMINATION VALUES FOR UNRESTRICTED RELEASE

RADIONUCLIDE (1)	Average Total (Fixed + Removable) Contamination (3,4) dpm/100cm^2 (2)	Maximum Total (Fixed + Removable) Contamination (5) dpm/100cm^2 (2)	Removable Contamination (2,6) dpm/100cm^2 (2)
Transuranics, I-125, I-129, Ra-225, Ac-227, Ra-228, Th-230, Pu-231	100	300	20
Th-(natural Sr-90, I-125, I-131, I-131, Ra-223, Ra-224, U-232, Th-232	1,000	3,000	200
U-(natural), U-235, U-236, & associated decay products, alpha emitters	5,000	15,000	1,000
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 & others noted above (7)	5,000	15,000	1,000

Limits in this table are from the Nuclear Regulatory Commission Regulatory Guide 1.86.

NOTES:

(1) 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.

(2) As used in this table, disintegrations per minute (dpm) is defined as 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.

(3) Measurements of average contamination should not be averaged over an area of more than 1 meter^2. For objects with a total surface area of less than 1 meter^2, the average should be derived for each object.

(4) The average exposure rate measured at one meter from accessible surfaces should be limited to 5 μR/hr above background.

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

(6) The amount of removable material per 100cm^2 of surface area should be determined by wiping an area of that size with a dry filter of soft, absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. Except for transuranics and Ra-228, Ac-227, Th 228, Pa 231 and alpha emitters, it is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate the total residual surface contamination levels are within the limits for removable contamination.

(7) 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.

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TABLE 10.2
TYPICAL FINAL SURVEY INSTRUMENTATION SUMMARY

Radiation Detected	Detector Type	Detector Area-Density	Manufacturer & Model #	Units
Surface Beta-Gamma Alpha	Gas flow proportional	125 cm^2 0.8 mg/cm^2	Ludlum 43-68	cpm
Surface Beta-Gamma Alpha	Gas flow proportional	300 cm^2 0.8 mg/cm^2	Ludlum 43-47	cpm
Surface Beta-Gamma Alpha	Gas flow proportional	550 cm^2 0.8 mg/cm^2	Ludlum 43-47	cpm
Surface Beta, Alpha	ZnS(Ag) Plastic Scintillation	125 cm^2 1.2 mg/cm^2	Ludlum 43-89	cpm
Surface Beta-Gamma	Geiger-Mueller	15.5 cm^2 1.7 mg/cm^2	Ludlum 44-40	cpm
Surface & Liquid Activity Beta/X-ray	Liquid Scintillation	N/A	Beckman LS 3801	cpm
Removable Surface Beta-Gamma, Alpha	Gas Flow proportional	24.2 cm^2 80 $\mu g/cm^2$	Tennelec LB-5100	cpm
Gamma Exposure Rate	Presssurized Ion Chamber (PIC)	8 L Sphere 2.85 g/cm^2	Reuter-Stokes RSS-112	$\mu R/hr$
Gamma Exposure Rate	Sodium Iodide scintillation	1" X 1"	Ludlum 44-2	$\mu R/hr$ (Cs-137)
Gamma Spectroscopy	High-purity Germanium	2" X 2"	Canberra Genie-PC®	Geometry Dependent
Background and Special Measurements	High-purity Germanium	2" X 2"	EG&G Ortec Nomad	Geometry Dependent

TABLE 10.3
TYPICAL DETECTION SENSITIVITIES

Instrument	Radiation	Count time (min)	Background (CPM)	Efficiency[a] (cpm/dpm)	Background Count Time (min)	MDA (dpm/100 cm^2)	Scan Survey MDA (dpm 100 cm^2
Ludlum Model 43-68	beta	0.17	750	0.21	1	960	2300
Ludlum Model 43-68	alpha	0.17	3	0.20	5	122	570
Ludlum Model 44-40 (scaler mode)[b]	beta-gamma	0.2	50	0.12	5	3580	5000
Tennelec LB-5100	beta	1	2.3	0.45	1	21.7	N/A
Tennelec LB-5100	alpha	10	0.1	0.31	10	2.5	N/A

Table 10.3 Notes:

[a]Sources used for efficiencies are traceable to the National Institute of Standards & Technology (NIST). Sources consist of Tc-99 or Th-230 uniformly deposited over areas of 17.3 cm^2 or 100 cm^2. The efficiencies for TC-99 and Th-230 are comparable to the nuclides of primary concern at RFETS; Pu-239, U-238, Am-241, U-233, 234.

The efficiency is determined by counting the source with the detector in a fixed position one-half cm from the source.

Scan survey sensitivity (MDA) was calculated assuming a scan rate of 5 cm/second.

[b]Due to its limited sensitivity, the Ludlum 44-40 detector should only be used for scan surveys when size constraints preclude use of larger detectors.

Efforts will be made to find structures and materials with approximately the same physical characteristics as the facility undergoing decommissioning. The sampling scheme, sample locations, number, and statistical evaluation will be based on the guidance in NUREG/CR 5849.

Background response will be established for each type of instrument or measurement to be used. The objective of the background determination are to:

- Assure reliable instrument operation;
- Establish the reference background values for each type of instrument - detector to be used in the survey.
- Assess the variability in background responses for principal detectors under different applications and conditions of use; and
- Determine the need for correction factors or special measurements to establish the background of final survey measurements.

Collection of background data will be performed in accordance with approved procedures appropriate for the instrumentation used. Background determination will include the following:

Direct Surface Beta-Gamma Measurements

Direct measurements will be made of similar building construction materials. This will assess the influence of naturally occurring radionuclides. The number of background measurements is dependent upon the types of facility materials.

Direct Surface Alpha Measurements

Similar protocols to those used to determine the direct beta-gamma. Special counting techniques may be required to assess the influence of naturally occurring radionuclides.

Removable Surface Beta - Gamma Measurements

Background determinations for removable beta-gamma measurements will be made by taking a series of blank smears collected from an area verified free of facility radioactive material.

Removal Surface Alpha Measurements

Background determinations for removable Alpha measurements will use same protocol as that for removable surface beta-gamma background.

Gamma Exposure Rate Measurements

Measurements will be made in various facilities with similar geometry and construction material. Attempts will be made to evaluate local background variations due to natural radioactivity in construction materials; (e.g. K-40) in the walls and floors of the area being surveyed and shielding of cosmic radiation.

Soil and Water Activity Measurements

Soil and water samples will be collected from the areas unaffected by facility operations.

10.4 Classification of Areas by Contamination Potential

All areas of the RFETS (including structures, plant systems and outdoor areas) will not have the

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same potential for residual contamination and therefore will not require the same level of survey coverage to achieve an acceptable level of confidence that the facility satisfies the established release criteria. By designing the survey such that areas with higher potential for contamination receive a higher degree of survey effort, the process will be both effective and efficient.

Classification of areas will be based on results of radiological characterization data, history of operations and potential for radioactive contamination and operational radiological surveys performed during building disposition. Each survey area will be classified as follows:

Affected Areas: Areas that have potential radioactive contamination (based on facility operating history) or known radioactive contamination (based on past or preliminary radiological surveillance). This would normally include areas where radioactive materials were used and stored and where records indicate spills or other unusual occurrences could have resulted in spread of contamination.

Unaffected Areas: All areas not classified as affected. These areas are not expected to contain residual radioactivity, based on a knowledge of the site/facility history and previous survey information.

10.5 Griding and Marking Measurement Location

To assure that all affected area surfaces and structures are adequately surveyed during final survey, a square or other appropriate geometric grid will be superimposed on surfaces being surveyed. The grids may be physically marked on the surfaces or, as a minimum, the measurement location will be labeled. The primary purpose of the grid is to facilitate systematic selection of measurement or sampling locations and provide a mechanism for referencing a measurement or sample back to a specific location. Typically a one by one meter griding protocol will be used for affected surfaces and structures.

Measurement locations will be clearly identified to provide a method of referencing survey results to survey area locations. Whenever it is a appropriate and cost effective, gridding will be used. However, the physical grid layout may be substituted with surface makings or labels. Due to the large number of obstructions, non-uniform surfaces and complex geometries remaining in some facilities, gridding will be used only for portions of affected areas (1 x 1 meter grids) and in affected open land areas (10 x 10 or 5 x 5 meter grids). Unaffected survey areas will not generally be gridded.

10.6 Measurement Frequency

Measurement frequencies will be selected to allow concentrated survey effort in those areas most likely to be contaminated, taking into account the type and size of the survey area. Based upon the facility design, number of systems and equipment that may be abandoned in place an appropriate number of measurement locations will be specified in survey packages using the following guidance:

Affected Areas - The survey to include a scan of 100% of accessible surface area and a minimum of 30 measurements per survey area for removable activity (smears) and total activity (fixed point measurements). In-situ measurements will be used in selected situations In areas of suspected material activation exposure rate measurements will be made. The selection of measurement locations will ensure uniform coverage of the area and the investigation of potentially elevated areas of activity identified during the scan.

If the area is gridded, measurements will be taken at each grid intersection. Where survey units are not gridded, the number of measurement locations will be based in part on the size of the area being surveyed. To ensure adequate coverage in survey areas not gridded, the following measurement frequencies have been established:

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For survey areas $\leq$ 20 M^2 - A minimum of 30 measurement locations

For survey areas > 20 M^2 - Equivalent to 1 meter intervals

Unaffected Survey Areas - The final survey of unaffected survey areas to include a scan of approximately 10% of the accessible surface area comprising of the floors and walls below 2 meters, and a minimum of 30 measurements per survey area for removable activity and total activity. In general, these areas will not be gridded. Measurement locations will ensure uniform coverage of the area and the investigation of potentially elevated areas of activity identified during the scan. The number of measurement locations will be based in part on the size of the area being surveyed.

For survey areas $\leq$ 1500 M^2 - A minimum of 30 measurement locations

For survey areas $\leq$ 1500 M^2 - A minimum of 1 measurement location for each 50 square meters surveyed

Affected Systems/Piping The final survey requirements for remaining facility systems/piping will involve selecting biased survey locations in the system (i.e. locations where activity, if present, is most likely to be found). Biased locations will be selected by an engineering evaluation of the system including consideration of where contamination may have entered the system, concentrated in the system or was present based on past radiological samples. Examples of biased measurement locations include filters, tank bottoms, low point piping, interface piping from contaminated systems. The appropriate number of survey locations and the extent of survey at each location is dependent on the size, function, history and contamination potential of the system. Normally, at least 30 survey locations are chosen, although the appropriate number will be dependent on the particular system.

Unaffected Systems/Piping - The final survey for unaffected systems/piping will involve collecting measurements at selected biased locations. Typically, 10 survey locations are chosen with an appropriate number of measurements taken at each location.

10.7 Instrumentation

Radiation detection and measurement instrumentation for final surveys will be selected to provide reliable operation and adequate sensitivity to demonstrate that the measurements taken are sufficient to conclusively demonstrate that the release limits have been met. Commercially available portable and laboratory instruments and detections produced by several manufacturers will be selected based upon detection sensitivity, operating characteristics and expected performance in the field. A listing of typical detectors and their detection characteristics are summarized in Tables 10.2 and 10.3. However, surveys will be performed using the most suitable equipment available and survey measurements shall not be limited to this listing. Data quality objectives (DQOs) for final survey measurements will be established and documented in accordance with Characterization and Survey Procedures.

Each instrument will be calibrated and maintained to enable the readout (usually in counts or counts per minute) to be converted to units in which the guideline levels are expressed. Instruments and detectors used to conduct final survey will be calibrated and maintained in accordance with applicable instrumentation procedures. Radioactive sources used for the purpose of calibration will be traceable to the National Institute of Standards and Technology (NIST).

Periodic checks of instrument response will be performed (normally daily or prior to use) to assure that calibration and background have not changed. Following calibration, instrument response will be determined and acceptable range of response established. Instrument response tests will be performed and documented typically prior to beginning the days measurements to

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assure continued acceptable operation. If the instrument response does not satisfy the established acceptable range, the instrument will be removed from service until the reason for the deviation can be determined and resolved and acceptable response again demonstrated. If repair and/or recalibration is necessary, acceptable response ranges will be reestablished and documented.

10.8 Minimum Detectable Activity (MDA)

The detection sensitivity of a measurement system refers to the statistically determined quantity of radioactive material or radiation that can be measured or detected at a pre-selected confidence level. This sensitivity is a factor of both the instrumentation and the technique or procedure being used. Typically, detection sensitivity has been defined as that level above which there is less than a 5% probability that radioactivity will be reported present when it is really absent (Type I error) or reported absent when it really is present (Type II error).

Field and laboratory instrument minimum detectable activities (MDA) will be calculated using Equation 10.1. The MDA is dependent upon several factors: sample count time, background count time, background count rate and detector efficiency. Count times will be selected to ensure that the measurements are sufficiently sensitive with respect to applicable guideline values. For example, for unaffected survey areas, the count times associated with measurements for total activity (fixed point measurements), removable activity (smears) and gamma spectral analysis (sediment samples and soil) will be adjusted as required to ensure a MDA of < 25% of the applicable guideline value. For affected survey areas count times will be adjusted as required to ensure an MDA of < 50% of the guideline value.

MDA values for field and laboratory counting instrumentation will be determined using the following equation

Equation 10.1

$$MDA = \frac{\frac{2.71}{t_s} + 3.29\sqrt{\frac{R_b}{t_s} + \frac{R_b}{t_b}}}{E * (A/100)}$$

MDA = the minimum amount of activity that can be statistically detected above background with a 95% probability and with a maximum of 5% probability of falsely interpreting background activity as activity due to contamination

t_2 = sample counting time (minutes).

R_b = background count rate in counts per minute (cpm),

t_b = background counting time (minutes),

E = counting efficiency (e.g. cpm/dpm), and

A = area of the detector, or area sampled for smear samples (cm^2)

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10.9 Data Interpretation

All measurements will be reported in units appropriate for comparison with release limits. Radiological survey data is usually obtained in units, such as counts per unit time, which have no intrinsic meaning relative to the guideline values. Therefore, the survey data from field and laboratory measurements will be converted to units which will enable comparison. Standard units for expressing final survey findings are:

- Surface Contamination $\frac{\text{dpm}}{100\ \text{cm}^2}$ (disintegrations per minute per 100 cm^2)
- Soil Radionuclide pCi/g (picocuries per gram)
- Exposure Rate μR/h (microroentgens per hour)

In performing the conversions it is necessary to know several factors; these are:

c	total integrated counts recorded by the measurement
c/m	total countrate from an analog (rate) instrument
t	time period (minutes) over which the count was recorded
B	count during recording period, due only to background levels of radiation
B/m	background count rate on an analog instrument
E	detection efficiency of instrument in counts per disintegration
A	active surface area of the detector in cm^2
M	mass of sample analyzed in grams
2.22	factor to convert a disintegration rate to activity units of picocuries, i.e. dpm/pCi.

All data from final survey will be presented in a format which provides (1) the calculated surface activity or specific radionuclide concentration value; (2) the estimated uncertainty at the 95% confidence level for that value; and (3) the estimated MDA for the measurement. An example of such a format would be:

Sample ID	Radionuclide Concentration (pCi/g)		
	Activity	Uncertainty (95% confidence level)	MDA
001	6.1	1.5	0.6
002	-1.0	1.2	0.5
003	0.1	0.2	0.2

Individual measurement results for total activity and exposure rate will be compared against the average and the maximum guideline values. Measurement results less than the average guideline value will be deemed acceptable. Measurement results greater than the maximum guideline value will indicate the need for remediation. Measurement results greater than the average guideline value but less than the maximum guideline value will require investigation to determine if the average of a series of measurements collected from one square meter for total activity, to 10 square meters for exposure rate, exceeds the average guideline value.

The 95% confidence level will be used to further demonstrate attainment of the release limits once the individual measurements have demonstrated compliance with the guideline value. The confidence interval for each survey area is calculated using Normal statistics (one-tailed test at the 95% confidence level), Equation 10.2.

$$U_a = \overline{x} + t_{1-\alpha,df} \frac{s_x}{\sqrt{n}} \qquad (10.2)$$

Where:

U_a = upper confidence limit of sample mean,

$\overline{x}$ = sample mean,

$t_{1-\alpha,df}$ = student t statistic for the degree of confidence and degrees of freedom; d*f* (degrees of freedom) is equal to n - 1; and α is 0.05 for this test,

s_x = sample standard deviation,

n = number of measurements in the survey area.

10.10 Final Survey Reporting

A summary of the measurement results and overall conclusions showing that the facility meets the release criteria will be provided. As applicable, a tabular data summary will present the results for each major category of survey unit such as: structures, components and facility systems. This tabulation will identify the number of survey units, the number and type of measurements such as: total surface beta-gamma, total surface alpha, removable surface beta-gamma and removable surface alpha activity concentration, and gamma exposure rate. For surface contamination, exposure rate and concentrations in soil and water, the average and maximum values, and upper the limit of the confidence interval about the mean will be reported for comparison to the release criteria. Typically, these results will also be illustrated in a graphical presentation to illustrate the individual data points and the statistical distribution of the results.

Within the release record for each survey unit (and/or subunit), the number of measurements and the applicable statistical distribution will typically be presented in graph form. These will be reported in units of dpm/100 cm^2 for each type of surface activity measurement; total surface beta-gamma, total surface alpha, removable surface beta-gamma and removable surface alpha activity concentration. Exposure rate measurements will be reported in units of μR/hr, and soil and water activity in units of pCi/g or pCi/ml, respectively. The applicable results of special sampling measurements, e.g., sediment, paint, concrete and other debris will be reported in the release record for each survey unit.

The results of final survey measurements within a survey unit that do not pass the statistical analysis (95% confidence level of the mean) will be investigated. The results of the investigation survey that indicate, after statistical testing, that the survey unit meets the release criteria will be contained in the final survey report along with the results of the initial final survey measurements. If remediation is required, a second final survey will be performed and the results of the second final survey after remediation will be included in the final survey report.

10.11 Independent Verification

An independent verification is necessary in order to validate the accuracy and completeness of final survey measurements to ensure that the facility/site meets the established release criteria.

The level of verification required by the Independent Verification Contractor (IVC) may range from a simple review of the decommissioning plans and final survey results, to onsite visits involving direct measurements and sampling. The level of verification is determined by DOE with input from the IVC. Verification activities may be required throughout the decommissioning effort and are therefore integrated into overall project planning.

After acceptance of the final survey report, the regulator may perform (or arrange for its agent to perform) a confirmatory survey. As the name implies, a confirmatory survey is performed to confirm the adequacy and accuracy of the final survey. The confirmatory survey develops radiological data of the same type as that presented in the final survey, but is usually limited in scope to spot-checking conditions at selected site locations, comparing findings with those of the status survey, and performing independent statistical evaluations of the data developed by the confirmatory survey and the final survey. Although the scope may vary, a confirmatory survey typically addresses from 1 to 10% of the site, but may be extended, if questions or anomalies develop or are identified. This survey is used in supporting a decision to release the facility.

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SECTION 11

OCCUPATIONAL SAFETY & HEALTH

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11.0 OCCUPATIONAL SAFETY & HEALTH

RMRS Environmental Safety Health and Quality (ESH&Q) will be responsible for safety and will implement its safety program. Safe Work Permits for decommissioning activities will be issued as necessary. The safety program will include verification that an evaluation of new equipment and new activities for potential safety hazards has been performed. Concerns to be addressed in the evaluation will include fire protection, occupational safety, as well as provisions for containment and loss of utility services. Typically, this evaluation will be part of the review and approval process for procedures and work packages which is conducted when preparing for the use of new equipment or new activities.

11.1 Safe Work Permits (SWP)

Decommissioning and subcontractor personnel will review hazards involved in the planned work operation, with specific attention to recent monitoring results, respiratory protection, and specialized safety equipment. Any potential for hazards will be discussed with the work crew before they enter the work area. At a minimum, this will occur during the daily plan-of-the-day meeting.

Decommissioning and/or subcontractor personnel will obtain safe work permits (SWP) prior to work activities which could result in serious injury, illness, or death. Hazardous work could be a result of the following:

- Chemical exposure
- Oxygen deficiency
- Extreme temperatures
- Excessive noise
- Biological hazards
- Electrical hazards

The SWP will be requested by the Decommissioning Team Leader, who will submit the request to the ESH&Q representative for approval. Approval of an SWP will be contingent on inspection of the work site, proper preparations for the work, results of an area hazardous gases sampling and checks, and worker awareness of hazards associated with the work.

11.2 Hazardous Materials Exposure

Decommissioning and subcontractor personnel will adhere to the RMRS Hazard Communication Program. The program will ensure that appropriate measures are taken to inform and protect those employees who work with hazardous chemicals. The Hazard Communication Program will include the following:

- Employee Information - Decommissioning personnel will be provided with information regarding potential chemical hazards in the workplace. Material Safety Data Sheets (MSDS) will be provided for detailed safety and health information.

- Employee Training - Decommissioning and subcontractor personnel will be trained to recognize and understand the potential hazards to safety and health associated with the work to be performed.

- Hazardous Chemical Inventory - An accurate, up-to-date inventory will be maintained for hazardous materials utilized in the performance of the work.

- Warning Labels - Warning labels will be in accordance with OSHA standards.

11.3 Confined Space Monitoring

Personnel and area monitoring programs will be devised to ensure the identification of areas and work activities for which engineered controls and/or respiratory protection are required. Monitoring will be conducted to confirm that levels of protection, provided by the respiratory protection program and by engineered controls, are adequate to protect the worker, the environment, and the public.

Respiratory protection shall be considered for tasks involving potential for airborne exposure(s) (e.g., working in areas containing asbestos, working where dust contamination cannot be controlled, etc.). Direct-reading measurements will be supplemented by analysis of breathing zone samples by a method approved by the National Institute of Occupational Safety and Health (NIOSH) and OSHA.

Monitoring may include assessments of airborne contaminants in work areas and at area boundaries. Swipe and grab samples may be collected to identify contamination on surfaces and equipment. Properly calibrated, and controlled equipment adequate to meet monitoring needs shall be available. Depending on the operation, surveys will be performed as required to determine the following:

- Airborne concentrations of chemical or biological materials
- Combustible/explosive gas/vapor levels
- Toxic gas levels
- Oxygen levels
- Noise levels
- Personnel contamination potential
- Surface contamination in work areas
- Contamination of personnel protective apparel and equipment
- Suitability of equipment and material for release to unrestricted areas

11.4 Fire Safety

Some activities may present potential fire hazards. Flame cutting, welding, and grinding are examples of such activities which are likely to occur on the project. To reduce this potential hazard, a project fire safety program will be implemented.

The project fire safety program will consist of employee awareness, fire prevention, and fire protection. The goal of the program is to reduce the likelihood of fire and to minimize the effect of a fire should one occur. Employees will receive training and instruction in fire prevention and fire protection. Decommissioning project personnel will respond to fire (and to other emergencies) as required in the emergency plan.

The Decommissioning Project Industrial Safety Officer (ISU) will have primary responsibility for project fire prevention activities, including ensuring employee awareness of fire safety. Fire safety training will be conducted by RMRS ESH&Q.

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11.4.1 Fire Prevention

Fire prevention on decommissioning projects will include utilization of good housekeeping practices, proper control and storage of flammables, use of cutting and burning permits, the presence of fire watches for hot work, implementation of a weekly project safety marshall/fire warden program, including fire safety instruction as part of the initial training, and weekly meeting programs. Fire safety inspections will be conducted regularly by RMRS ESH&Q.

Daily fire safety inspections will be conducted by the ESH&Q Site Safety Representative, who is appointed weekly. RMRS Emergency Services Technicians will inspect fire suppression equipment monthly and conduct general fire safety walkdowns of the facility monthly. They will also inspect areas requiring cutting or burning permits daily before the start of work.

When using an ignition source, e.g., cutting, welding or grinding, a cutting or burning permit is required. The permit will be issued and controlled by RMRS Technical Assurance, Permitting in accordance with the National Fire Protection Association (NFPA) Code NFPA-1, Appendix H. Any hot work will require the presence of a dedicated fire watch with ready access to a fire extinguisher. Fire watchers will be trained in fire causes and types, fire extinguisher selection and use, and specific fire watch duties and responsibilities.

11.4.2 Fire Protection

Decommissioning project personnel will sound the fire alarm by (1) word of mouth to co-workers in the area, (2) activating one of the fire alarm pullboxes located throughout the facility, and/or (3) telephoning Ext. 2911, the Site Emergency Telephone Number. The decommissioning project Emergency Response Team will provide an initial response to any local fire alarm. That response is limited to an attempt to confine or control the fire until Site Emergency Services personnel arrive. Emergency Response Team Members will be first aid/CPR trained, trained in the use of fire suppression equipment, and at least some member will be trained in SCBA use.

Fire suppression systems available for use on the project include portable equipment, a fire main capable of supplying water to fire hoses, and heat activated sprinklers and a nitrogen blanket system for HEPA filter protection. The sprinklers and the nitrogen system are automatic. The fire extinguishers and fire hoses will be used as appropriate in controlling fire emergency situations. In the event of a fire alarm, Site Emergency Services Technicians will respond with the site fire trucks.

Site Emergency Services will take control of the scene upon their arrival and will determine if outside support is needed. If outside support is required, Site Emergency Services will notify the appropriate outside organization and provide assistance to them as necessary.

11.4.3 Fire Suppression System Changes

Progress on the decommissioning project may necessitate reconfiguration and even removal of some of the fire suppression equipment. In that event, temporary fire suppression will be made available. These activities will be performed at the latest possible point in the project. Proposed system reconfiguration and/or removal will be reviewed by Site Emergency Services and appropriate outside organizations will be advised as necessary prior to performing the work. Whenever a portion of a fixed fire suppression system must be deactivated, replacement capability will comply with the requirements of the OSHA General Industry Standard for Portable Fire Extinguishers (29 CFR 1910.158), the OSHA Construction Industry Standard, Subpart E on Fire Protection (1926.150) and NFPA Standard No. 10, Standard for Portable Fire Extinguishers.

11.5 Industrial Hygiene

It is RMRS policy to provide employees with a place and condition of employment free from or protected against recognized hazards that cause or are likely to cause sickness, impaired health and well-being, or significant discomfort and inefficiency in work. It is also RMRS policy to encourage employees to participate in the assessment of industrial hygiene hazards and in the determination of controls for eliminating or minimizing those hazards.

To implement these policies, industrial hygiene procedures will be developed to establish requirements and provide instructions and guidance in preventing and controlling occupational disease and injury. The Industrial Hygiene Program described in this section addresses the non-radiological chemical and physical hazards that may be encountered while working on decommissioning projects. Potential non-radiological hazards which are likely to be found at RFETS include the following:

- beryllium
- asbestos
- acids and caustics
- organic solvents and metals
- ultraviolet light
- temperature extremes
- noise
- biological agents
- ergonomic stress
- heat stress
- confined spaces
- lead

The Industrial Hygiene Program conforms to the requirements of DOE Order 440.1A, "Environmental Protection, Safety, and Health Protection Standards." The respiratory protection program is in accordance with 29 CFR 1910.134, "Respiratory Protection."

12.0 TRAINING

All decommissioning personnel will receive instruction through orientation/training concerning the project radiological protection and health and safety programs. Each decommissioning project worker will receive orientation/training which will consist of instruction in jobsite radiological protection, health and safety, hazard recognition and control, fire extinguisher training, contingency plan implementation, occurrence reporting, and emergency and safety awareness. This training program will also include applicable decontamination procedures for work in areas of real or potential radiological significance, radiation effects, radiation safety, radiation dosimetry, contamination control, and the role and obligation of workers with respect to regulatory requirements.

Training will consist of classroom training and appropriate practical drills in which individuals demonstrate the ability to perform various aspects of their assigned functions. During the practical drills, on-the-spot correction of improper actions will be made and a demonstration of the proper performance offered by the instructor. Specialized training applicable to specific conditions will be given as the progress of decommissioning activities dictates. This training applies to all decommissioning and subcontractor personnel.

Supervisor safety training is an important part of the safety training program. Each team leader will receive a team leader's safety orientation detailing the safety responsibilities of his position and how to develop good safety practices among the workers. Records are kept of personnel attendances, level of accomplishment, follow-up sessions, etc., as necessary to ensure that the appropriate awareness and competency have been demonstrated.

For the purpose of defining training requirements for the decommissioning project, personnel are assigned to three categories: visitors, intermittent personnel, and decommissioning workers.

- Visitors

  Individuals who do not frequent controlled areas (i.e., visitors such as tour groups or visiting managers) shall be escorted by RMRS decommissioning employees while in the controlled areas and will not require training. These individual may not enter areas where they are likely to receive > 2 mrem in any hour or > 100 mrem in any year, whichever is the more restrictive.

- Intermittent Personnel

  Individuals who frequent the controlled area (more than 40 hours per quarter) but who do not work in the area will be required to take a four-hour Contractor Radiation Safety Course and pass a written exam with a grade of at least 70 percent.

  Other individuals included in this category are workers with special skills who are brought in for a specific task of less than 40-hour duration. These individuals may work in the radioactively controlled areas under direct supervision of a qualified decommissioning worker. They will be required to take and pass the four-hour Radiation Safety Course.

- Decommissioning Workers

  Individuals who will routinely handle radioactive material or contaminated equipment associated with the decommissioning project must have satisfactorily completed a two-day Radiological Safety Course prior to working in the controlled area.

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12.1 Radiological Safety Course

A Radiological Safety Course is required for decommissioning workers which includes the following topics: ALARA practices, an introduction to 10 CFR 834 and 10 CFR 20 835, radiological instrumentation and controls, decontamination procedures, fire protection, and emergency procedures. General subjects such as the nature and sources of radiation, methods of controlling contamination, interactions of radiation and matter, biological effects of radiation, use of monitoring equipment, principles of nuclear criticality safety, and risks from occupational radiation exposure also are covered. The course is comprised of lectures and demonstrations, augmented with selected audiovisual aids. It also includes industrial and general safety training. The content of the Radiological Safety Course may be revised as the need becomes apparent during the project, provided that such changes do not decrease the effectiveness of the training program.

The comprehension of each worker and the overall effectiveness of the training course will be evaluated by a written examination given at the end of the course. Workers will be required to pass the examination with a grade of at least 70 percent. The RMRS Manager of Health Physics or a qualified designee will be responsible for the radiological safety training course content and for conducting the training.

12.1.1 Retraining

Additional radiological and general safety training that is specifically directed toward planned work activities will be conducted by representatives of Health Physics and Safety prior to the start of the activity. Work Packages will be issued for each task and will include reference to the applicable procedure(s) and specific concerns/precautions related to health and safety.

In addition to the above-mentioned training, retraining on selected subjects will be conducted on an as-needed basis, but at least annually. Individual comprehension and the program's overall effectiveness will be evaluated by a written examination, which requires a score of at least 70 percent.

12.1.2 Health Physics Technician Training

Health physics technicians shall successfully complete the Radiological Safety Course described above. In addition, they must receive three (3) weeks on-the-job training. Additional training, including characteristics of criticality, principles of nuclear safety, and details of postulated criticality accidents, will be given to enable technicians to recognize potential problem areas.

12.2 Occupational Safety and Health Training

12.2.1 Equipment Operator Training

A number of specialized powered tools and equipment will be utilized through the course of the decommissioning project. Operator qualification for this equipment will be required to ensure personnel safety and operational efficiency requirements are met. Qualification will be attained by completion of the following:

- Study of vendor-supplied literature and of the applicable Operating Procedure(s)
- Functional demonstration of the use of the equipment
- Hands-on training under qualified supervision

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Whether operator retraining/requalification is necessary at any time will be determined on a continuing basis. The Decommissioning Team Leader will have the responsibility to require operator requalification, depending on operating complexity, operator continuity of service, or other reasons as deemed appropriate.

12.2.2 Nonradiological/Occupational Safety Training

Each individual shall be given instruction regarding the hazards and safety precautions applicable to the type of work in question. Only qualified persons shall operate equipment and machinery.

Individuals shall be instructed concerning workplace hazards, such as flammable liquids and gases, chemicals, and confined spaces and shall be instructed in the procedures for protecting themselves from injury.

Examples of special training requirements:

- Crane/hoist operation (including forklifts)
- Powered platforms and scaffolds
- Use of personal protective equipment in elevated work areas
- Disposal of chemicals and hazardous materials
- Use of cutting and welding equipment

Workers will be instructed in the use of ladders, in protecting floor and wall openings, in maintaining emergency egress capability, and in the proper use of scaffolding.

Individuals shall be given instructions in accident prevention during the daily readiness reviews.

12.3 Respiratory Protection

Employees required to use respiratory protection will receive special instructions and training in the proper use and care of the respiratory protection equipment. Health Physics and Industrial Hygiene will ensure the compliance of the Respiratory Protection Program with the appropriate regulations. This training is preceded by a medical evaluation to assure that workers can tolerate the stress associated with wearing respiratory protection equipment.

12.4 Training Records

Records will include but are not limited to:

- The name of the supervisor and attending employees
- The subject of the meeting and a brief description
- The date, time, and duration of the training or meeting
- Written examinations

Such records will be kept in accordance with 10 CFR Part 830 and Part 835 and RFETS requirements.

12.5 Individual Training Plans

An innovative training plan implemented for the Decommissioning Program starts with modular training packages, prepared by the instructors, and involves "training the trainers," who will be RMRS workers and not professional trainers. A specific training plan will be developed for each worker by comparing his or her existing qualifications to the requirements of the role to which each aspires. Verification that the additional skills necessary to perform the role have been achieved is a key part of the training. After it is demonstrated within the Decommissioning Program, this plan will find wide favor among workers, contractors, and the DOE as a way to convert former defense program workers to decontamination and decommissioning workers with benefits accruing to all parties.