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DECOMMISSIONING IMPLEMENTATION GUIDE



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FOREWORD

The Department of Energy (DOE) faces an enormous task in the disposition of the nation's excess facilities. Many of these facilities are large and complex and contain potentially hazardous substances. As DOE facilities complete mission operations and are declared excess, they pass into a transition phase which ultimately prepares them for disposition. The disposition phase of a facility's life-cycle usually includes deactivation, decommissioning, and surveillance and maintenance (S&M) activities.

Four Guides were developed to provide implementation guidance for requirements, found in DOE O 430.1A, LIFE CYCLE ASSET MANAGEMENT, specific to the transition and disposition of contaminated, excess facilities. The Guides are: DOE G 430.1-2, IMPLEMENTATION GUIDE FOR SURVEILLANCE AND MAINTENANCE DURING FACILITY TRANSITION AND DISPOSITION; DOE G 430.1-3, DEACTIVATION IMPLEMENTATION GUIDE; DOE G 430.1-4, DECOMMISSIONING IMPLEMENTATION GUIDE; and DOE G 430.1-5, TRANSITION IMPLEMENTATION GUIDE. The goal of the processes described in the Guides is a continuum of hazard mitigation and risk reduction throughout the transition and disposition phases, leading to a timely, cost-effective disposition of the facility.

Transition activities occur between operations and disposition in a facility's life cycle. Transition begins once a facility has been declared or forecast to be excess to current and future DOE needs. It includes placing the facility in stable and known conditions, identifying hazards, eliminating or mitigating hazards, and transferring programmatic and financial responsibilities from the operating program to the disposition program. Timely completion of transition activities can take advantage of facility operational capabilities before they are lost, eliminating or mitigating hazards in a more efficient, cost-effective manner. In preparation for the disposition phase, it is important that material, systems and infrastructure stabilization activities be initiated prior to the end of facility operations.

Following operational shutdown and transition, the first disposition activity, usually, is to deactivate the facility. The deactivation mission is to place a facility in a safe shutdown condition that is economical to monitor and maintain for an extended period, until the eventual decommissioning of the facility. Deactivation of contaminated, excess facilities should occur as soon as reasonable and for as many facilities as possible. In this way, DOE can apply its resources to accomplish the greatest net gains to safety and stability in the shortest time. Deactivation can accomplish various activities, placing the facility in a low-risk state with minimum S&M requirements.

The final facility disposition activity is typically decommissioning, where the facility is taken to its ultimate end state through decontamination and/or dismantlement to demolition or entombment. After decommissioning is complete, the facility or surrounding area may require DOE control for protection of the public and the environment or for environmental remediation.

S&M activities are conducted throughout the facility life-cycle, including when a facility is not operating and is not expected to operate again. During these last periods of a facility life-cycle, it is important to ensure that S&M is adequate to maintain the facility safety envelope during the final stages of operations through a seamless transition to the final disposition of the facility. S&M is adjusted during the facility life-cycle as transition, deactivation and decommissioning activities are completed. S&M activities include periodic inspections and maintenance of structures, systems, and equipment to ensure, at a minimum, that there is adequate containment of any contamination and that the potential hazards to workers, the public, and the environment are eliminated or mitigated and controlled.

The technical, managerial and planning perspectives offered in these Guides can be equally effective in conducting activities other than transition and disposition, such as refurbishment and “clean-up” for reuse. As such, the adaptation of this guidance can result in efficient results if applied to facilities that are not being declared excess.

An important objective throughout transition and disposition is to continue to maintain an integrated and seamless process linking deactivation, decommissioning and S&M with the previous life-cycle phases. Activities of facility transition and disposition shall incorporate integrated safety management at all levels to provide cost-effective protection of workers, the public and the environment.

TABLE OF CONTENTS

1.0 Introduction	1
1.1 Purpose	1
1.2 Alternative Methods	2
1.3 Applicability	2
2.0 Decommissioning Activities -- General Guidance	3
2.1 DOE/EPA Policy on Decommissioning	3
2.2 Integrated Safety Management	3
2.3 Graded Approach	4
3.0 The Decommissioning Framework	6
3.1 Applicability of the Framework to Regulatory Scenarios	6
3.2 Crosswalk, DOE O 430.1A Requirements to DOE G 430.1-4	6
3.3 Developing End-Points	7
4.0 Implementing the Decommissioning Framework	11
4.1 Pre-decision	11
4.2 Determination of Action	12
4.3 Choosing the Decommissioning Alternative	19
4.4 Engineering and Planning	23
4.5 Decommissioning Operations	28
4.6 Post-decommissioning Action	29

1.0 Introduction

1.1 Purpose

This Guide was prepared to aid in the planning and implementation of decommissioning activities at Department of Energy (DOE) facilities that have been declared excess to any future mission requirements. It is one of four that have been developed to provide guidance for facility transition and disposition activities. The others are: DOE G 430.1-2, IMPLEMENTATION GUIDE FOR SURVEILLANCE AND MAINTENANCE DURING FACILITY TRANSITION AND DISPOSITION; DOE G 430.1-3, DEACTIVATION IMPLEMENTATION GUIDE; and DOE G 430.1-5, TRANSITION IMPLEMENTATION GUIDE.

Requirements for decommissioning are stated in DOE Order 430.1A, LIFE CYCLE ASSET MANAGEMENT (LCAM), which identifies the minimum requirements for disposition of an excess DOE facility. This Guide defines activities or actions that provide a sequenced risk reduction to the selected disposition path. It is part of the DOE Directives System, and is consistent with the principles and core functions of P 450.4, SAFETY MANAGEMENT SYSTEM POLICY. Other documents that should be consulted to support the planning and conduct of transition and disposition activities include: DOE-STD-1120-98, INTEGRATION OF ENVIRONMENT, SAFETY AND HEALTH INTO FACILITY DISPOSITION ACTIVITIES, and the Good Practice Guides associated with LCAM. This Guide also addresses implementation of the *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*, May 22, 1995 (commonly known as the Decommissioning Policy).

The DECOMMISSIONING IMPLEMENTATION GUIDE, *Decommissioning Handbook* (Draft - DOE/EM-0383, January 1999), and *Decommissioning Preferred Alternatives Matrix* (June 30, 1997) replace the previously issued *Decommissioning Resource Manual* (DOE/EM-0246, August 1995) and *Decommissioning Handbook* (DOE/EM-EM-0142P, March 1994). The present DECOMMISSIONING IMPLEMENTATION GUIDE differs from the *Decommissioning Resource Manual* (DOE/EM-0246, August 1995), which included a variety of information of interest or potential use to decommissioning project managers and staff. Material from the Resource Manual that directly relates to implementation of these policies and directives has been incorporated in this Guide. Material from the Resource Manual and former Handbook that does not directly relate to acceptable methods for meeting program requirements is being compiled in the present *Decommissioning Handbook* as an information resource for decommissioning project personnel. Material from the former Handbook dealing with decommissioning technologies has been incorporated into the *Decommissioning Preferred Alternatives Matrix*.

1.2 Alternative Methods

This Guide presents acceptable methods for implementing the decommissioning requirements specified in LCAM, to ensure effective and efficient management of DOE excess facilities. It does not in itself impose additional requirements. The Department has invested substantial time and effort in developing a decommissioning framework that (1) meets DOE's requirements and expectations, (2) draws on DOE's previous experience, and (3) is responsive to oversight entities. Although alternative methods and approaches to the ones discussed in this Guide may be used, a comparable amount of time and effort may be needed to evaluate the acceptability of those alternatives.

1.3 Applicability

This Guide may be applied to decommissioning activities and processes at contaminated DOE facilities. "Contaminated" refers to both radioactive contamination and to hazardous-substance contamination. Nuclear facilities and non-nuclear contaminated facilities are included in the scope of this Guide. Project personnel are expected to apply a graded approach in planning and conducting decommissioning activities at different types of facilities and with different hazard conditions.

2.0 Decommissioning Activities -- General Guidance

2.1 DOE/EPA Policy on Decommissioning

In 1994, the Secretary of Energy determined it was inappropriate for the Department to be self-regulating in the performance of decommissioning and that provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) applies when appropriate. A working group involving DOE and the Environmental Protection Agency (EPA) was formed to establish the manner of applying CERCLA to decommissioning. The result of this effort was the *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act*, signed on May 22, 1995, by the Assistant Administrators at EPA's Office of Enforcement and Compliance Assurance and Office of Solid Waste and Emergency Response, and by DOE's Assistant Secretary for Environmental Management. The policy is consistent with, and builds upon, the multi-agency *Guidance on Accelerating CERCLA Environmental Restoration at Federal Facilities*, August 22, 1994.

The policy establishes that decommissioning activities will be conducted as non-time-critical removal actions under CERCLA, unless the circumstances at the facility make it inappropriate. 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. Non-time critical removal actions are defined and explained in the National Oil and Hazardous Substances Pollution Contingency Plan, known as the National Contingency Plan (NCP) and found at 40 CFR 300. In brief, non-time critical removals are response actions initiated under CERCLA removal authority that are conducted under DOE lead-agency authority and that typically have a planning horizon of six months or more.¹

2.2 Integrated Safety Management

In accordance with LCAM, sufficient planning shall be done to systematically integrate a safety management system into management and work practices at all levels. DOE's safety management system policy and guidance are identified in DOE Policy 450.4, SAFETY MANAGEMENT SYSTEM POLICY and G 450.4-1, INTEGRATED SAFETY MANAGEMENT SYSTEM GUIDE. The major mechanism for integrating safety and health into decommissioning efforts is the work planning process during which the safety documentation from the facility's earlier phases is reviewed and evaluated. Decommissioning activities are identified and evaluated against existing controls, and modification to controls are identified as required by the new activities that were not previously performed.

¹ Simultaneous with issuance of the decommissioning policy, the Office of Environmental Management published the *Environmental Restoration Program Decommissioning Implementation Guide* to support policy implementation. That guide included the decommissioning framework agreed to by DOE and EPA for achieving the objectives of the policy. The May 22, 1995, implementation document is the basis for the present Guide.

Often, the safety documentation of an older facility, including worker safety and health aspects, fall short of today's standards and requirements. Revisions, comparisons, crosswalks and other evaluation techniques can be used to determine which decommissioning actions may be covered in existing documentation, and which actions require supplemental coverage. Such evaluation efforts, especially if performed by those who know the facility well, are more cost effective and time efficient than the preparation of new safety documentation. Worker involvement in all levels of safety/hazards analysis in the planning of decommissioning activities is key to implementing all elements of transition.

DOE-STD-1120-98, Section 3.0, "Integrated Safety Management System," provides detailed guidance for developing and implementing a ISMS for decommissioning activities. Furthermore, Appendix C of the referenced Standard, "ISMS Performance Expectations," provides information that may be meaningful to verify that ISM considerations have been adequately addressed.

2.3 Graded Approach

The "graded approach" application of requirements to a particular project, activity or facility is required by LCAM. Implementation of the tailoring approach, as defined in DOE Guide 450.3-3, TAILORING FOR INTEGRATED SAFETY MANAGEMENT APPLICATIONS, is an acceptable method of complying with this requirement. DOE G 450.3-3 demonstrates that tailoring is integral to the Integrated Safety Management system. Application of tailoring is appropriate for all steps in facility decommissioning.

Tailoring allows choices to be made from among a variety of engineering and administrative controls that provide adequate protection for workers, the public, and the environment during the performance of work. Tailoring of higher-level contractual and project agreements enables contractors to establish general standards for work. Individual tasks are tailored so that each task has controls that fit the specific work and the hazards associated with it and that are consistent with higher-level performance expectations.

Tailoring permits the consideration of differences between facilities and provides a means to determine the extent to which actions are appropriate for a particular facility (or portions thereof). The depth of detail required and the magnitude of resources expended for a particular management element is commensurate with the relative importance of that element to safety, environmental compliance, safeguards, and security; the magnitude of any hazard identified; programmatic importance; financial impact; and/or other facility-specific requirements. For projects where no logical delineation between deactivation and decommissioning exists, the requirements are integrated to serve the overall project and completion objectives. In doing so, planning considers the possibility of future changes to priorities and should identify the conditions (end-points) where a project may be safely and efficiently slowed or accelerated, if it becomes necessary to do so.

Tailoring is cost effective because it does not demand a high level of analysis and/or planning for simple jobs already covered in established procedures. Worker involvement, as stated earlier, has also proven to be cost-effective because these employees are often those who have spent many years performing tasks during operations, and they may have a good understanding of the safety and performance requirements of the decommissioning activities.

Tailoring the Integrated Safety Management system offers a means to grade activities and processes to different hazards associated with individual facilities. Tailoring is used to scale expectations and acceptable performance to the needs of the site, activity, facility, or work to be performed. When applied to the five core safety management functions, tailoring promotes a work management system that is safe, efficient, and cost effective.

3.0 The Decommissioning Framework

3.1 Applicability of the Framework to Regulatory Scenarios

DOE has developed a decommissioning framework that implements the requirements of the Decommissioning Policy and the requirements that the LCAM order places on decommissioning activities. This model for decommissioning DOE facilities has been designed explicitly to accommodate all types of regulatory scenarios under which decommissioning can be initiated.

The decommissioning framework, which is the focus of this Guide, is modeled after the process for conducting CERCLA non-time-critical removal actions, as specified in the National Contingency Plan. However, the basic framework is flexible enough to accommodate all DOE decommissioning projects, regardless of the statute, authority, or management decision that initiates the project.

A decommissioning project may be initiated by a variety of circumstances, including:

- Determination that a release or substantial threat of release to the environment is present, and a removal action under CERCLA is appropriate;
- Implementation of a decommissioning plan approved by the Nuclear Regulatory Commission (NRC), with the objective of termination of an NRC license;
- Decommissioning in accordance with a Resource Conservation and Recovery Act (RCRA) permit or order; and
- DOE programmatic management decision to proceed with the disposition of a surplus facility.

The decommissioning framework satisfies the requirements of these potential drivers, as well as the asset management specifications of LCAM and integrated safety management requirements.

3.2 Crosswalk, DOE O 430.1A Requirements to DOE G 430.1-4

The requirements, as specified in LCAM, that are applicable to the decommissioning of a contaminated, excess facility are included in Table 1 and are mapped to the section of this Guide where they are addressed. While the table quotes the requirements as they appear in LCAM, this Guide addresses only those elements which apply to the decommissioning process. Parallel tables in DOE G 430.1-2, IMPLEMENTATION GUIDE FOR SURVEILLANCE AND MAINTENANCE DURING FACILITY TRANSITION AND DISPOSITION; DOE G 430.1-3, DEACTIVATION IMPLEMENTATION GUIDE; and DOE G 430.1-5, TRANSITION IMPLEMENTATION GUIDE

provide the crosswalks between requirements and guidance for surveillance and maintenance, deactivation and transition, respectively.

Table 1 - Mapping of Requirements - Decommissioning

Requirement	Where Addressed in Guide
O 430.1A 6.a: Application of graded approach	Section 2.3, Graded Approach, and Chapter 4.0, as applicable
O 430.1A 6.g(6)(a)(i): Collection of characterization data, including supplemental data	Section 4.3, Choosing the Decommissioning Alternative, Steps 7-11
O 430.1A 6.g(6)(a)(ii): S&M activities that correspond to facility conditions	Chapter 4.0, Implementing the Decommissioning Framework, particularly Sections 4.1 and 4.2 (Steps 1 and 5) and Section 4.5 (Steps 19 and 20).
O 430.1A 6.g(6)(a)(iii): Method for identifying, assessing, evaluating, selecting alternatives	Section 4.3, Choosing the Decommissioning Alternative, Steps 7-15
O 430.1A 6.g(6)(a)(iv): End-point process that specifies specific facility end-points and activities needed to achieve those end-points.	Section 3.3, Developing End-Points
O 430.1A 6.g(6)(a)(v): Method of detailed engineering planning and plan documentation	Section 4.4, Engineering and Planning, Steps 16 and 17
O 430.1A 6.g(6)(b): Use of non-time critical removal action as approach to decommissioning	Chapter 4.0, Implementing the Decommissioning Framework, Steps 1-22
O 430.1A 6.g(6)(c): Development of a project final report, or equivalent	Section 4.5, Decommissioning Operations, Step 20
O 430.1A 6.j: Decommissioning activities consistent with integrated safety management and facility disposition policies	Chapter 4.0, Decommissioning Framework, particularly Sections 4.3 (Step 11), 4.4 (Steps 16 and 17), and 4.5 (Steps 18 and 20)

3.3 Developing End-Points

The LCAM Order requires an end-point process in decommissioning planning that identifies specific facility end-points and activities needed to achieve those end-points. End-points are the detailed specification of conditions to be achieved for a facility’s spaces, systems, and major equipment. End-point specifications for the entire facility are used during and/or after implementation:

- As input for scheduling and cost estimating,
- To create detailed work plans for each space and system in the facility,
- To document bases for performance-based contracting or outsourcing of work, where practical to do so,
- To demonstrate conformance to agreements negotiated with third parties, and

- To show compliance with both local and Federal regulations.

Since identifying the end-points is an integral part of deriving the project work breakdown structure, schedule, and budget, end-point planning and specification must be initiated as soon as possible. Specifying end-conditions is the first part of the end-point planning process. Facility end-point specifications must be quantitative, where possible, and in all instances must be explicit.

Specifying and achieving end-points is a systematic, engineering method for progressing from an existing condition to a stated desired final condition in which the facility has been decommissioned. An end-point method is a way to translate broad mission statements into explicit goals that are readily understood by engineers and the crafts personnel who will perform the work.

The detailed specification and actual end-points achieved will undoubtedly vary from facility to facility across the DOE complex. Variations are expected because of the differences among facilities with respect to previous mission requirements, equipment and systems, containment, degree of contamination, ability to isolate the contamination, facility environs, projected ultimate disposition, and a host of other factors. Regardless of variations in conditions to be achieved, the methods used to decide and specify end-points are fundamentally similar.

Several guiding principles form the foundation of the end-point process:

- (1) The decision to specify an end-point needs to be driven by, and clearly linked to, top-tier program objectives.
- (2) End-point decisions are integrally linked to decisions (and constraints) on resources and methods. If a proposed end-point is not economically feasible, it will only be specified if mandated by law, applicable regulation, or formal agreement.
- (3) Successful end-point development requires "ownership" by all affected organizations, including the planners, the decommissioning work force, and the receiving organization.
- (4) Work teams in the field need clear, quantitative completion criteria. End-points must be established up front, must meet the completion criteria, and be practical and achievable.
- (5) End-point development is an iterative process. Most end-point decisions can be made during the planning stages early in the project; however, some end-points will have to be revisited as decommissioning proceeds.
- (6) Decommissioning end-points need to be consistent with applicable land and facility use plans, and with any planned site remediation activities.

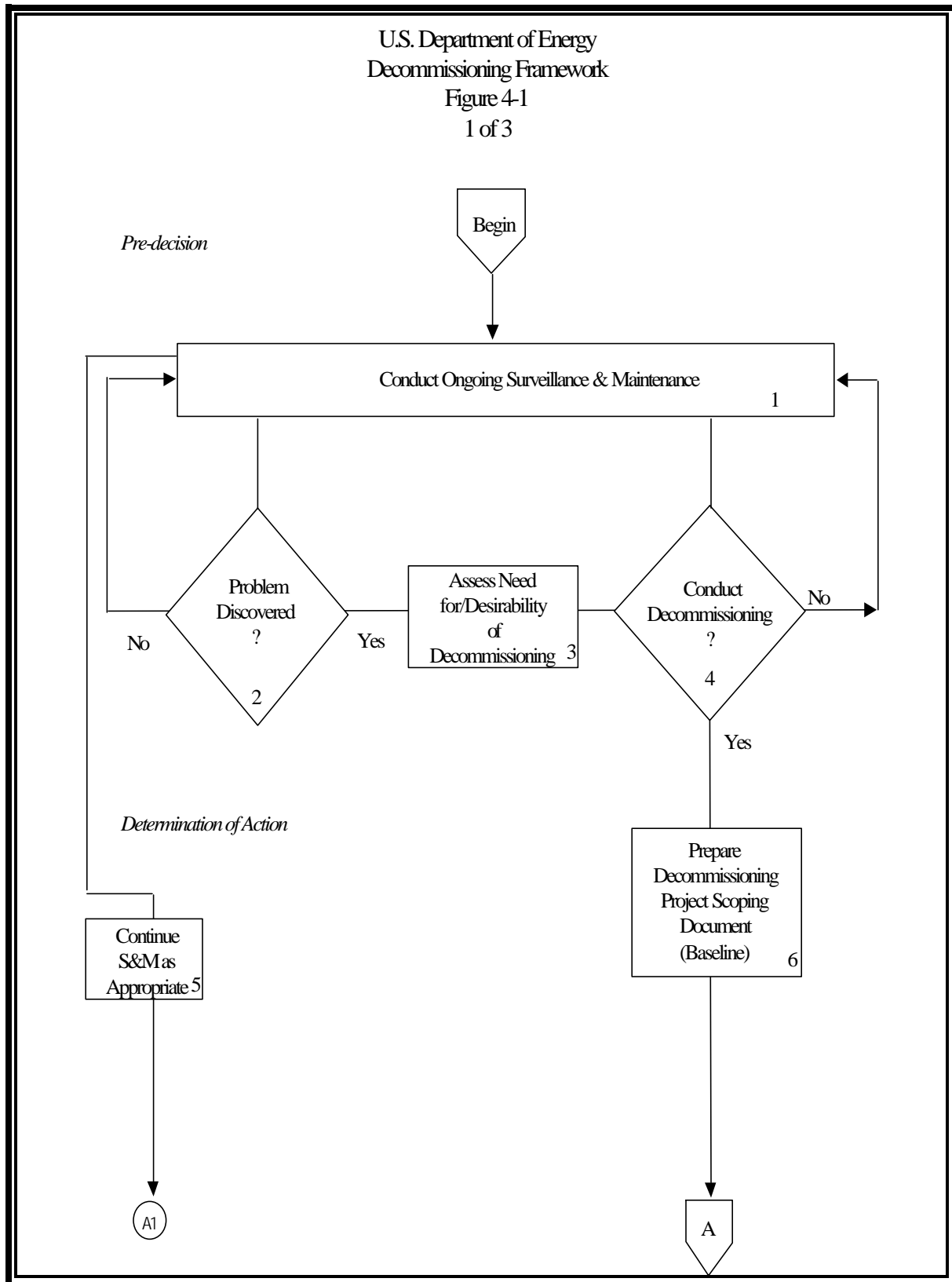
These guidelines should be used when selecting the end-point method, setting up criteria, and specifying detailed end-points. The use of a tailoring approach in the development of the facility end-points is appropriate to differentiate between complex facilities with process systems and/or significant hazards and those with relatively simple buildings that are not substantially contaminated and do not have complex equipment or systems.

The Decommissioning Framework

The Decommissioning Framework provides an end-point development process, as described above, throughout the identification and analysis of alternatives and planning stages of the project. End-points are integrated into the Decommissioning Framework as follows:

Table 2 - End-Points in the Decommissioning Framework

Decommissioning Framework	End-point Development Process
Step 6: Prepare Decommissioning Project Scoping Document (Baseline)	In this step, decommissioning objectives are defined; decommissioning objectives are equivalent to end-points. The end-points should be determined as early as possible to provide the basis for identifying and assessing alternatives, then planning the work.
Steps 7-13: Choosing the Decommissioning Alternative	End-points drive the development and analysis of alternatives and will be reevaluated as characterization, risk, and safety data become available.
Step 12: Define and Conduct Activities to Inform/Involve Stakeholders Step 14: Respond to Public Comments	End-points are subject to regulator and stakeholder review and approval.
Step 15: Document Final Decision	Once agreed upon with the regulators and stakeholders, end-points are documented.



4.0 Implementing the Decommissioning Framework

The decommissioning framework comprises a sequence of steps that takes a facility through the entire decommissioning process, from pre-decision to close-out (and, if necessary, long-term monitoring). This sequence links required activities in a systematic manner. The decommissioning framework is depicted in flowchart form and described in this section.² The framework encompasses decommissioning activities in compliance with an NRC license; with permits or orders issued under RCRA; or with programmatic requirements, including DOE directives; as well as with CERCLA. Implementation of integrated safety management is provided for in this framework, specifically, incorporation of worker and facility safety activities into decommissioning work planning and execution. In all cases, the graded approach is used as appropriate.

This chapter walks through each step in the framework, which comprises six stages of activities typically required at the end of the facility life-cycle, from Pre-Decision through Post-Decommissioning. Where appropriate, reference is made when steps correspond directly to CERCLA as specified in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) codified in 40 CFR 300. References to companion facility disposition guidance documents are included where appropriate.

Symbols: Matching symbols show continuity from one chart to the next.

4.1 Pre-decision

Prior to decommissioning, the facility typically will be in a stable and known condition maintained through a surveillance and maintenance (S&M) program.. For deactivated facilities, this will have been established at the completion of deactivation and accomplishment of the deactivation end state, as described in DOE G 430.1-3, DEACTIVATION IMPLEMENTATION GUIDE, a companion to the present Guide. The S&M program in effect will be consistent with requirements for environment, health and safety, and radiation protection and designed for cost-effectiveness. For details, see DOE G 430.1A-2, SURVEILLANCE AND MAINTENANCE DURING FACILITY DISPOSITION, also a companion to this Guide.

Step 1 - Conduct On-going Surveillance & Maintenance - In general, facilities (or portions thereof) will have been placed in a stable and known shutdown condition with an S&M program. Conversely, a facility may enter the disposition phase directly decommissioning with its condition and/or operating history unknown. In these cases, the steps described in DOE G 430.1-2, IMPLEMENTATION GUIDE FOR SURVEILLANCE AND MAINTENANCE DURING

² The DOE decommissioning approach described here is substantively the same as the original decommissioning framework developed in May 1995 consistent with the Decommissioning Policy, but has been revised to consolidate and streamline related activities.

FACILITY TRANSITION AND DISPOSITION provide a general overview for determining the status and condition of a facility.

The typical decommissioning candidate facility will be in S&M mode, the budget process will be proceeding, and decommissioning will be planned for a future date. In some cases, facilities will transfer directly from deactivation to decommissioning without an interim period of S&M, and the facilities will continue S&M as a follow-on to post-deactivation S&M planning. Similarly, some facilities may transition directly from operating programs to decommissioning without an interim period of S&M, and the facilities will perform S&M as a continuation of operating plant maintenance. Regardless of the scenario, S&M shall be guided by a written program, prepared according to the principles described in DOE G 430.1-2.

The time a facility spends in this S&M mode depends upon conditions specific to that facility. In the past, some operating facilities were shut down with expectations of restarting. Time passed and restart expectations were not realized. These facilities are generally now in an S&M mode and deactivation is proceeding "after the fact."

In general, for high-risk, urgent situations, and for some NRC-mandated schedules, the decommissioning process will proceed promptly. For low-risk situations, a number of years may elapse before budget priority considerations make funds available for decommissioning, assuming no adverse changes in the facility condition arise during that time. Because of differences such as these, the time interval between Steps 1 and 2 or 4 can vary greatly. As conditions change over time, the S&M authorization basis will change accordingly, and the S&M program will need to be updated to reflect these changes.

S&M activities continue as necessary, whether a decision to proceed with decommissioning is made early on or after some time has elapsed, until the facility's ultimate disposition is accomplished.

4.2 Determination of Action

In this stage, the evaluation factors of NCP Section 300.415(b)(2) will be assessed, and any other data will be collected as necessary to determine if decommissioning is appropriate. Evaluation factors include: (1) impact on nearby humans, animals or the food chain; (2) contamination of drinking water supplies or sensitive ecosystems; (3) materials in drums, barrels, tanks or other bulk container that pose a threat of release; (4) materials in soils at or near the surface that may migrate; (5) weather that may cause materials to migrate or be released; (6) threat of fire or explosion; (7) the availability of other appropriate federal or state response mechanisms to respond to the release; and (8) other situations or factors that may pose threats to public health or welfare or the environment. Documentation includes the facility description, threats to workers or public health or the environment, and the basis for proceeding with decommissioning either under a regulatory scenario or as a programmatic decision. DOE shall consult with EPA and the state concerning this determination consistent with applicable local agreements.

DOE elements shall apply the graded approach in determining the nature and extent of documentation appropriate for this stage, consistent with the regulatory or programmatic authority on which the decommissioning decision is based and with local agreements as applicable.

Step 2 - Problem Discovered - This step corresponds to the "discovery" described in 40 *CFR* 300.405. This step may be triggered by discovery of a release or threatened release of hazardous substances (including radionuclides) into the environment, or by some other circumstance that prompts a programmatic decision to consider proceeding with decommissioning.

If an actual release of hazardous material is involved, it will typically be revealed through routine action of government (or government contractor) employees. However, it might be reported directly to DOE officials by the public or through a report to the National Response Center.

Whether a release from a facility is "actual" or "threatened" depends primarily upon temporal considerations. Actual releases should be observable or detectable by instruments. A "threat" of release involves judgments concerning events that have not occurred, yet may occur. Appropriate matters to consider include:

- C Condition of storage containers or areas containing contamination
- C Evidence of structural failure
- C Condition of roofs, windows and doors
- C Evidence of human, animal, wind, or water intrusion.

By their nature, facilities in a decommissioning program are aged and some degree of deterioration will have occurred. The determination of whether a "substantial threat of release" exists is a decision to be made on a case-by-case basis in consultation with regional EPA, state, Tribal, and/or local officials as provided for in local agreements.

Notification to the National Response Center (1-800-424-8802, TTY/TDD 202-426-2675) is required for releases or threatened releases of hazardous substances above certain quantities. Notification is not required if quantities do not exceed the Reportable Quantities of 40 *CFR* 302 or if the release is authorized by a federal permit. In addition, under 40 *CFR* 350, 355, 370, 372, Community Right-to-Know Requirements, the State Emergency Response Commission and the Local Emergency Planning Committee must be notified when an amount exceeding established thresholds of an extremely hazardous substance exists or is released into the environment that could result in exposure to persons outside the facility boundaries.

If natural resources are or may be injured by the release, the appropriate state and federal trustees of the affected resources are to be notified. While DOE is the federal trustee for natural resources located on land administered by DOE, the Department may share trustee responsibility with other federal agencies, the states, or affected Native American Tribes. Other actions may be required to assist in assessments, evaluations, investigations, and planning (per 40 *CFR* 300.410(g)). Where possible, such action will be incorporated into related decommissioning actions and documents, as applicable.

Depending on the circumstances, some other type of response may be necessary. This might include an emergency action, for example, to respond to a spill or leak; a time-critical removal action, of less urgency than an emergency but where response is required in less than six months; or a final or interim remedial action, if circumstances warrant. It is possible that, after some of the responses described above, the logic flow would lead back to Step 1 for continuing S&M.

Step 3 - Assess Need for/Desirability of Decommissioning - This step entails an evaluation of the situation to determine what action, if any, is appropriate. It includes a review of existing documents such as: the authorization basis; relevant deactivation documentation including any defined decommissioning objectives; the Pre-Transfer Review Report (described in DOE G 430.1-5); and the existing S&M program. Information examined can be grouped as follows:

- C *Facility History* - Facility history consists of the operating history of the facility to obtain process knowledge of the nuclear and chemical materials that were handled and potential spills or leaks that might have occurred. Interviews with former operating and maintenance personnel may be appropriate. Knowledge of facility modifications and the presence of as-built drawings also are important.
- C *The Deactivation Process* - The deactivation process is the manner in which the facility was taken out of active service and placed in a stable shutdown configuration. The "safety envelope" will be defined in a Safety Assessment, a Safety Analysis Report (SAR), or similar documentation. Technical Specifications or a Limiting Conditions Document may exist and should be reviewed. The presence of any unresolved safety issues will be identified and plans developed to address these situations. A deactivation completion package or equivalent document should be available for review.
- C *Surveillance and Maintenance* - An S&M plan will describe actions which were planned to maintain and inspect the facility in order to contain the contamination present, protect health and safety of workers and the public, and avoid impact on the environment (in general, maintain the "safety envelope" specified for the facility). Routine S&M records and annual reports will serve as records of events during the S&M period of the facility.
- C *The Physical Condition of the Facility* - S&M records will indicate the physical status of the facility and can be useful for detecting trends that might indicate impending problems. Other sources of information about the facility include the Facility Information Management System (FIMS).
- C *Preliminary Characterization Data* - This information focuses on identifying the nature and location of the contamination (nuclides, chemical constituents) in the facility. General mapping of dose rates and airborne contamination (rad and non-rad) should be available. Characterization data and documents accumulated during deactivation, if applicable, serves as a starting point. If these data are not available, they must be collected in a site inspection. If information about

quantities is available, it should be examined, but quantitative information is not a primary interest in this preliminary assessment.

- C *Preliminary Hazards Analysis* - The hazards present in the facility and the risks presented by those hazards will have been identified so that appropriate features can be incorporated into the S&M program to keep impact on people and the environment at a low and acceptable level. This information shall be reviewed to confirm status and determine if any additional hazards are present. DOE-STD-1120-98, Section 3.2, "Integrated Hazard Analysis," provides further discussion of hazards analysis.

In considering whether a CERCLA response is appropriate, additional factors will be examined, including:

- C *Nuclear Incidents*. Section 101(22)(C) of CERCLA excludes from the definition of release any source, by-product, or special nuclear material from a nuclear incident when that release is covered by the financial protection requirements (emphasis added) as established by the NRC.
- C *Uranium Mining Sites*. Section 101(22)(C) of CERCLA provides an additional exclusion from the term release. If a release of source by-product or special nuclear material from any processing site designated under Sections 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act (UMTRCA) occurs, a response action under CERCLA is not necessary.
- C *Federally Permitted Releases*. CERCLA Section 101(10) defines a federally permitted release in terms of releases permitted under specific environmental statutes. If a release occurs from a vessel or facility that is permitted under an environmental statute listed in CERCLA Section 101(10), a response action may not be appropriate. EPA proposed regulations to clarify the scope of the federally permitted release exemption on July 19, 1988 (53 FR 27268). A Supplemental Notice of Proposed Rulemaking appeared on July 11, 1989 (54 FR 29306) providing additional clarification on the Section 101(10)(H) exemption for air releases.
- C *Petroleum*. Hazardous substance, as defined in CERCLA Section 101(14), excludes the term petroleum, which includes crude oil or any fraction thereof that is not specifically listed or designated as a hazardous substance. EPA issued a memo to clarify this exemption on July 31, 1987 (OSWER Directive Number 9838.1). It states that the exclusion applies to petroleum products or derivatives, natural and synthetic gases, or mixtures of natural and synthetic gases. The exclusion, however, does not cover contaminants present in used oil or in any other petroleum substance. Contaminants are substances not normally found in refined petroleum fractions or present at levels which exceed those normally found in such fractions.

- C *Underground Storage Tanks (USTs)*. The remediation of USTs is governed by RCRA, as specified at 40 CFR 280.
- C *Other Considerations*. Workplace exposures, fertilizer applications and engine exhaust emissions are excluded from the definition of "releases," under CERCLA Section 101(22).

In addition to considering facility condition and status information, factors to be considered at this point include state historic preservation office approval.

The site evaluation may include perimeter or on-site inspections. Any physical inspection must be planned so as to maintain worker health and safety and to protect the public and the environment. The S&M health and safety program derived from the authorization basis will be used as a foundation and augmented as necessary to assure protection during any inspection.

Step 4 - Conduct Decommissioning? - Step 4 provides a decision point to evaluate whether or not to go forward with decommissioning at this time. A decision to conduct decommissioning can be triggered in two ways. As described under Steps 2 and 3 above, one way the decommissioning process can be initiated is in response to a problem that has been discovered. The site evaluation provides flexibility to determine whether CERCLA response is warranted or another appropriate federal or state response is necessary and available.

Differences between CERCLA and non-CERCLA actions to be considered at this point include the following:

- C Permits are not required if decommissioning is conducted as a CERCLA response, but legal provisions and other requirements that give rise to the need for permits will be included as applicable or relevant and appropriate requirements (ARARs). Otherwise, necessary permits must be obtained.
- C If environmental samples are to be collected, the sampling and analysis plan must be submitted to and approved by EPA if decommissioning is conducted as a CERCLA response. Otherwise, the sampling and analysis plan does not require outside approval.
- C Decommissioning projects conducted as CERCLA responses shall involve EPA and/or the State, as required by the policy on decommissioning under CERCLA. Such involvement shall be consistent with the provisions of the site-wide compliance agreement, if there is one.
- C Decommissioning projects conducted under NRC-approved decommissioning plans or RCRA permits or orders may need to meet requirements specific to those plans, permits, or orders and some additional information may be specified under such plans, permits, or orders.
- C Decommissioning projects under CERCLA must adhere to the public participation and administrative record requirements of the NCP. Separate review of the environmental impact under the National Environmental Policy Act (NEPA) is not

required. This review will be accomplished by incorporating NEPA values in decisions and documents prepared as part of the CERCLA process.

- C Public participation also is an essential part of the decommissioning framework for projects that are not CERCLA responses. The decommissioning project manager still must ensure that stakeholders are informed about decommissioning decisions and activities. In this case, the NEPA process provides for review of environmental impacts and for public participation.

CERCLA response may not be necessary for a facility licensed by the NRC and being decommissioned in conformance with an NRC-approved decommissioning plan, for a facility being decommissioned in compliance with a RCRA permit or order, or if a release or substantial threat of release is not present at the facility or the amount of hazardous substances present does not warrant federal response. DOE is to consult with EPA and the state concerning this decision in accordance with applicable site agreements.

A programmatic decision to proceed with decommissioning also can initiate the process for a facility in the S&M mode. In this event, Step 4 immediately follows Step 1. In the case of a programmatic decision, DOE may consider other factors to make a decision to decommission a facility under its authority from the Atomic Energy Act (e.g., a building may be more costly to maintain than to dismantle, budget windfall, asset management at multi-program sites).

In either case, this step brings together the key factors for determining whether or not decommissioning will proceed at this time. In all cases, when decommissioning does proceed, the same basic process outlined in this framework is followed. If the determination is made to proceed with decommissioning, the process continues with Step 6. If the decision is made that decommissioning is not appropriate at this time, Step 1 S&M activities will be continued until a future time when it is appropriate to consider Step 4 again.

Step 5 - Continue S&M as Appropriate - This step depicts the continuation of S&M as a parallel activity throughout this phase and, given a decision to proceed, as planning and programmatic actions go forward. S&M activities continue throughout the life of the decommissioning project, until phased out in the manner planned during decommissioning operations (Step 19) or converted to a long-term, post-cleanup situation (Step 22).

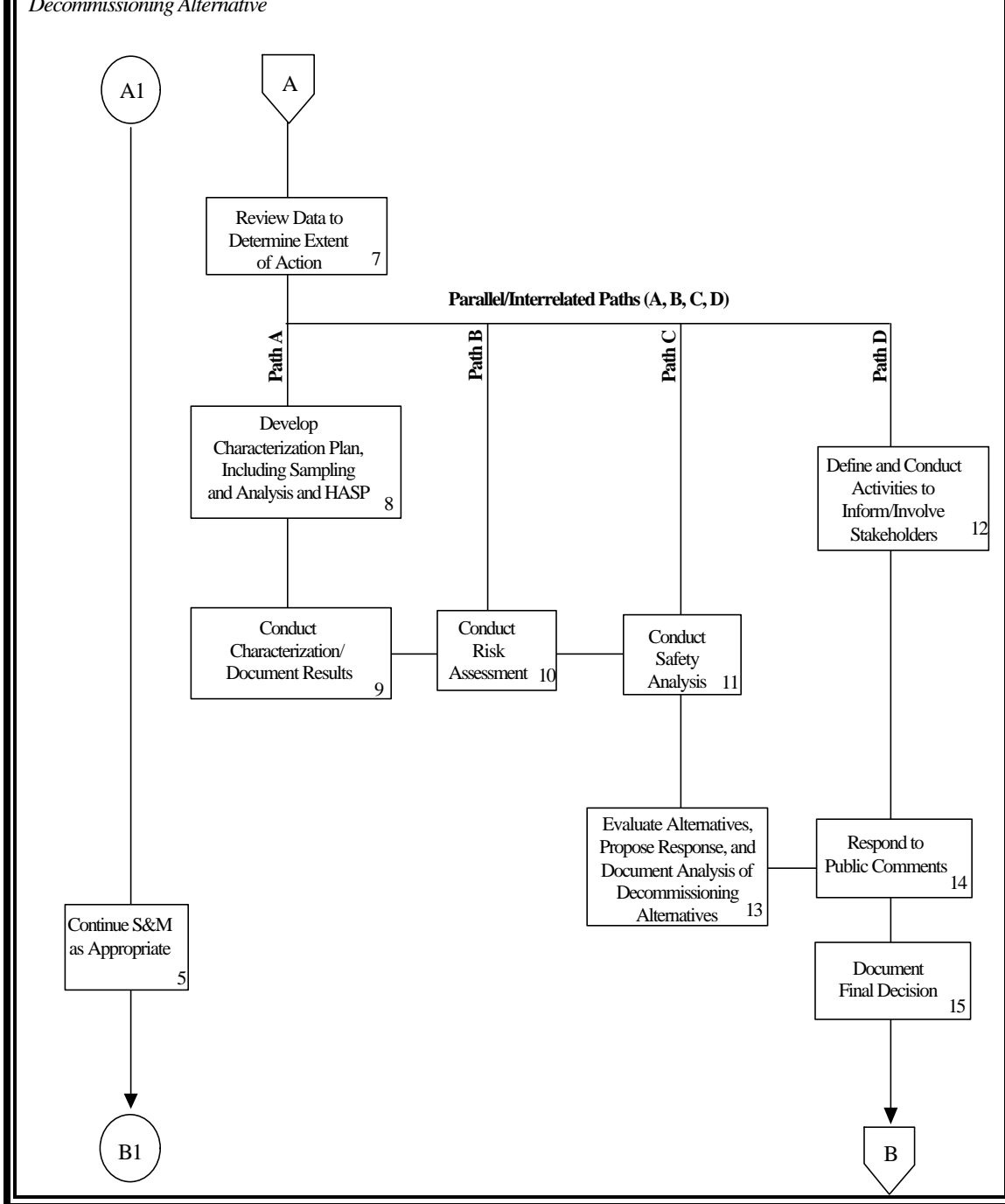
Step 6 - Prepare Decommissioning Project Scoping Document (Baseline) - This step entails preparation of a decommissioning project scoping document or preliminary project plan. The scoping document conceptually defines the objectives/end-points of the project and establishes the preliminary technical scope, cost, and schedule baseline ranges for the project. The scoping document, or preliminary project plan, describes the general approach to be taken to protect the safety and health of workers and the public, and to protect the environment, to the extent such matters can be determined at this stage of the project. Additionally, this document identifies the specific approach to readiness reviews (Step 17) that will be followed in the project.

The decommissioning end-points should be determined as early as possible; refer to Section 3.3 for further discussion on end-points. End-points provide the basis for identifying and assessing alternatives, then planning the work. Decommissioning end-points must be consistent with applicable land and facility use plans, and with any planned site remediation activities.

U.S. Department of Energy
Decommissioning Framework

Figure 4-1
2 of 3

*Choosing the
Decommissioning Alternative*



4.3 Choosing the Decommissioning Alternative

This stage of the process (steps 7-15) involves collecting additional information, performing additional analyses, identifying the decommissioning alternatives, and then choosing the most appropriate alternative with input from the public as appropriate. Decommissioning end-points drive the development and analysis of alternatives during this phase subject to regulator and stakeholder review and comment.

In accordance with LCAM, the graded approach shall be applied to developing documentation associated with this stage. Evaluation factors and results are to be documented as appropriate, though individual documents are not required for each step.

Step 7 - Review Data to Determine Extent of Action - This step starts the process of selecting and evaluating decommissioning alternatives for the facility (or portions thereof). All data compiled to this point is to be reviewed including, but not limited to, information gathered for transition, deactivation, S&M, the removal site evaluation, review of facility history, preliminary hazard characterization, and the project scoping document or preliminary project plan. The obvious starting point for selecting potential alternatives is the project scoping document or preliminary project plan prepared in Step 6. However, if some years have elapsed since the preliminary project plan was prepared, it is appropriate to review and update the list of potential alternatives, considering the factors and the types of actions described in the NCP (40 CFR 300.415(b)(2) and (d)), among others. Following identification of candidate alternatives, four parallel yet interrelated paths of actions will lead to the selection of the appropriate alternative. Site agreements will specify the manner of coordinating with EPA and the State in determining the level of regulator involvement and what response action is appropriate for facilities on the National Priorities List (NPL). NRC-approved decommissioning plans and RCRA permits or orders also may specify coordination between the regulator(s) and DOE.

If the decommissioning is not proceeding under CERCLA, managers are to attention at this point to the need to obtain long-lead permits. Permitting requirements of a decommissioning project must be evaluated early and frequently so that the time requirements for permits are not an impediment to timely completion of the work.

Step 8 - Develop Characterization Plan, Including Sampling and Analysis and HASP - This step continues the process of characterization of the facility and areas contiguous to the facility as necessary so that the nature of contamination is identified. Where a facility has been characterized as part of deactivation, then deactivated to specified end-points, the need for characterization may be satisfied by characterization data and documents resulting from deactivation activities. Per LCAM, characterization results and documents from prior deactivation activities shall be augmented as necessary to reflect changes in facility conditions during the disposition process. This step entails preparation of a characterization plan if additional characterization is required. The plan satisfies NCP requirements in 40 CFR 300.415(b)(4)(ii) for a field sampling plan and a quality assurance project plan (referred to collectively as the sampling and analysis plan). The NCP requirement in 40 CFR 300.415(b)(4)(ii) to submit the sampling and analysis plan to EPA for review and approval (for CERCLA actions only) must be satisfied if environmental (e.g., soil, surface water, ground water) samples are to be collected. The plan must include a Health and Safety Plan (HASP) for the field sampling work, to ensure adequate controls for worker safety

while conducting characterization activities, and an assessment of the physical condition of the DOE facilities involved and other programmatic requirements. See DOE-STD-1120-98, Section 3.3.4, "Hazard Baseline Documentation, for further discussion.

Step 9 - Conduct Characterization/Document Results - This step entails the conduct of the field characterization work, data analysis, and documentation, as appropriate. The graded approach shall be applied to the collection and analysis of data and to the associated documentation.

Step 10 - Conduct Risk Assessment - This step entails preparation of a risk assessment to support the safety analysis and the evaluation of decommissioning alternatives. The focus should be on the environmental safety and health risks associated with the decommissioning alternatives, using the graded approach. The scope and depth of the assessment should be in proportion to the potential threat resulting from actual conditions at the facility.

Step 11 - Conduct Safety Analysis - This step entails an analysis of hazards and identification of mitigating actions associated with each decommissioning alternative, performed in graded conformance with DOE 5481.1B (or 5480.23). For each alternative, hazards and risks are to be identified and mitigation measures that are to be provided for in the decommissioning plan described. Sections 3.2, "Integrated Hazard Analysis," and 3.3, "Hazard Controls and ES&H Documentation," of DOE-STD-1120-98 provide guidance on integrated hazard analysis and hazard controls, respectively, which should be consulted during this step.

Step 12 - Define and Conduct Activities to Inform/Involve Stakeholders - DOE field offices are responsible for developing and implementing comprehensive public participation plans and programs for environmental restoration activities and thus may have established public participation programs. An established program that provides for the activities in Steps 12 and 14 may be followed in lieu of these specific steps. (Guidance was provided in DOE/EH-0221, [*Public Participation in Environmental Restoration Activities*], U.S. DOE, Office of Environmental Guidance, RCRA/CERCLA Division, EH-231, November 1991.)

This step initiates the process to involve stakeholders in the selection of the decommissioning alternative. This initial step satisfies the NCP requirement in 40 CFR 300.415(m)(1) to designate a spokesperson, inform the community of the actions taken, respond to inquiries, provide information concerning the release (or threat of release), and to notify affected citizens and officials, when appropriate.

The Secretarial Policy on the National Environmental Policy Act, U.S. Department of Energy, June 1994, emphasizes the importance of early public involvement in the CERCLA process and making CERCLA documents available to the public as early as possible in keeping with the NEPA process. If decommissioning is not proceeding as a CERCLA response, the public participation requirements of NEPA will apply.

This step also includes the establishment of the Administrative Record for CERCLA action, as specified by the NCP (40 CFR 300.800). The Administrative Record is to be established as soon as possible after the decommissioning scoping document or preliminary project plan is prepared (Step 6) and no later than the issuance for public comment of the document which analyzes decommissioning alternatives (Step 14). The Record is to contain the results of the Step 3 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 is to be included. Public comments, and DOE's response, will be included in the Administrative Record.

Activities in this step include conducting interviews and preparing a formal community relations plan (CRP) and establish and maintain an information repository for decommissioning projects initiated as CERCLA removal actions where on-site action is expected to extend beyond 120 days from the initiation of on-site removal activities (40 CFR 300.415(m)(3)). Per 40 CFR 300.415(m)(4)(i), these actions must be completed prior to the completion of the analysis of alternatives (Step 13).

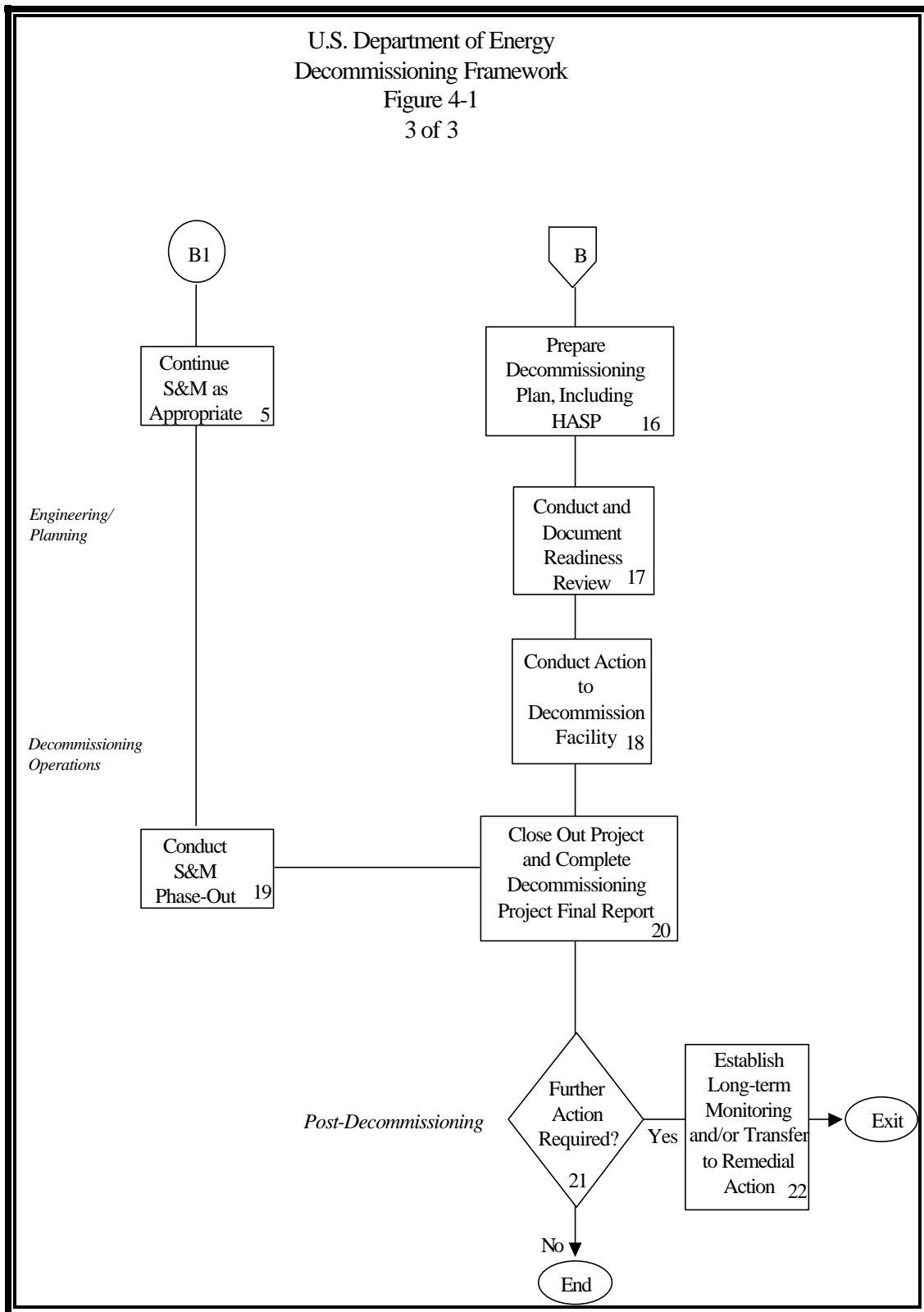
Step 13 - Evaluate Alternatives, Propose Response and Document Analysis of Decommissioning Alternatives - Using the information from the steps preceding, DOE will formulate and evaluate the decommissioning alternatives and select and identify the preferred alternative. The analysis of decommissioning alternatives will be commensurate with the scope and complexity of the decommissioning project, consistent with the graded approach.

The Secretarial Policy on the National Environmental Policy Act, U.S. DOE, June 1994, provides for incorporating NEPA values into CERCLA documents, such as analysis of cumulative, off-site, ecological and socioeconomic impacts, to the extent practicable. If decommissioning is not performed as a CERCLA response, NEPA evaluation is required during this step.

Step 14 - Respond to Public Comment - This step entails providing an opportunity for public review and comment on the alternatives considered. Public comments are reviewed and written response may need to be made to significant public comments in this step. For CERCLA actions, this step involves publication in a major local newspaper of a notice of availability of the Analysis of Decommissioning Alternatives and provides 30 calendar days (45 or more, upon timely request) for submission of written and oral comments on the analysis in compliance with 40 CFR 300.415(m)(4)(ii) and (iii). The public comments are reviewed and written responses are made to significant public comments pursuant to 40 CFR 300.820.

Step 15 - Document Final Decision - The final decision in the selection of the decommissioning action is documented. The decision takes into account the analysis of decommissioning alternatives, the comments received on the analysis, and, if appropriate, comments received prior to the analysis comment period. The determination in this step must be documented. Applicable portions of the EPA Action Memorandum format may be used to document the determination. DOE will consult with regulators concerning this decision in a manner consistent with applicable local agreements, NRC-approved decommissioning plans, or RCRA permits or orders.

U.S. Department of Energy
Decommissioning Framework
Figure 4-1
3 of 3



4.4 Engineering and Planning

Steps 16 and 17 describe engineering and planning work that must be performed to address the specific risks present during decommissioning and to provide measures to mitigate the risks and protect workers, the public, and the environment. The decommissioning end-points reflected in the selected alternative drive detailed planning, including determination of criteria for determining that end-points have been achieved.

Step 16 - Prepare Decommissioning Project Plan, including HASP - This step includes the engineering and planning work required to prepare the decommissioning project plan or equivalent documentation. Coordination with regulators during this step will be the subject of local agreements under CERCLA, NRC-approved decommissioning plans, RCRA permits or orders, and/or NEPA provisions. At sites on the NPL, the work described in the decommissioning project plan must be consistent with long-term remedies at the site.

Work planning activities need to include integrating safety and health considerations specific to worker protection and facility safety during decommissioning. This includes development of performance indicators to ensure adequate protection during project execution. Section 3.0, “Integrated Safety Management System” of DOE-STD-1120-98 provides specific guidance on integrating safety and health factors into project planning and into the decommissioning project plan, or equivalent, and related performance expectations. As part of this step, the existing safety analysis will be revised as necessary to reflect the specified decommissioning activities. The planning work considers ALARA in the decision-making process.

Decommissioning Project Plan Contents

The decommissioning project plan functions as the detailed design for the project and, if so specified in local agreements, may serve as the document to communicate to regulators and other stakeholders the scope and intent of the decommissioning action to be taken. The scope of the decommissioning project plan addresses, subject to the graded approach, the following topics: Facility description and history to provide context for the decommissioning decision and approach; project scope and end-points; summary of characterization results; technical approach, including the decommissioning approach to be followed and the technical baselines and assumptions; project management, including approach, cost, schedule, quality assurance, project organization, and training; worker and environmental protection and facility safety, including the HASP, the ALARA program and how it was applied during planning, and the safety analysis; waste management plan; and plans and criteria for the final site survey.

Consistent with the graded approach, the scope and detail of the decommissioning project plan will be commensurate with the scope and complexity of the decommissioning project. The decommissioning project plan or equivalent documentation should provide for change control, unless change control management is addressed on a site-wide basis.

When it is completed and approved, the decommissioning project plan or equivalent will replace the preliminary project plan (or scoping document), constituting the new technical, cost, and schedule baselines for the project, and will become the technical specifications for performing the work.

Planning Considerations

In defining, organizing, and planning the technical components of a decommissioning project, program or project managers should consider a number of factors. Such factors will vary from site to site and may include:

- C Physical proximity,
- C Continuing operational requirements,
- C Land use requirements,
- C Logical groupings of facilities and activities,
- C Similarities in structures and nature of contamination,
- C Realistic forecast of available funding, and
- C Relationship and proximity to soil/ground water remedial action projects.

In particular, the release criteria to be used for the decontamination of equipment, structures, and the environment (i.e., soil, air, ground water) need to be established in the planning process for a decommissioning project. The criteria must be established early in the project, because these will have a significant effect on the technical approach, schedule, and cost for the project. The radiological criteria to be used will depend on regulatory requirements that may be imposed and on whether the decontaminated facility or site will be released for use with or without radiological restrictions.

For release of non-real DOE property, such as tools and equipment or reusable debris, the release process specified in the *Handbook for Controlling Release for Reuse or Recycle of Non-Real Property Containing Residual Radioactive Material* is followed. The steps spelled out in this process are designed to satisfy the requirements of DOE 5400.5, *Radiation Protection of the Public and the Environment*, and the codification of that order as proposed in 10 CFR 834 (58 FR 16268, March 25, 1993).

For real property (that is, facilities or sites) to be released without radiological restrictions, the release criteria shall be developed on the basis of the guidelines found in Chapter IV of DOE 5400.5, *Radiation Protection of the Public and the Environment*, and proposed for codification at 10 CFR 834. The process of establishing release criteria starts with the guideline values for residual radioactive material. Generic guidelines for thorium and radium in soil, airborne radon decay products, external gamma radiation, surface contamination, and residual radionuclides in air and water are specified in the order. Guidelines for radionuclides in soil other than thorium and radium must be derived on a site-specific basis.

To derive site-specific guidelines for soils and remaining structures, a contribution to the basic radiation dose limit of 100 mrem/yr is applied to a member of a critical population group, using the DOE material code RESRAD, and employing a realistic pathway analysis. The radiation dose is defined here as the effective dose equivalent from external radiation plus the committed effective dose equivalent from internal radiation. This limit applies to all routine DOE activities, not just the decommissioning project. The radiation dose limit is based on radiation protection standards and requirements specified in DOE 5400.5.

“Authorized limits” are defined as concentrations of radionuclides and levels of radioactivity that must not be exceeded if the remedial action or decontamination effort is to be considered complete and the site is to be released for use without radiological restrictions. Authorized limits are set equal to guideline values unless (1) variations (supplemental limits or exceptions) specified in DOE 5400.5 apply, in which case an authorized limit may be set above the corresponding guidelines value for the specific location or condition to which the exception applies; or (2) it can be clearly established that limits below the guideline values are reasonable and that the use of such limits are cost beneficial and comply with appropriate requirements (DOE 5400.5).

In addition to requiring that residual radioactivity be below guideline values, DOE also requires, as a matter of policy, that residual radioactivity be reduced to ALARA levels before a site is released, regardless of the guidelines. Socioeconomic considerations, as well as technical feasibility, need to be taken into account in implementing this policy. The ALARA requirements apply to all DOE actions, as described in Chapter IV of DOE 5400.5, including establishment of the "authorized limits."

Step 17 - Conduct and Document Readiness Review - In this step, the organization that will perform the decommissioning will be identified and/or acquired. It may be an independent contractor or an in-house resource (especially for small projects). The performing organization will make preparations for the field work, such as completion of appropriate detailed procedures, manuals and additional plans, and the training of personnel. The performing organization's involvement in work planning is described in Section 3.1, “Work Planning and Hazard Identification” of DOE-STD-1120-98.

Preparation of Detailed Work Packages

The information contained in the project plan forms the basis for the development of detailed work packages (activity specifications). These specific work packages provide the safety and health requirements as well as the step-by-step instructions to the workers responsible for the conduct of the work to be performed.

As the level of detail improves during project development, detailed work tasks can be developed and scheduled. These tasks are identified, evaluated, and controlled within the facility's existing job-control system. As indicated in Section 2.2 of this Guide, the principles of Integrated Safety Management must be an integral part of the work package and job-control system.

To be effective, work packages should include the following items:

- A description of specific work scope activities.
- Identification of the type of hazard analysis required for the activity, and verification that the analysis was performed.
- A method to ensure that hazards associated with each of the planned activities are documented and shared with workers together with the steps to eliminate, minimize or reduce the risk of those hazards to an acceptable level.
- Work permits necessary to conduct such work.
- The necessary training requirements to perform each task.
- A listing of equipment and each item's intended use.

- The personal protective equipment needed to limit exposure to the identified hazards.
- The emergency response procedures applicable to the task.
- A description of the management structure, including communication and reporting channels.
- Engineering studies applicable to the task.
- The expected results upon completion of the task.

The detailed work packages provide the details of the work to be accomplished and the process for doing such work safely and efficiently. The work packages, also, provide the structure of project activities needed to sufficiently inform all involved parties of the work to be accomplished. This documentation ensures that safety and health impacts have been verified and evaluated that controls are established prior to commencing work.

As a final step to work package preparation, the planned work activities are evaluated against the potential impact to the safety authorization of the facility. A safety review is conducted to ensure that the work activities are authorized to be performed within the facility's safety envelope. The formality and rigor of this type of process may vary with the hazard classification of the project or facility. However, a determination of the impact on the authorization basis is essential.

Contracting Approach Considerations

DOE has been moving toward more performance-based contracting where there are appropriate opportunities. Work packages are prepared in biddable format to the extent feasible and practical and in sufficient detail, for competitive bidding and award on a basis with maximum degree of fixity (e.g., lump-sum, fixed price preferred; fixed unit prices next in preference).

In making decisions concerning the contracting approach, managers will need to consider a number of factors. Some of these factors are:

- C* *Funding availability.* Are sufficient funds available for a meaningful contracting effort or is it prudent to plan the work and/or the flexibility of performance by in-house labor forces?
- C* *Size of Project.* Larger projects may be more successfully contracted out than smaller projects.
- C* *Uncertainty of Scope.* If, despite a reasonable level of investigation, uncertainty exists about the scope of certain work (e.g., extent of contamination in cracks, under slabs), unit prices may be more appropriate than a fixed price contract, or performance by in-house labor may be appropriate.
- C* *Labor Source.* At some DOE sites it may be appropriate to use retrained or otherwise qualified ex-production workers to perform decommissioning work. This will need to be weighed against potential economics of competition bidding and award to contractors with their own labor sources. If Building and Construction Trades labor is to be used, local jurisdictional practices related to demolition need to be considered.

- C *Department of Labor (DOL) Determinations.* At the Shippingport Station Decommissioning Project, DOL made the determination that the lower wage rates of the Service Contract Act applied to the decommissioning work, rather than the construction wage rates of the Davis-Bacon Act. This type of decision can have a major effect on the cost of larger projects and may affect the contracting approach.

Activity specifications should focus on **WHAT** is to be done and what management and safety considerations are necessary and appropriate for the job. To the extent possible, the means, methods, and techniques should be left up to the performing organization. That performing organization should prepare detailed procedures that describe **HOW** the work will be performed. It is crucial that all of these activities be performed under the umbrella of site-wide safety and health and quality assurance programs.

Readiness Review

When the performing organization is fully prepared, an appropriately graded readiness review will be conducted to ensure that all the necessary activities have been completed and documented prior to the start of decommissioning operations. The purpose of the review is to minimize the possibility of halting the progress of decommissioning operations due to incomplete planning and preparation and to ensure safety during decommissioning operations.

The readiness review is necessary to ensure that all hazards have been identified, appropriate safety and health requirements have been met, and safety systems and controls are in place and capable of performing their intended functions. DOE-STD-1120-98 provides further guidance on, and a checklist for, performing readiness reviews prior to initiating decommissioning projects.

It is possible that a project may have more than one readiness review to cover portions of the project that are separated in time (e.g., acquisition of the performing contractor and the completion of its manuals and training programs, followed by the acquisition of a specialty subcontractor and the completion by it of the detailed procedures applicable to its work.) It also is possible that not all items need to be complete before work can start. For example, operating procedures for one group of activities may be needed for the start of the work while others may not need to be prepared until later in the course of project activities. It should be the judgment of the review group as to which items need to be complete for a particular stage of readiness for the project. In any case, the decommissioning scoping document or preliminary project plan (and subsequently, the decommissioning project plan) should identify the specific approach to readiness reviews that will be followed for the project.

The readiness review should be conducted by an organization that is not directly involved with the day-to-day management of the decommissioning project. The results and conclusions of the review should be documented by the reviewer and include a list of open items that must be completed before and after the start of decommissioning operations.

In scheduling the project activities, a period of time (approximately one month) should be considered between the readiness review and the start of decommissioning operations. This will allow for the completion of any open items identified in the readiness review.

4.5 Decommissioning Operations

Step 18 - Conduct Action to Decommission Facility - This step is the performance of the field work to achieve the end-points stated in the decommissioning project plan or equivalent. During decommissioning operations, provisions of the HASP and the technical specification of the decommissioning project plan or equivalent must be followed to assure that field operations are protective of workers, the public and the environment, consistent with the graded approach. During decommissioning operations, all wastes generated must be handled in compliance with all applicable regulatory requirements.

A change management process should be in place to ensure that safety controls are current, adequate, and documented as decommissioning progresses. Section 3.4.2 of DOE-STD-1120-98 provides guidance on management of change to address worker protection and facility safety throughout the decommissioning project.

The safety and health performance indicators developed in the planning phase and documented in the decommissioning project plan should be monitored regularly to ensure that they are being met and that timely corrective action is taken if end-points are not being met. Section 3.5 of DOE-STD-1120-98 provides additional guidance on safety and health performance feedback and evaluation.

Step 19 - Conduct S&M Phase-Out - During field operations, S&M activities will be continued until phased out in the planned manner. See DOE G 430.1-2 for applicable guidance.

Step 20 - Close Out Project and Complete Decommissioning Project Final Report - This step comprises project close-out activities. This includes conducting final facility (or portions thereof) surveys to demonstrate that decommissioning end-points have been achieved. Decommissioning will be completed by conducting final radiation and chemical surveys to demonstrate that the project end-points (which shall be consistent with DOE 5400.5 and appropriate non-radiological contamination criteria) have been achieved. S&M activities will cease with the achievement of decommissioning end-points, unless required for long-term remedial action or continuing site control pending release or transfer of the property or facility.

Independent verification may be required to verify that the decommissioning end-points have been achieved. Independent verification is necessary for:

- (1) Facilities that are to be released for unrestricted use.
- (2) Decommissioning projects in which DOE has sole responsibility for the closure documents. These include:
 - C Removal actions conducted under CERCLA where neither the U.S. Environmental Protection Agency nor the state signs the closure document and where no further action will be required to remediate the site under CERCLA remedial action.

- C Decommissioning projects performed under DOE Atomic Energy Act authority, rather than under CERCLA, RCRA, NRC, or Agreement State authority.

A decommissioning project final report or equivalent must be prepared, consistent with the graded approach, after all technical work has been completed and verified. The final report describes decommissioning activities; accomplishments; final facility status; and lessons learned, including evaluation and feedback on the safety management system.

4.6 Post-decommissioning Action

Decommissioning will not always be the final action, particularly at NPL sites where follow-on remedial action for soils and water bodies often is required to complete the cleanup. When this is the case, follow-up responsibilities will be included in ongoing remedial action programs.

Another type of post-decommissioning action that may be necessary is long-term monitoring of the site, whether or not additional remedial action is performed.

Step 21 - Further Action Required. - This step entails evaluating whether or not further action is required, and, if so, what that further action will be.

Step 22 - Establish Long-term Monitoring and/or Transfer to Remedial Action - Additional action may include long-term monitoring, if appropriate; transfer to site remedial action for final cleanup of adjacent soil or ground water; continuing site control activities, as necessary, pending property or facility release or transfer to another authorized party; or administrative action consistent with the decommissioning end state and/or site plan.