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Decommissioning Handbook

PROCEDURES AND PRACTICES
FOR DECOMMISSIONING



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1.0 Introduction

1.1 Objective

The objective of the U.S. Department of Energy (DOE) Decommissioning Handbook: Procedures and Practices for Decommissioning (hereafter, Handbook), is to use examples and information about lessons learned to illustrate established procedures and practices that are adequate to implement the DOE decommissioning framework, as defined in DOE G 430.1-4, *Decommissioning Implementation Guide*.

1.2 Scope and Applicability

This Handbook supports the *Decommissioning Implementation Guide*, which was prepared to provide guidance for implementing the requirements of DOE O 430.1A, *Life-Cycle Asset Management (LCAM)* and aid in the planning and implementation of decommissioning activities at DOE facilities that have been declared excess to any future mission requirements.

This Handbook provides contractors and DOE personnel with non-mandatory guidance and information about DOE's expectations on meeting existing requirements and DOE policies. Specifically, this Handbook illustrates procedures and practices that are consistent with the acceptable methods and approaches discussed in the *Decommissioning Implementation Guide*.

It does not itself impose any requirements. However, it may repeat requirements already imposed by DOE or other Federal agencies. For example, requirements imposed by LCAM; DOE P 450.4, *Safety Management System Policy*; and the *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)* (hereafter, the *1995 Decommissioning Policy*) may be repeated in this Handbook because the *Decommissioning Implementation Guide* addresses such requirements.

Background on the 1995 Decommissioning Policy

Under authority delegated by Executive Order 12580, DOE is responsible for evaluating whether conditions at sites under the Department's jurisdiction pose a significant threat of release of hazardous substances, as defined by CERCLA. If so, DOE is authorized to conduct removal action, remedial action, and any other response measures consistent with the National Contingency Plan (NCP). For sites listed on the National Priorities List (NPL), the U.S. Environmental Protection Agency (EPA) has responsibility for ensuring that actions taken by DOE comply with CERCLA requirements. In that role, EPA may take legal action against DOE in the event EPA disagrees with DOE's determination as to the presence of a release or substantial threat of release of hazardous substances at a DOE site.

In 1994, a working group involving DOE and EPA personnel was formed to establish the manner of applying CERCLA to decommissioning of facilities located on DOE sites. The result of this effort was the *1995 Decommissioning Policy*, which was signed on May 22, 1995. The *1995 Decommissioning Policy* establishes that decommissioning activities at facilities located on DOE sites will be conducted as non-time-critical removal actions under CERCLA, unless the circumstances at the facility make it inappropriate.

Furthermore, the finalized LCAM Order requires the use of non-time critical removal actions for decommissioning activities as specified in the *1995 Decommissioning Policy*.

The guidance provided by this Handbook applies to all decommissioning actions at contaminated facilities, or portions thereof, owned by DOE or that DOE has agreed to decommission. “Contaminated” refers to both radioactive contamination and to hazardous substance contamination. Nuclear facilities and non-nuclear facilities are included in the scope of this Handbook.

It is important to note that facility decommissioning may be only one aspect of environmental remediation at a site. Also, environmental remediation at some sites may not involve facility decommissioning. Therefore, DOE is developing other guidance to explain the generic process and principles of environmental remediation. The decommissioning framework (discussed both in this Handbook and in the *Decommissioning Implementation Guide*) should be viewed as a subset of that generic remediation process.

1.3 Approach and Structure

The layout of this Handbook is based on the decommissioning framework flowchart presented in Figure 4-1 of the *Decommissioning Implementation Guide* and repeated here in Chapter 2. The layout is as follows:

- < **Chapter 1** provides an introduction of the objectives, scope, and applicability of this Handbook
- < **Chapter 2** describes the basis and structure of the decommissioning framework, which is divided into six stages.
- < **Chapters 3 through 8** present the particular aspects of each of the six stages of the decommissioning framework. The description of each aspect is supplemented, as appropriate, by additional discussion, tables, examples, flowcharts, and lessons learned that illustrate the use of established procedures and practices to complete the components of the aspect. The source of the supplemental information provided includes, but was not limited to, the *Decommissioning Resource Manual* and the former *Decommissioning Handbook* (DOE/EM-0142P, March 1994).
- < **Appendix A** lists authorities cited in this Handbook that were consulted in preparing this document.
- < **Appendix B** lists other references provided as possible sources of additional guidance on specific topics. Such references may not have been consulted in preparing this Handbook, and are provided solely for the reader's convenience.
- < **Appendices C and D** list acronyms and definitions, respectively.
- < **Appendix E** provides suggestions on the functions and purposes of a decommissioning plan.
- < The requirements and activities associated with verification and certification and the content of the certification docket are described in **Appendix F**.

As a note, this Handbook, the *Decommissioning Implementation Guide*, and the *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 *Decommissioning Implementation Guide* differs from the *Decommissioning Resource Manual*, which included a variety of information of interest or potential use to decommissioning project managers and staff. Material from the *Decommissioning Resource Manual* that directly relates to implementation of policies and directives has been incorporated in the *Decommissioning Implementation Guide*. Material from the *Decommissioning Resource Manual* and former Handbook that does not directly relate to acceptable methods for meeting program requirements is being compiled in this 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*.

2.0 The Decommissioning Framework

2.1 DOE G 430.1-4, *Decommissioning Implementation Guide*

LCAM¹ directs that DOE, in partnership with its contractors, shall plan, acquire, operate, maintain, lease, and dispose of physical assets in a safe and cost effective manner to meet DOE's mission. According to LCAM, this management of physical assets from acquisition through operations and disposition shall be a seamless process. LCAM further directs that industry standards, a graded approach, and performance objectives are to be used in managing an asset throughout its life-cycle, including the disposition phase. The disposition phase of an asset may consist of activities within any or all of the following categories: surveillance and maintenance (S&M), deactivation, and decommissioning.

To assist DOE elements in implementing the requirements of LCAM that apply to asset disposition, DOE developed the following four guidance documents:

1. **DOE G 430.1-2, *Implementation Guide for Surveillance and Maintenance During Facility Transition and Disposition***
2. **DOE G 430.1-3, *Deactivation Implementation Guide***
3. **DOE G 430.1-4, *Decommissioning Implementation Guide***
4. **Draft DOE G 430.1A-5, *Transition Implementation Guide***

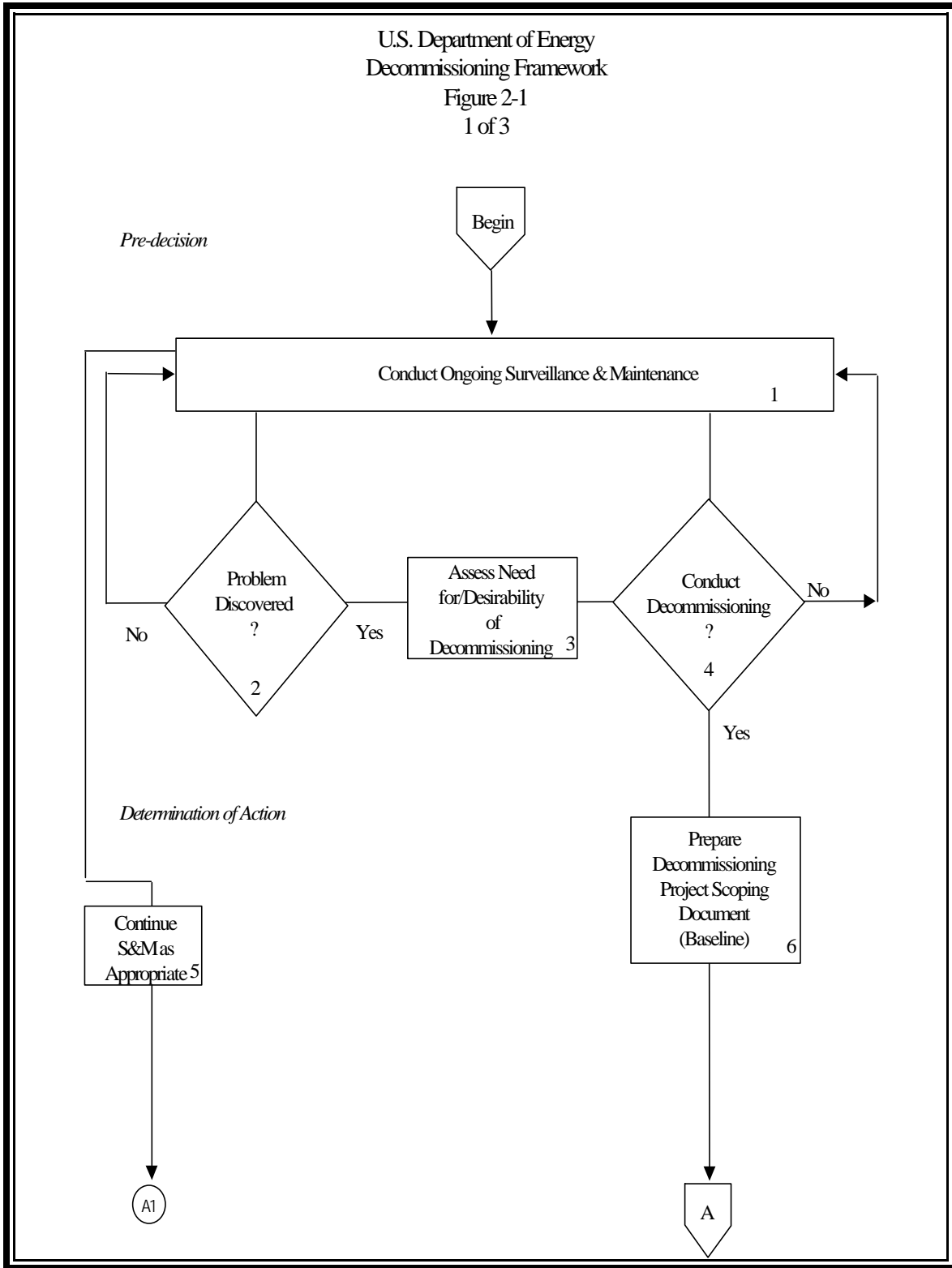
The *Decommissioning Implementation Guide* describes a decommissioning framework designed to assure that actions taken at the end of the life of a DOE facility to retire it from service are consistent with the requirements of any driving statutes or DOE policies. Specifically, the *Decommissioning Implementation Guide* provides an approach for cost-effective asset management in accordance with LCAM that is consistent with the principles and core functions of DOE P 450.4, *Safety Management System Policy*, and that addresses implementation of the *1995 Decommissioning Policy*. The decommissioning framework is depicted in flowchart form which is presented on the following pages. As a note, matching symbols show continuity from one chart to the next.

¹ On October 14, 1998, a revision to DOE O 430.1 was completed. The new LCAM Order, DOE O 430.1A is available at: <http://www.explorer.doe.gov:1776/> or <http://www.em.doe.gov/dd>.

DECOMMISSIONING FRAMEWORK

U.S. Department of Energy
Decommissioning Framework

Figure 2-1
1 of 3

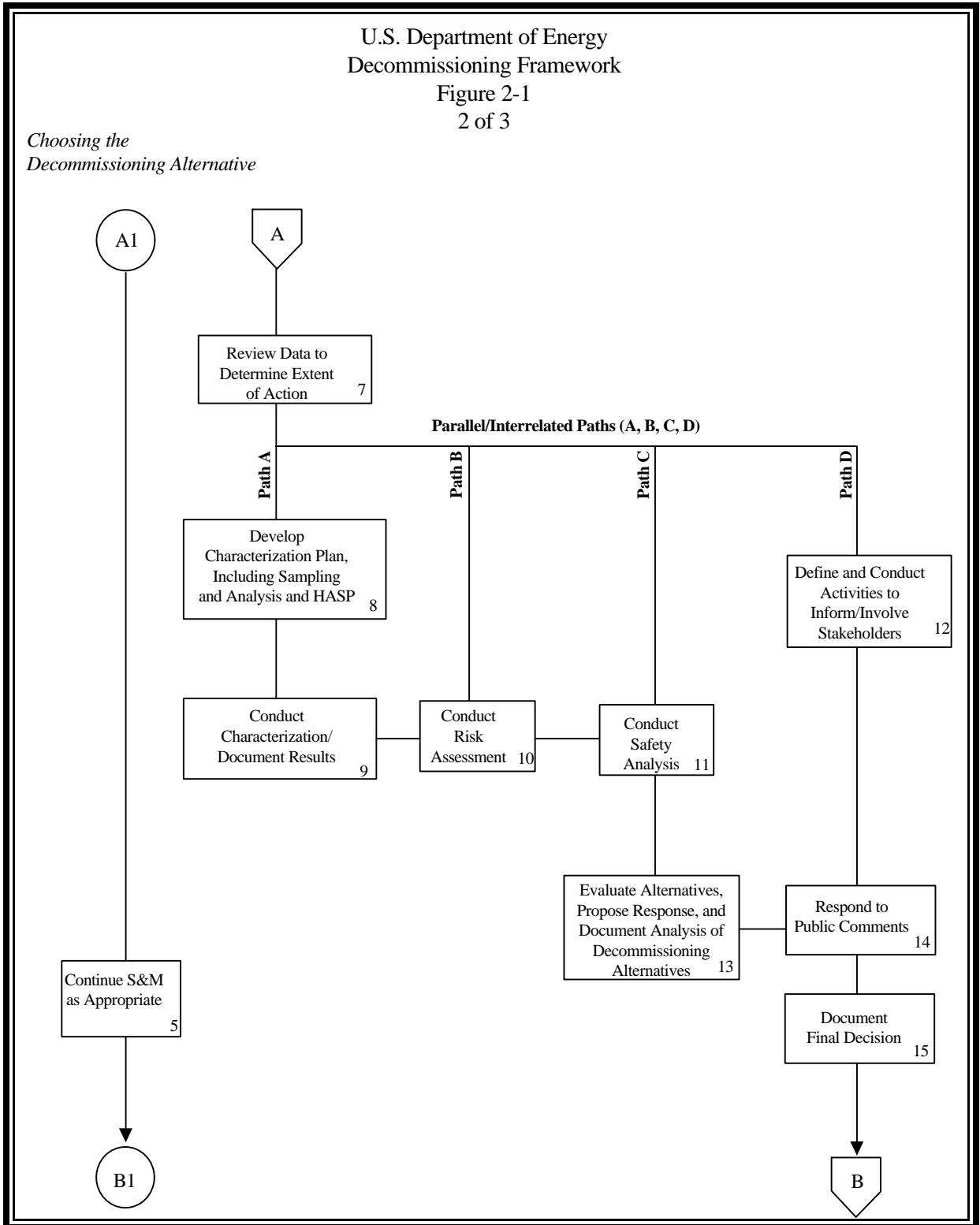


DECOMMISSIONING FRAMEWORK

U.S. Department of Energy
Decommissioning Framework

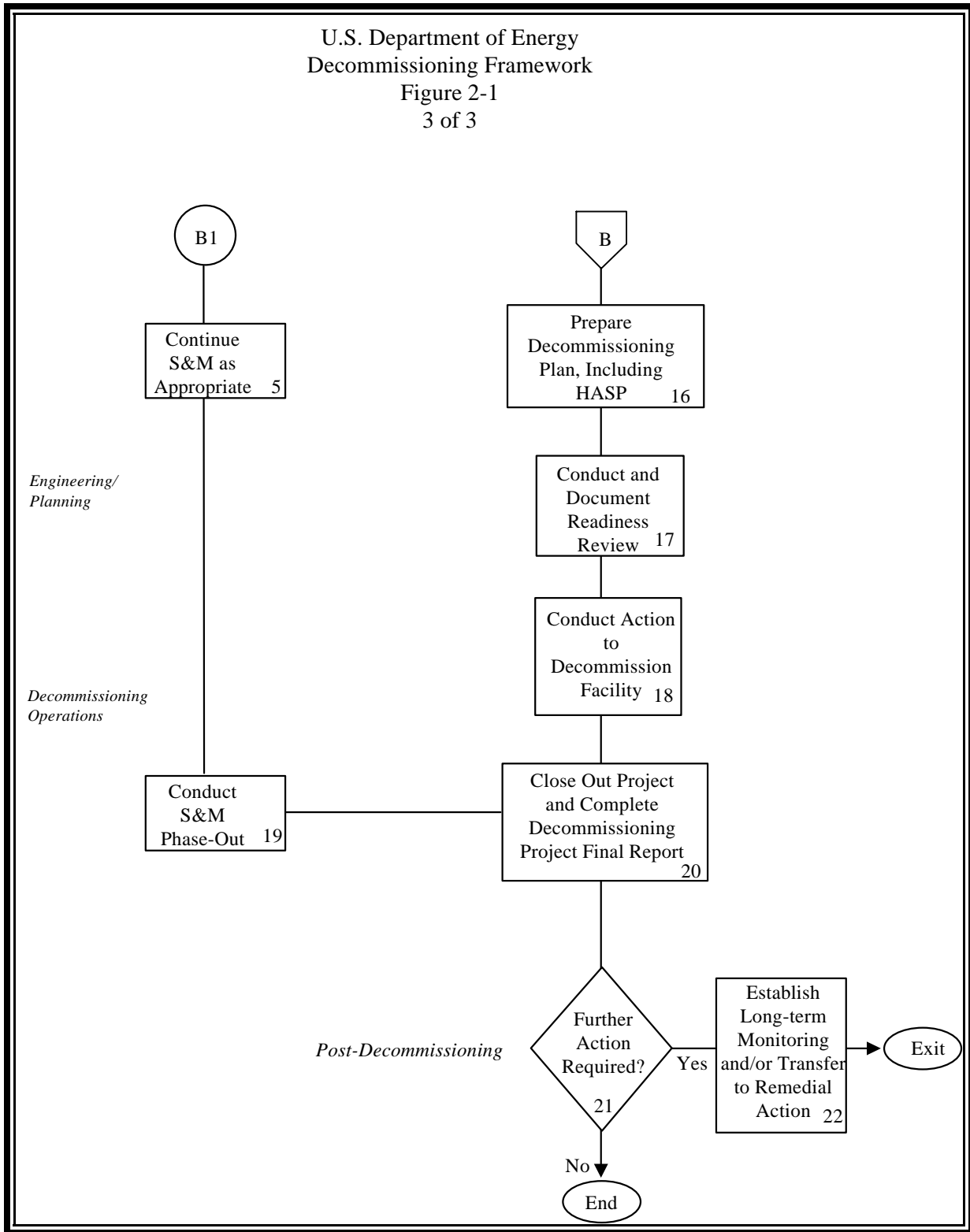
Figure 2-1
2 of 3

*Choosing the
Decommissioning Alternative*



DECOMMISSIONING FRAMEWORK

U.S. Department of Energy
Decommissioning Framework
Figure 2-1
3 of 3



2.2 Structure of the Decommissioning Framework

2.2.1 Basis for the Decommissioning Framework

The framework for decommissioning presented in the *Decommissioning Implementation Guide* is modeled after the process for conducting non-time-critical removal actions under CERCLA, as that process is delineated in the Code of Federal Regulations (CFR), Title 40, Part 300 (40 CFR Part 300, referred to as "the National Contingency Plan" or "NCP"). Notwithstanding its CERCLA foundation, the decommissioning framework was designed to be flexible enough to accommodate facilities not governed by CERCLA. As such, each aspect of the framework should be adapted on a case-specific basis to accommodate the requirements of the legal authority or management decision that actually triggered decommissioning at a particular DOE facility. In addition to the provisions of CERCLA, examples of legal and management drivers of decommissioning that may apply at DOE facilities include provisions in a U.S. Nuclear Regulatory Commission (NRC) license, provisions in permits or orders issued under the Resource Conservation and Recovery Act (RCRA), and DOE programmatic decisions governed by DOE directives. Only in cases where decommissioning is directly driven by CERCLA is it necessarily appropriate for the decommissioning process to adhere rigorously to the CERCLA process for conducting non-time-critical removal actions. In all other cases, the *Decommissioning Implementation Guide* encourages case-specific decisions with respect to whether the CERCLA non-time-critical removal action process is appropriate.

LESSON LEARNED

The application of lessons learned and demonstrated management techniques is essential to the safe, cost-effective, and timely completion of decommissioning projects.

The decommissioning of Building 889 in the early 1990s was the first large scale decommissioning project of a radiologically contaminated building at the Rocky Flats Environmental Technology Site. Prior to decommissioning, the building was used as a decontamination and repackaging facility for uranium and beryllium operations.

Successful decommissioning of the building was facilitated by application of the following management approaches. A single focal point for decommissioning, based upon proven techniques and lessons learned from previous decommissioning projects, unified technical and operational functions, streamlined decision-making, enhanced communication, and improved project efficiency. To ensure consistency in the quality of work, and to foster a sense of teamwork and ownership, individuals were permanently assigned to the project, and technical craftsmen were involved in the initial phases of project planning.

Employing techniques such as these helped in completing the project as originally scheduled and decreased the generation of radioactive and hazardous waste.

Dorr, K.A. et.al. Waste Management '97, June 15, 1997. "Decontamination and Decommissioning of Building 889 at Rocky Flats Environmental Technology Site."

2.2.2 Phases of the Decommissioning Framework

The various aspects of the decommissioning framework presented in the *Decommissioning Implementation Guide* can be grouped into the six stages described below. These descriptions provide a useful outline of the decommissioning framework and are the basis for the headings of Chapters 3 through 8.

Stage One: Pre-decision

The disposition phase of a DOE facility's life-cycle usually includes deactivation, decommissioning, and S&M activities. As DOE facilities complete mission operations and are declared excess, they pass into a transition phase which ultimately prepares them for disposition. Deactivation, which is usually the first activity associated with facility disposition, places the facility in a safe shut-down condition that is economical to monitor and maintain for an extended period until decommissioning decisions have been made and the decommissioning activity begins. Decommissioning is typically the final activity associated with facility disposition. During decommissioning, the facility may be decontaminated and/or dismantled, and released, demolished, or entombed. Throughout deactivation and decommissioning, S&M activities are performed to maintain the facility safety envelope. S&M may also be conducted as a separate, stand-alone activity between the deactivation and decommissioning activities, if these activities are separated by a substantial length of time.

Ideally, before formal decommissioning begins (i.e., during the pre-decision stage), the facility to be decommissioned will have completed the deactivation activity, and S&M will be ongoing as just described. Such a facility would enter the pre-decision stage of decommissioning in a stable and known condition. Some DOE facilities, however, may enter the pre-decision stage of decommissioning with their conditions and/or operating histories unknown. For example, a facility that was shut down with the initial expectation of restarting, but that did not restart for a number of years could be in a situation during the pre-decision stage where the current status and condition of structures and systems are not well documented. Some S&M activities may be ongoing, and completion of deactivation tasks may also be ongoing. Under these circumstances, it will probably be necessary to directly verify the status and condition of the facility, and the S&M plan is likely to require modification during the pre-decision stage to reflect changes in the facility's authorization basis as deactivation tasks proceed.

Practices and procedures appropriate to the pre-decision stage of decommissioning are provided in Chapter 3.0.

Stage Two: Determination of Action

The decision to decommission a DOE facility may result from discovery of a release or substantial threat of release of hazardous substances at the facility, or may simply be a programmatic decision to go forward with decommissioning. In any case, a reasoned evaluation will be needed to justify the decision. Also, it will be necessary to determine the appropriate decommissioning process and to define the baseline technical scope of the decommissioning project, its baseline cost, and its baseline schedule. Further, while these tasks are active, appropriate S&M must continue to ensure maintenance of worker and public safety and environmental protection at the facility to be decommissioned.

Practices and procedures appropriate to making the decision to decommission are provided in Chapter 4.0.

Stage Three: Choosing the Decommissioning Alternative

After deciding to proceed with decommissioning, a DOE facility will identify decommissioning alternatives and choose the most appropriate alternative. This may involve collecting additional information and performing additional analyses to support the evaluation of alternatives, especially if several years have elapsed since completion of a project scoping document. Hence, choosing the final decommissioning action will entail reviewing data that support any previously prepared project scoping document. Also, it may be necessary to develop and implement plans to appropriately supplement such data. A plan for stakeholder participation in the decision process should be prepared and implemented, and the final choice of a decommissioning action must be made only after considering all available information, including stakeholder comments.

Practices and procedures appropriate for choosing a decommissioning alternative are provided in Chapter 5.0.

Stage Four: Engineering and Planning

Once a final decommissioning action has been selected for a DOE facility, the next stage of decommissioning (i.e., the engineering and planning stage) involves preparing a decommissioning project plan and completing a readiness review. The scope of each of these tasks should be graded to be commensurate with the complexity of the chosen decommissioning alternative. However, the engineering effort to prepare the decommissioning project plan should always be sufficient to address the risks expected during decommissioning. The plan should include measures that will mitigate the risks and protect workers, the public, and the environment.

The purpose of the readiness review, which should be performed by an independent organization, is to ensure that appropriate procedures are in place to effectively implement the decommissioning project plan. Before decommissioning operations start, the readiness review confirms that workers are properly trained and that the organization performing the decommissioning operations is adequately prepared to implement the decommissioning plan.

Practices and procedures appropriate to the engineering and planning stage of decommissioning are provided in Chapter 6.0.

Stage Five: Decommissioning Operations

After the decommissioning project plan is approved and readiness has been verified, decommissioning operations can start. During the operations stage of decommissioning, S&M continues while actions are taken to achieve the decommissioning end points stated in the decommissioning project plan. As end points are successfully met, S&M is either phased out in a manner identified in the decommissioning project plan, or converted to long-term, post-cleanup S&M. Finally, appropriate surveys are conducted to demonstrate that decommissioning end points have been met, and a final report is prepared.

Practices and procedures appropriate to decommissioning operations are provided in Chapter 7.0.

Stage Six: Post-decommissioning Action

Decommissioning will not always be the final action. Prime examples of this are facilities located at NPL sites where site plans require follow-on remedial action for soils and water bodies to complete the cleanup. For such facilities, the disposition phase of the life-cycle must include a post-decommissioning stage. Other examples of facilities requiring post-decommissioning action are facilities at which the decommissioning alternative leaves contaminated materials entombed or otherwise contained on-site. Here, the post-decommissioning stage would involve long-term S&M.

Practices and procedures appropriate to post-decommissioning actions are provided in Chapter 7.0.

2.3 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.

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.

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 The "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.

The *Decommissioning Implementation Guide* advises that application of the graded approach is appropriate for all steps in facility decommissioning. In this way, an appropriate level of detail and sophistication can be established for different facility types and for facilities with different hazard categories. Accordingly, for the purpose of this Handbook, the graded approach should be applied when deciding an appropriate level of effort for any recommended action described in Chapters 3 through 8. The bases for the level of effort chosen by applying the graded approach should be documented.

3.0 Pre-Decision

As was explained in Section 2.2.2, the disposition phase of a DOE facility's life-cycle usually includes deactivation, decommissioning, and S&M activities.

S&M activities consist of two elements: surveillance and maintenance. Surveillance includes any activity at a facility that involves the scheduled periodic inspection of a facility, equipment or structure as required by federal and state environmental, safety and health laws, regulations and DOE Orders. The purpose of surveillance is to demonstrate compliance, identify problem areas requiring corrective action, and determine the facility's present environmental, radiological, and physical condition. More specifically, surveillance includes activities to be performed to determine the operability of critical equipment, monitor radiological conditions, check safety-related items, provide for facility security controls, and to assess facility structural integrity. Maintenance includes any activity performed at a facility on a day to day basis that is required to sustain property in a condition suitable for the property to be used for its designated purpose and includes preventative, predictive, and corrective maintenance.

S&M activities are performed throughout deactivation and decommissioning. S&M may also be conducted as a separate, stand-alone activity between deactivation and decommissioning activities, if deactivation and decommissioning are separated by a substantial length of time. S&M is adjusted during the facility life-cycle as transition, deactivation and decommissioning activities are completed. In any event, after facility operations have ceased, until a definitive decision is made to go forward with decommissioning, a facility is in the decommissioning pre-decision stage. This stage has one aspect, which is described in Section 3.1.

LESSON LEARNED

Continuing surveillance and monitoring activities after facility shutdown provides information for evaluating facility conditions prior to decommissioning.

In the late 1960's, DOE Buildings K-1131 and K-725, located at the K-25 Plant, were classified as "abandoned in place," meaning that the buildings still contained hazardous materials and facility conditions that had not been stabilized. These auxiliary powerhouse buildings were previously used for special research projects, miscellaneous storage, and training.

Because almost all S&M activities were discontinued after the buildings were shut down, facility conditions deteriorated such that additional safety measures were necessary at the time of decommissioning (e.g., workers entering the buildings were required to wear respirators). These additional precautions increased project costs and resulted in schedule delays.

Maintaining an S&M program after a building is shut down provides valuable information about facility conditions at the time of decommissioning, and helps to identify and mitigate unsafe conditions that may arise prior to decommissioning. This is especially important for buildings that store hazardous and radioactive materials.

Cost-Effective Facility Disposition Planning with Safety and Health Lessons Learned and Good Practices from the Oak Ridge Decontamination and Decommissioning Program (May 1998)-DOE/EH-0568

3.1 Step 1 - Conduct On-going Surveillance and Maintenance

After operations at a DOE facility cease, the facility will enter a transition period in which it will be placed in a stable and known shutdown condition and may be deactivated. Then, the facility will await a decision on whether to proceed with deactivation and/or decommissioning. Sometimes, the decommissioning decision will be made promptly after transition or deactivation, but in low-risk situations (e.g., no release or substantial threat of release of hazardous substances exists), budget priorities may delay the decommissioning decision for some time. Regardless of the length of time required to make the decommissioning decision, S&M activities at the facility must continue in the interim to support maintenance of the inactive facility's safety envelope, and to provide feedback for evaluating and revising, if necessary, the facility's hazard baseline documentation.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.1, Step 1, of the *Decommissioning Implementation Guide*:

- 1. If the facility underwent documented transition (e.g., in accordance with the *Transition Implementation Guide*) and does not require deactivation prior to decommissioning, refer to the Pre-Transfer Review report and follow the existing S&M plan.**

The *Transition Implementation Guide* provides recommended steps to place an excess facility in stable and known conditions, identify hazards, eliminate or mitigate those hazards, and transfer programmatic and financial responsibilities from the operating program to the disposition program. At the completion of transition activities, a Pre-Transfer Review is conducted to ensure that the facility condition, contents, regulatory status and hazards have been identified and documented. A Pre-Transfer Review report is prepared to document the results of the review and reflect the up-to-date condition of the facility and its contents. The Pre-Transfer Review report should also provide a clear understanding of the current S&M program to maintain the safety envelope of the facility, and its systems and contents. Hence, during the pre-decision stage of decommissioning at a DOE facility that has undergone transition according to the *Transition Implementation Guide*, S&M should be conducted and documented according to the Pre-Transfer Review report and the existing S&M plan. The methodology for evaluating/reevaluating, modifying, and implementing an S&M program is addressed by the *Implementation Guide for Surveillance and Maintenance During Facility Transition and Disposition* (hereafter, *S&M Implementation Guide*).

- 2. If the facility underwent documented deactivation (e.g., in accordance with the *Deactivation Implementation Guide*), follow the existing written S&M plan.**

The *Deactivation Implementation Guide* provides a recommended framework to aid personnel at DOE facilities that have been declared surplus to any future DOE mission requirements in placing such facilities into a low-risk state with documented S&M requirements. This recommended framework specifies that completion of deactivation and commencement of the next activities of a facility's management should be documented in a deactivation final report. This report includes S&M recommendations for ensuring the remaining facility hazards are contained and monitored. Hence, during the pre-decision stage of decommissioning at a DOE facility that has undergone deactivation according to the *Deactivation Implementation Guide*, S&M should be conducted and documented according to the deactivation final report and the existing S&M plan. The methodology for evaluating/reevaluating, modifying, and implementing an S&M program is addressed by the *S&M Implementation Guide*.

3. If the facility condition and/or operating history is unknown, collect and evaluate baseline data, develop/revise the S&M Plan, and implement the S&M Program.

The *S&M Implementation Guide* provides guidance on S&M activities conducted as part of facility transition and disposition activities. It states that when a facility enters the disposition phase (e.g., pre-decommissioning) with its condition and/or operating history unknown, baseline data must be collected and evaluated to determine the status and condition of the facility. To do this, the guide suggests sources of baseline data that should be reviewed, including the Pre-Transfer Review report, deactivation final report, facility operating information, interviews with past and present employees, facility walkdowns, and other characterization activities. This baseline data collection should be performed at a level of rigor commensurate with how much is already known about the facility condition and operating history. DOE-STD-1120-98, *Integration of Environment, Safety, and Health into Facility Disposition Activities* provides further information on how to identify and analyze hazards, and also provides guidance on accomplishing facility walkdowns.

Once baseline data is collected and evaluated, the *S&M Implementation Guide* states that this data forms the basis for the S&M plan. The topics to be addressed in the plan include, as appropriate, facility history, facility operations, facility surveillance, facility maintenance, waste management and environmental compliance requirements, quality assurance, radiological controls, hazardous material protection, training and qualification, health and safety, emergency preparedness, safeguards and security, and cost and schedule. The *S&M Implementation Guide* explains how each of these topics should be covered in the S&M plan.

The final step in the process is implementation of an S&M program based on the S&M plan. The S&M program will be implemented through detailed procedures and work packages which specify the work to be accomplished, frequency, and process for doing such work safely and efficiently. The *S&M Implementation Guide* provides guidance on items that should be included in S&M procedures and work packages.

- 4. Review the S&M plan and activities regularly until a decommissioning decision is made. As needed, modify the S&M plan to ensure continuing maintenance of worker and public safety, environmental protection, and adequate feedback for evaluating the need to revise the facility's S&M program.**

Development and implementation of an S&M program is an iterative process in which the S&M program is frequently reevaluated and updated to reflect changes in facility conditions and activities. Execution of the various S&M tasks is performed until facility and/or equipment conditions change such that the activity is no longer required or must be altered to meet a new condition. Evaluation and feedback from S&M implementation can provide information to the planning organization in order to assess the need for additional S&M or the removal of existing S&M. In addition, the implementation of unplanned S&M activities may be required due to changes in the schedule of planned decommissioning. Furthermore, a change in the time horizon (e.g., if decommissioning planned for 3 years in the future is extended to 6 years) or a change in the ultimate decommissioning objective will affect S&M. In each of these cases, the need to evaluate/reevaluate the S&M baseline will be identified and the S&M program adjusted accordingly.

4.0 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. DOE must consult with EPA and the state concerning this determination consistent with applicable local agreements. The graded approach will be applied 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.

4.1 Step 2 - Problem Discovered?

The decision to decommission an inactive facility for which DOE is responsible may result from discovery of a problem at the facility in the form of a release or substantial threat of release of hazardous substances, or in the form of other circumstances that suggest decommissioning may be appropriate based on programmatic considerations.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.2, Step 2, of the *Decommissioning Implementation Guide*:

- 1. If information is discovered at an inactive facility for which DOE is responsible suggesting that a release of a hazardous substance has occurred, or a substantial threat of such a release exists, posing a threat to human health or the environment, CERCLA response action may be required. Other statutes may also require remedial action. Therefore, consult with responsible EPA, State, Tribal, and/or local officials in accordance with local agreements to confirm regulatory roles during further investigations of the suspected release or threatened release.**

CERCLA response authority would be appropriate at an inactive DOE facility if the following four threshold criteria are met (CERCLA §104(a)(1)):

1. A hazardous substance is involved;
2. There has been a release, or there is a substantial threat of release;
3. The release or substantial threat of release is into the environment; and
4. Response is necessary to protect human health or the environment.

Under Executive Order (E.O.) 12580, *Superfund Implementation* (E.O. 12580), DOE is charged with determining if a release or a substantial threat of release requiring CERCLA response action exists at facilities that DOE owns or for which it is responsible. EPA is responsible for overseeing compliance at such DOE facilities with the requirements of CERCLA, the NCP and other applicable Federal laws and regulations. EPA is also responsible for providing an opportunity for State

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participation in any CERCLA-related removal, pre-remedial, remedial, and enforcement response activities. Given this division of CERCLA responsibilities, it is important that DOE consult early with EPA regarding regulatory roles at a DOE facility if information is discovered suggesting that CERCLA may apply. The role of State regulators and Tribal representatives should also be discussed.

The 1995 *Decommissioning Policy* encourages the responsible DOE Operations Office and EPA Region to communicate concerning the level of consultation needed for decommissioning projects to ensure an adequate regulatory role.

CERCLA does not generally address releases which are entirely within buildings because the presence of hazardous substances within a building does not constitute a release into the environment. However, if a release has occurred within a building, it may pose a threat of release covered by CERCLA.

Specifically, DOE is to: 1) consult with EPA when a removal site evaluation is conducted; 2) provide EPA with the information needed to review the removal site evaluation; 3) consult with EPA when DOE determines that no release or substantial threat of release has occurred; and 4) provide EPA with the information needed to evaluate such a determination.

Other Statutes That May Require Remedial Action

- **Resource Conservation and Recovery Act (RCRA).** A facility that treats, stores or disposes of hazardous waste is subject to the requirements of RCRA. If such a facility for which DOE is responsible is required to obtain a RCRA permit, RCRA imposes corrective action requirements when a release of hazardous waste or hazardous waste constituents occurs from any solid waste management unit located at the facility (RCRA §3004(u)). RCRA also imposes facility closure requirements on hazardous waste management facilities required to have permits. RCRA corrective action and closure requirements will usually be incorporated into the facility's RCRA permit and enforced by EPA and/or the responsible RCRA-authorized State. If the facility's permit has not been issued (i.e., the facility is in interim status), RCRA requirements may be imposed through an administrative order. Both RCRA and CERCLA could apply simultaneously to a facility for which DOE is responsible if a release of hazardous waste has occurred. Hence, at a DOE facility to which RCRA requirements apply, it is particularly important that DOE consult early with EPA regarding regulatory roles if information is discovered suggesting that a CERCLA response action may be required. The role of State regulators or Tribal representatives should also be discussed.
- **Atomic Energy Act (AEA) of 1954.** The AEA authorizes NRC to regulate the processing and utilization of source material, byproduct material, and

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special nuclear material in order to protect public health and safety. NRC has interpreted this responsibility to include ensuring the safe and timely decommissioning of the nuclear facilities that it licenses. Hence, NRC has adopted regulations requiring a licensed facility that ceases to perform licensed activities to be decommissioned according to an approved decommissioning plan before its license can be terminated. NRC, or the responsible Agreement State, would enforce these regulations at any NRC- or Agreement State-licensed DOE facility or other licensed facility for which DOE has decommissioning responsibility. In circumstances where a facility for which DOE is responsible holds a permit under the AEA, it will be important for DOE to consult with NRC or the Agreement State and with EPA regarding regulatory roles if information is discovered suggesting that CERCLA response action may be required.

- **Local Agreements at CERCLA Sites.** If a CERCLA response action is taken at a DOE facility, E.O. 12580 provides that DOE will be the lead Federal agency when the facility is the sole source of the hazardous substances released. As the lead Federal agency, DOE may choose the type of CERCLA response that is most appropriate under the circumstances (e.g., removal actions, remedial actions, or other response measures). For DOE sites that are listed on the National Priorities List (NPL), Section 120 of CERCLA, *Federal Facilities*, requires DOE and EPA to enter into an Interagency Agreement (IAG) that provides for expeditious completion of remedial action at facilities located on the site. Additionally, it has been DOE's policy that non-NPL DOE sites conducting CERCLA remedial actions also enter into IAGs with EPA. Often, remedial actions covered by an IAG include decommissioning of facilities.
- **Local Agreements at CERCLA/RCRA Sites.** The Administrator of EPA has long encouraged incorporation of RCRA cleanup requirements into IAGs at DOE CERCLA sites. This allows DOE sites containing facilities subject to both RCRA and CERCLA cleanup requirements (i.e., RCRA/CERCLA sites) to be governed under one enforceable agreement that serves as a comprehensive plan for investigatory and remedial activities at the site. Since CERCLA requires that EPA appropriately involve States at NPL sites and since States are often authorized to implement RCRA within their boundaries, a State which hosts a DOE site listed on the NPL and/or hosting RCRA facilities is also usually a party to any local IAGs. Among other things, IAGs establish the roles of DOE, EPA, and the State in completing the remedial action. As at CERCLA sites, remedial actions at a RCRA/CERCLA site covered by an IAG often include decommissioning of facilities.

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- **Examples of Local Agreements at DOE Sites.** IAGs for the DOE sites listed below are available for viewing and downloading on the Internet at <http://www.em.doe.gov/ffaa/cercla.htm>:
 - < Brookhaven National Laboratory (February 28, 1992)
 - < Feed Materials Production Center (April 9, 1990)
 - < Fernald Environmental Management Project (September 20, 1991)
 - < Hanford (May 15, 1989, as amended through April 1998)
 - < Idaho National Engineering Laboratory (December 9, 1991)
 - < Lawrence Livermore National Laboratory (Main Site) (November 1, 1988)
 - < Lawrence Livermore National Laboratory (Site 300) (June 29, 1992)
 - < Maywood (September 17, 1990)
 - < Monticello (December 22, 1988)
 - < Mound (August 6, 1990)
 - < Oak Ridge Reservation (November 18, 1991)
 - < Paducah Gaseous Diffusion Plant (November 4, 1988)
 - < Portsmouth Gaseous Diffusion Plant (September 27, 1990)
 - < Rocky Flats (July 19, 1996)
 - < Savannah River Site (January 15, 1993)
 - < St. Louis & Hazelwood (FUSRAP Sites) (June 26, 1990)
 - < Weldon Spring Site Remedial Action Project (August 22, 1986)
 - < W.R. Grace (Wayne) (September 17, 1990)

- **Local Agreements at CERCLA/NRC-Licensed Sites.** If a facility for which DOE has decommissioning responsibility has been issued a license by the NRC or an Agreement State under the AEA, the decommissioning plan approved during the licensing process will govern the DOE-NRC decommissioning consultation process. A CERCLA IAG may not have been developed for such a facility even if CERCLA would otherwise apply because of EPA's policy to not list NRC-licensed facilities on the NPL.

- **Local Stakeholder Involvement.** An IAG or a NRC-approved decommissioning plan may contain provisions for involvement of the public and other stakeholders in the decommissioning process at a facility being decommissioned by DOE. At facilities where CERCLA applies, the NCP mandates public involvement in the response action decision-making process. At facilities where RCRA applies, public involvement is governed by 40 CFR Part 270, *EPA Administered Permits: The Hazardous Waste Management Program*, or equivalent State regulations. Also, as a matter of policy, DOE recognizes that, regardless of whether laws and regulations mandate it, public participation must be a fundamental component of the Department's program

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operations, planning activities, and decision making. As a result, each DOE site is responsible for developing its own public participation program and plans in consultation with stakeholders and with the concurrence of appropriate Headquarters program offices. Almost all DOE sites already have a designated public liaison. Hence, when information has been discovered to suggest that decommissioning decisions will be made at a DOE facility, plans should be made to comply with all requirements and obligations to involve the public and stakeholders in the decision-making process.

2. If warranted, notify the National Response Center.

The NCP requires that the National Response Center be notified immediately in accordance with 40 CFR Part 302, *Designation, Reportable Quantities, and Notification*, if the reportable quantity (RQ), or more, of a hazardous substance is released. Notification must be made to:

National Response Center Duty Officer
Washington, D.C.
Toll Free: 1-800-424-8802, or
Washington, D.C. area: 202-267-2675.

No notification is necessary if a release is authorized by a Federal permit, even though the release exceeds a reportable quantity of a hazardous substance.

If available information about a facility for which DOE has responsibility clearly indicates that a reportable release of a hazardous substance has occurred, the National Response Center must be notified immediately upon discovery of the information.

If the National Response Center must be notified, DOE personnel should also evaluate whether community right-to-know requirements direct notification of the responsible State Emergency Response Commission and the Local Emergency Planning Committee.

3. If warranted, notify State, Tribal, and Federal natural resources trustees.

Under CERCLA Section 104 and E.O. 12580, as lead Federal agency at a DOE-controlled facility, DOE must investigate when there is reason to believe that release of a hazardous substance has occurred or is about to occur from the facility. Section 104 of CERCLA also requires DOE to promptly notify the appropriate Federal and State natural resource trustees of potential damages to natural resources resulting from releases that are under investigation. While DOE is the Federal trustee for natural resources located on land administered by DOE, the Department may share responsibility with other Federal agencies, the States, or affected Tribal Nations. In circumstances requiring notice, DOE must seek to coordinate the assessments, investigations and planning with such other responsible natural resource trustees.

4. If there is no indication that a release has occurred or that a substantial threat of release exists at a facility for which DOE is responsible, but other circumstances suggest that decommissioning may be appropriate.

Section 107 of CERCLA, *Natural Resources Liability*, creates liability to the United States Government and to any State or Tribal Nation in the case of injury to, destruction of, or loss of natural resources. The National Contingency Plan designates Federal, State and Tribal trustees of natural resources to act on behalf of the public to recover damages under CERCLA §107. Pursuant to CERCLA §120, this liability applies to Federal facilities in the same manner and to the same extent as to any non-governmental entity.

If no release or substantial threat of release exists, it might still be appropriate to decommission a facility. Examples of situations that might cause a DOE Program Office to decide to decommission an inactive facility, even though there is no release or substantial threat of release of hazardous substances, include the presence of buildings in a serious state of disrepair and/or the presence of buildings that would be more costly to maintain than to dismantle. Section 3.3 (p. 20) discusses actions that would support a decision to decommission even though the release of hazardous substances is not involved.

4.2 Step 3 - Assess Need for/Desirability of Decommissioning

Under LCAM, DOE Program Offices have lead responsibility for defining planning and budgeting for program facilities, and for notifying DOE Field Elements of plans to close program facilities. If the responsible Program Office declares that a program facility is available for other use, it is classified as surplus. A surplus facility that does not qualify for disposal by the General Services Administration (GSA) under 41 CFR Part 101, *Federal Property Management Regulations*, becomes a candidate for transfer to another DOE Program Office. An Assessment of Candidacy for Transfer is conducted to decide whether such transfer should be to the DOE Office of Environmental Management (EM) for disposition, or to another DOE program office

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for reuse. In order to adequately evaluate whether transfer to EM for disposition would be appropriate, the following facility conditions are to be considered during the Assessment of Candidacy for Transfer:

- The presence of contamination at the facility or at structurally independent portions of the facility;
- The condition of structures and equipment;
- The potential for future programmatic use; and
- The anticipated cost of surveillance, maintenance, and reactivation.

For the purpose of an Assessment of Candidacy for Transfer, contamination is present when 40 CFR Part 373, *Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property*, would require a notice of hazardous substance activity at the time the facility was sold or transferred. Such notice would be required if the release of more than a reportable quantity of a hazardous substance has occurred at the facility during its life, or if more than a specified quantity of a hazardous substance was stored at the facility for more than one year during its life.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.2, Step 3, of the *Decommissioning Implementation Guide*:

1. Review existing facility documentation to establish facility status.

In order to assess the need for or desirability of decommissioning a facility for which DOE is responsible, it will be necessary to evaluate the situation at the facility. This evaluation should include a review of documents and information concerning the structural and operational integrity of the facility, the level of environmental and facility component contamination, the presence of hazardous materials, the projected future programmatic need for the facility, the cost of continued S&M and reactivation, and any other facility attributes that could influence the decision to proceed with decommissioning. The documents and information to be reviewed should include, but are not limited to the following:

- Facility operating and S&M records, such as:
 - < Records of nuclear and chemical materials used;
 - < Records of nuclear and chemical materials stored;
 - < Records of spills and leaks;
 - < Records of on-site disposals, if any;
 - < Facility drawings (as-built and as-modified);
 - < Deactivation final report;
 - < S&M plan;
 - < S&M records and annual reports;

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- < Lessons learned reports;
 - < DOE Occurrence Reporting and Processing System database events for the facility; and
 - < Information in the Facility Information Management System (FIMS).
- Documents comprising the facility's authorization basis for operations, deactivation, and/or S&M, such as:
 - < Safety Analysis Report (or Safety Assessment);
 - < Other Safety Analyses;
 - < Hazard Classification Documents (or Preliminary Hazards Analysis);
 - < Technical Safety Requirements (or Technical Specification, or Limiting Conditions Document);
 - < DOE-issued safety evaluation reports; and
 - < Facility-specific commitments regarding compliance with DOE Orders and Policies.

If any of these records indicate the possibility that a release of a hazardous substance has occurred, or that a threatened release exists, then DOE should try to assemble key information answering the following questions in order to determine if a CERCLA response action would be appropriate:

- Has the location of the release or threat of release been identified?
- Can the types of materials or specific chemicals be determined?
- Has an estimate of quantities of materials released or threatening to be released been made?
- What was the date and time of the release or threat of release?
- What media have been affected by the release or threat of release?
- Are there any known risks posed by the release or threat of release?

2. Evaluate whether a release or substantial threat of release of a hazardous substance warranting a CERCLA response exists at the facility.

A CERCLA response would be appropriate if a release into the environment of a hazardous substance has occurred or a substantial threat of a release exists, and a response is necessary to protect human health and the environment. The evaluation of whether available information confirms that a CERCLA response is appropriate should include at least the following components, which define the minimum scope of a CERCLA remedial preliminary assessment as set forth in 40 CFR 300.410(c):

- Identification of the source and nature of the release or threat of release;

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- Evaluation by the Agency for Toxic Substances and Disease Registry (ATSDR) or by other sources (e.g., State public health agencies), of the threat to public health;
- Evaluation of the magnitude of the threat;
- Evaluation of factors necessary to make the determination of whether a removal is necessary; and
- Determination of whether a non-Federal party is undertaking proper response.

If a release or substantial threat of release does not involve a hazardous substance, or is specifically exempt from CERCLA authority, or has been generically determined by EPA to not require a CERCLA response, then a CERCLA response action may not be appropriate. Such situations are described in greater detail below.

- **Does Not Involve a Hazardous Substance.**

CERCLA Section 101(14) defines the term hazardous substance as: 1) any substance designated pursuant to Section 311(b)(2)(A) of the Clean Water Act (CWA); 2) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of CERCLA; 3) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the RCRA (but not including any waste suspended from regulation under Section 3001(b) of RCRA); 4) any toxic pollutant listed under Section 307(a) of the CWA; 5) any hazardous air pollutant listed under Section 112 of the Clean Air Act (CAA); and 6) any imminently hazardous chemical substance or mixture for which action has been taken under Section 7 of the Toxic Substances Control Act (TSCA). A complete list of hazardous substances and the reportable quantity for each is located in 40 CFR 302.4. Unless a release or substantial threat of release at a facility that is a candidate for decommissioning by DOE involves a substance that falls within this definition of hazardous substance, a CERCLA response action may not be appropriate.

- **Is Specifically Exempt from CERCLA Authority.**

Under CERCLA Section 101(22), the following events are specifically excluded from the definition of release and, as such are exempt from CERCLA authority:

- < Any release that results in exposure to persons solely within a workplace, with respect to any claim that such persons may assert against the employer;
- < Emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine;

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- < Release of source, byproduct, or special nuclear material from a nuclear incident, as defined in the AEA, if such release is subject to requirements with respect to financial protection established by the NRC under Section 170 of AEA, or for the purposes of Section 104 of CERCLA or any other response action, any release of source, byproduct, 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 of 1978 (UMTRCA); and
- < The normal application of fertilizer.

Therefore, if DOE confirms that any potential release or substantial threat of release at a facility that is a candidate for decommissioning by DOE is one of these exempt events, a CERCLA response action may not be appropriate.

Section 101(14) of CERCLA excludes petroleum from the definition of "hazardous substance" for the purpose of deciding whether a CERCLA response is required because a separate set of reporting and response requirements apply to oil and petroleum under the CWA (see 40 CFR 110). For the purpose of the CERCLA exclusion, petroleum includes: 1) crude oil or any fraction thereof that is not specifically listed or designated as a hazardous substance; 2) natural gas; 3) natural gas liquids; 4) liquefied natural gas; 5) synthetic gas usable for fuel; and 6) mixtures of natural gas and such synthetic gas.

Therefore, if DOE confirms that any potential release or substantial threat of release at a facility that is a candidate for decommissioning by DOE involves excluded petroleum, a CERCLA response action may not be appropriate.

DOE personnel should also be aware that, releases of CERCLA hazardous substances that are Federally permitted releases, as defined in CERCLA Section 101(10), are exempt from CERCLA reporting requirements under Section 103 and from CERCLA liability under Section 107. Nevertheless, a CERCLA response action under Section 104, 106, or 122 may still be required to address such Federally permitted releases if they present a threat to human health or the environment.

- **Has Been Generically Determined by EPA to Not Require a CERCLA Response.**

If a release of a hazardous substance consists of one of the following situations, EPA has generically determined that no CERCLA response is necessary, unless the release constitutes a public health or environmental emergency:

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- < Release of a naturally occurring substance in its unaltered form, or altered solely through naturally occurring processes or phenomena, from a location where it is naturally found;
- < Release of products that are part of the structure of, and result in exposure within, residential, business, or community structures; or
- < Release into public or private drinking water supplies due to deterioration of the system through ordinary use.

Therefore, if DOE confirms that any potential release or substantial threat of release at a facility that is a candidate for decommissioning by DOE is one of these events, a CERCLA response action may not be appropriate.

If possible, existing key information should be used to evaluate whether a release or substantial threat of release of a hazardous substance exists. However, if the evaluation cannot be completed based on existing key information, a site inspection may be necessary. Such inspection may include a perimeter (i.e., off-site) or on-site inspection, taking into consideration whether the inspection can be performed safely. If a site inspection is necessary, EPA and responsible State and local regulators should be consulted regarding the scope of the inspection.

If no actual release of hazardous substances is discovered at a facility, the status of the facility and events that have not yet occurred must be evaluated to decide whether there is sufficient threat of a release to suggest that CERCLA response action and decommissioning may be appropriate. The first step in this evaluation should be identification of hazards at the shut-down facility that could contribute to causing a release. Appropriate matters to consider in identifying such hazards include, but are not limited to:

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

Hazard identification and characterization for the purpose of evaluating the threat of a release should be coordinated with hazard identification and characterization for the purpose of evaluating other situations at a facility as discussed in number 3, below.

Examples of situations in which a threat of release was believed to be substantial enough to render CERCLA response action appropriate are described below.

3. Evaluate programmatic and cost factors.

- **Evaluate Facility Status Not Related to Release of Hazardous Substances.**

As was the case with evaluating whether a substantial threat of release exists at a facility, hazards identification should be the first step in evaluating whether other situations at an inactive facility present a problem suggesting the need for decommissioning. Such hazards may include threats of release that are not sufficiently substantial to warrant CERCLA response action. If possible, the identification of hazards should be made based on the existing key information assembled. If this is not possible, the following additional hazard identification activities may be needed:

- < Interview past and present employees, as necessary, to supplement information on past facility operations, including mishaps and incidents; and
- < Perform a facility walkdown to assess facility conditions and identify inherent hazards.

Hazard identification and characterization for the purpose of evaluating whether non-release situations at a facility suggest decommissioning should be coordinated with any hazard identification and characterization being conducted at the same facility for the purpose of evaluating the threat of a release.

- **Evaluate Cost of S&M and Reactivation.**

The costs of S&M and reactivation of a surplus facility is a factor to consider in deciding whether the facility should be transferred to EM for disposition.

4. Document reviews and evaluations.

The results of the site evaluation and any hazard analyses conducted to assess whether a CERCLA response would be appropriate for a facility that is a candidate for decommissioning by DOE should be fully documented. Other analyses of hazards and estimates of costs should also be appropriately documented. Finally, the methodology and results of the evaluation of all such information should be documented as the Assessment of Candidacy for Transfer.

The graded approach should be applied to determine the appropriate level of detail for the documentation of the Assessment of Candidacy for Transfer.

4.3 Step 4 - Conduct Decommissioning?

DETERMINATION OF ACTION: Step 4 - Conduct Decommissioning?

If the Assessment of Candidacy for Transfer indicates that a facility for which DOE is responsible should be transferred to EM for disposition, EM must make a reasoned evaluation about whether or not decommissioning should proceed immediately upon completion of the transfer.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.2, Step 4, of the *Decommissioning Implementation Guide*:

1. Identify and evaluate alternatives to proceeding immediately with decommissioning if a release or substantial threat of release of hazardous substances has been confirmed at the facility.

When DOE has determined that a CERCLA response action is appropriate, DOE is authorized to evaluate, select, and implement the CERCLA response action that DOE determines will best protect health, welfare, or the environment from the risks posed by the release or substantial threat of release. To facilitate EPA oversight responsibilities and approval of final remedial action at the site, however, such response action should be coordinated and conducted in consultation with EPA. CERCLA response actions include removal actions and remedial actions, which are described below:

- Remedial actions are actions consistent with permanent remedy, which are taken, instead of or in addition to removal action, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health, public welfare, or the environment (40 CFR 300.5). The remedial action process typically involves extensive studies to support remedy selection and may take years to complete. For this reason, the remedial action procedure has been determined by EPA and DOE to be generally inappropriate for situations involving surplus DOE facility decommissioning. As the 1995 *Decommissioning Policy* states, EPA and DOE agree that streamlined decision-making is to be encouraged in such situations.
- A removal action may be initiated when DOE determines that the action will prevent, minimize, stabilize, or eliminate a risk to health or the environment. The NCP specifies that the factors listed below be evaluated to determine whether a risk to health or the environment warrants a removal action (40 CFR 300.415(b)(2)):
 - < Actual or potential exposure of humans, animals, or the food chain;
 - < The presence of contained hazardous substances that pose a threat of release;

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- < The threat of migration of the hazardous substances;
- < The threat of fire or explosion; and
- < The availability of an appropriate Federal or State response capability.

There are three types of CERCLA removal actions: 1) emergency removal actions; 2) time-critical removal actions; and 3) non-time-critical removal actions. Each is designated based on the type of situation, the urgency of the threat associated with the release, and the subsequent time frame in which the action must be initiated.

In 1994, DOE, EPA and DoD issued interagency guidance endorsing an increased use of removal actions in order to streamline CERCLA response actions at Federal facilities. Subsequently, EPA and DOE issued the 1995 *Decommissioning Policy* endorsing the use of the CERCLA non-time critical removal action process for decommissioning surplus DOE facilities, unless the circumstances at a facility make doing so inappropriate.

If a release or substantial threat of release of hazardous substances is confirmed at a facility that is transferred to EM for disposition, DOE must decide which of the three types of CERCLA removal actions, if any, would be appropriate in the circumstances at the facility. If a CERCLA emergency removal action or time-critical removal action is determined to be appropriate, immediate decommissioning may not be necessary. Unless substantial elements of the decommissioning project would have to be completed in order to complete the necessary removal action, it might be more cost effective to complete the removal action, but delay decommissioning. Any decision to delay decommissioning when a CERCLA removal action would be appropriate should be closely coordinated with EPA and the responsible State agency. Possible alternatives to immediate decommissioning in circumstances that would justify either a CERCLA emergency removal action, or a CERCLA time-critical removal action might be:

- With concurrence of all responsible regulatory agencies, conduct a CERCLA emergency removal action to eliminate the hazard and stabilize the facility. Then, deactivate and/or conduct S&M until a later decision time that is consistent with budgetary considerations and the final site remedial action.
- With concurrence of all responsible regulatory agencies, conduct a CERCLA time-critical removal action to eliminate the hazard and stabilize the facility. Then, deactivate and/or conduct S&M until a later decision time which is consistent with budgetary considerations and the final site remedial action.

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If a CERCLA non-time critical removal action is determined to be appropriate at a facility that is transferred to EM for disposition, it will probably be best to proceed immediately to decommissioning.

If a CERCLA response action is appropriate at a facility that is transferred to EM for disposition, the responsible regulatory agencies may still agree under certain circumstances not to proceed under CERCLA authority. Such situations, which may offer alternatives to immediate decommissioning, are described below:

- If a release or substantial threat of release of hazardous substances has been confirmed at a facility that is transferred to EM for disposition, a CERCLA response action may not be appropriate **if the facility is subject to RCRA permitting requirements**, and the release involves hazardous waste or hazardous waste constituents. Under such circumstances, EPA and the authorized State may agree in an IAG that remediation of the release should proceed according to corrective action provisions of a RCRA permit or compliance order, or according to a RCRA closure plan. If such an agreement is reached, some examples of possible alternatives to immediate decommissioning might be:
 - < With concurrence of all responsible regulatory agencies, conduct corrective action according to the requirements of the RCRA permit or compliance order to remove the hazard and stabilize the facility. Then, deactivate and/or conduct S&M until a later decision time which is consistent with budgetary considerations and the final site remedy.
 - < With concurrence of all responsible regulatory agencies, decommission according to the schedule indicated in the RCRA closure plan.

- If a release or substantial threat of release of hazardous substances has been confirmed at a facility that is transferred to EM for disposition, a CERCLA response action may not be appropriate **if the facility holds a license issued by the NRC**. Historically, facilities licensed by the NRC have been decommissioned in conformance with an NRC-approved decommissioning plan. An example of a possible alternative to immediate decommissioning for a facility licensed by the NRC might be:
 - < With concurrence of all responsible regulatory agencies, decommission according to the schedule indicated in the NRC-approved decommissioning plan.

- If a release or substantial threat of release of hazardous substances has been confirmed at a facility that is transferred to EM for disposition, a CERCLA response action may not be appropriate if the facility is an underground storage tank, and the release involves petroleum or hazardous substances. Subtitle I, Sections 9001 through 9010, of RCRA requires owners of underground storage tanks containing petroleum or hazardous substances to perform corrective action in response to such releases. Under circumstances where these RCRA provisions would apply (as implemented by 40 CFR 280, Subpart F), EPA and the authorized State may agree in an IAG, or other type of agreement, that remediation of the release should proceed according to RCRA Subtitle I, rather than as a CERCLA response action. If such agreement is reached, an example of a possible alternative to immediate decommissioning might be:
 - < With concurrence of all responsible regulatory agencies, conduct corrective action according to the requirements of 40 CFR 280, Subpart F, to remove the hazard and stabilize the facility. Then, deactivate and/or conduct S&M until a later decision time which is consistent with budgetary considerations and the final site remedy.

2. Identify and evaluate alternatives to proceeding immediately with decommissioning if no release or substantial threat of release has been confirmed at the facility.

Situations not involving the release or substantial threat of release of hazardous substances may suggest decommissioning and be the basis for transferring a facility to EM for disposition. Examples of situations like this at a facility include the presence of buildings in a serious state of disrepair and/or the presence of buildings that would be more costly to maintain than to dismantle. For such cases, possible alternatives to immediate decommissioning will have to be identified based on the specific situations and the estimated levels of hazard.

4.4 Step 5 - Continue S&M as Appropriate

S&M activities continue throughout the life of the decommissioning project, until phased out in a manner planned during decommissioning operations, or converted to long-term, post-cleanup S&M. Over the course of the decommissioning phase, the scope and hazards of the work evolve. Therefore, to ensure continued maintenance of human safety and environmental protection, ongoing S&M plans and activities should be reviewed and updated throughout the disposition phase of a project.

DETERMINATION OF ACTION: Step 5 - Continue S&M as Appropriate

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.2, Step 5, of the *Decommissioning Implementation Guide*:

- 1. Conduct S&M according to the current S&M program throughout each stage of the decommissioning phase of the facility, and update the S&M program, as needed, before and during all stages of the decommissioning phase to ensure continued maintenance of human safety and environmental protection.**

Throughout deactivation and decommissioning, S&M activities are performed to maintain the facility safety envelope. Continuing S&M ensures, at a minimum, that any contamination is adequately contained and that potential hazards to workers, the public and the environment are minimized.

The *S&M Implementation Guide* provides guidance on S&M activities conducted as part of facility transition and disposition activities. It states that execution of S&M activities is performed until facility and/or equipment conditions change such that the activity is no longer required or must be altered to meet a new condition. The completion of decommissioning activities may decontaminate or remove systems, equipment, or otherwise change conditions that directly affect the requirement for the continued execution of a specific S&M activity. In this case, the need to evaluate/reevaluate the S&M baseline will be identified and the S&M program adjusted accordingly.

To revise the S&M program, baseline data must be reevaluated. The guide suggests sources of baseline data that should be reviewed, including the Pre-Transfer Review report, deactivation final report, facility operating information, interviews with past and present employees, facility walkdowns, and other characterization activities. This baseline

LESSON LEARNED

Requirements-based surveillance and maintenance (RBSM) reviews help in designing cost-effective surveillance and maintenance (S&M) plans.

The most effective way to reduce a facility's surveillance and maintenance cost is to remove hazardous materials. S&M costs can also be reduced by ensuring that sites perform only those activities required to protect workers, the public, and the environment. To this end, the Office of Environmental Management has developed a requirements-based surveillance and maintenance process, which helps to identify and eliminate unnecessary S&M activities by comparing existing S&M *requirements* to the S&M activities currently being conducted. Resources that would otherwise be spent on S&M can then be reallocated to site cleanup and closure activities. A 1997 pilot initiative estimated that the RBSM process could potentially reduce current S&M costs by 20-25 percent.

"The Requirements-Based Surveillance and Maintenance Review Guide." US DOE, Office of Environmental Management, Office of Nuclear Material and Facility Stabilization. Washington, D.C. (DOE/EM-0341).

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data collection should be performed at a level of rigor commensurate with how much is already known about the facility condition and operating history.

DOE-STD-1120-98, *Integration of Environment, Safety, and Health into Facility Disposition Activities* provides further information on how to identify and analyze hazards, and also provides guidance on accomplishing facility walkdowns.

Once baseline data is collected and evaluated, the *S&M Implementation Guide* states that this data forms the basis for the S&M plan. The topics to be addressed in the plan include, as appropriate, facility history, facility operations, facility surveillance, facility maintenance, waste management and environmental compliance requirements, quality assurance, radiological controls, hazardous material protection, training and qualification, health and safety, emergency preparedness, safeguards and security, and cost and schedule. The *S&M Implementation Guide* explains how each of these topics should be covered in the S&M plan.

The final step in the process is implementation of an S&M program based on the S&M plan. The

S&M program will be implemented through detailed procedures and work packages which specify the work to be accomplished, frequency, and process for doing such work safely and efficiently. The *S&M Implementation Guide* provides guidance on items that should be included in S&M procedures and work packages.

The *S&M Implementation Guide* provides further discussion on the development and implementation of an S&M program and also discusses particular facility aspects that should be considered when evaluating baseline data during the decommissioning phase of disposition.

Project Baseline Definitions

Technical baseline. Documented technical requirements/scope of the effort needed to achieve the project objectives.

Schedule baseline. Documented logic sequence of activities with durations and milestones that defines the project's path from beginning to completion.

Cost baseline. Documented estimate of cost to complete all the scheduled activities, including direct and indirect work scope for the project, time-phased with the project's schedule.

4.5 Step 6 - Prepare Decommissioning Project Scoping Document (Baseline)

Once a decision has been made to proceed with decommissioning, the decommissioning project scoping document must be prepared to define the ultimate decommissioning objective (e.g., demolition) and end-points, and establish conceptual initial estimates of technical scope, cost, and schedule for the project. Decommissioning end-points are the detailed specification of conditions to be achieved for a facility's spaces, systems, and major equipment; they drive the

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development and analysis of alternatives subject to regulator and stakeholder review and comment. The initial estimates of technical scope, cost, and schedule provide baselines for planning the decommissioning project in a manner consistent with DOE's project management policy. It is understood that, at this early stage of the decommissioning project, the cost and schedule baselines will be only order of magnitude estimates.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.2, Step 6, of the *Decommissioning Implementation Guide*:

1. Prepare decommissioning project scoping document.

All decommissioning projects, regardless of size or complexity, should have a formal management control system in place that meets the requirements identified in LCAM or DOE O 4700.1, *Project Management System*. DOE O 4700.1 continues to apply at facilities where it is incorporated into ongoing contracts, but is being phased out on a site-by-site basis as such contracts expire and LCAM is implemented. According to the formal management control system, all decommissioning projects are to establish technical, schedule, and cost baselines in the decommissioning project scoping document and subsequently update them in the decommissioning project plan. Therefore, the decommissioning project scoping document, to the extent possible at this early stage of project planning, should contain components similar to those needed in the decommissioning plan.

The first component in the decommissioning project scoping document should be a definition of the decommissioning objective, or projected ultimate end state of the facility.

Decommissioning Objective vs. End-Points LESSON LEARNED	
Using order-of-magnitude cost/benefit evaluations early in the decision making process can help to reduce data collection and expedite action.	<p>Decommissioning Objective. Overall status and disposition of the facility after decommissioning.</p> <p>End-points. The detailed specification of conditions to be achieved for a facility's spaces, systems and major equipment.</p> <p>Without conducting a detailed cost estimate, sites can use existing information to approximate the relative costs of each option through an order-of-magnitude cost/benefit evaluation. Using this approach, decommissioning alternatives that are not cost-effective can be eliminated from consideration early in the decision-making process.</p> <p>For the Building 21 project at the Miamisburg Environmental Management Project (MEMP), an order-of-magnitude cost/benefit evaluation indicated that disposal of debris as low-level waste without decontamination was more cost-effective than decontamination of the building followed by disposal of the debris as non-radiological waste. MEMP estimated that this approach could potentially result in cost savings of about \$160,000.</p> <p><small>"Facility Disposition Lessons Learned from the Mound Site." DOE, November, 1997.</small></p>

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Next, should be the project technical baseline. In general, the parts of the technical baseline are:

1. Hazard identification, analysis, and control strategy;
2. ES&H requirements identification;
3. ES&H performance measures and progress metrics to be used;
4. Description of ES&H organizational responsibilities;
5. Discussion of waste management considerations, such as minimization and pollution prevention measures;
6. Discussion of the facility safety basis and potential impacts during decommissioning;
7. Discussion of environmental permits and methods for achieving compliance with permit conditions for deactivation and long-term S&M activities; and
8. End-point specifications.

For decommissioning projects that will be conducted as CERCLA non-time-critical removal actions, both CERCLA and DOE requirements will have to be met, and should be integrated where possible. Therefore, the technical baseline in the decommissioning scoping document for such projects should address the strategy for integrating the activities, documentation, and reviews and approvals required by the NCP for a CERCLA non-time-critical removal action with the ES&H activities, documentation, and reviews and approvals required by DOE directives for all DOE actions. The set of agreed-upon ARARs² should also be documented.

LESSON LEARNED

Keeping things simple and using small steps can make the process less cumbersome.

At Fernald, several observations have been made that can make decommissioning efforts run more smoothly. These include:

- keep jobs simple by applying existing technologies to dismantle;
- use a team approach that involves all stakeholders in the process;
- bid the facilities in chunks to keep projects from getting too large; and
- build safety into every step of the process.

"Steps May be Taken to Make Decommissioning Activities Quicker and Safer." DOE, July, 1999.

²

Any hazardous substance that will remain onsite after completion of a CERCLA response action must comply with a level or standard of control which at least attains the level or standard of control imposed by any federal or state, legally applicable, or relevant and appropriate requirement (ARAR) (CERCLA Section 121(d)(2)). ARARs include cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site are "applicable" requirements. If such standards, requirements, criteria, or limitations are not applicable requirements, but nevertheless address problems or situations sufficiently similar

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With respect to the last item in the technical baseline, the *Decommissioning Implementation Guide* provides guidance on the development of decommissioning end-points. In particular, the guide discusses uses and guiding principles for the end-point process. Identifying the end-points is an integral part of deriving the project work breakdown structure, schedule and budget, therefore end-point planning and specification must be initiated as soon as possible. Specifying the ultimate decommissioning objective 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. Methods for specifying end-points are presented in the *Deactivation Handbook*, DOE/EM-0318.

The use of a graded 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.

Finally, the decommissioning scoping document should provide cost and schedule baselines. It is understood that, at this early stage of the decommissioning project, the cost and schedule baselines will be only order of magnitude estimates.

If the facility being decommissioned is licensed by the NRC, it will be necessary to organize the cost estimate, schedule, and technical scope into a format that meets NRC requirements for decommissioning plans. Such format may vary depending on the nature of the NRC license.

to those encountered at a CERCLA site that their use would be well suited to the site, they are "relevant and appropriate requirements." A given standard, requirement, criteria, or limitation may be either "applicable," or "relevant and appropriate" at a CERCLA site, but not both.

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The terms “stakeholder” and “public” are used interchangeably in this Handbook. They both refer to any affected or interested party, which may include representatives of State, Tribal, and local Governments, Congress, other Federal agencies, external review bodies, community groups, environmental and other interest groups, business, labor, academia, professional and technical organizations, educational organizations, DOE employees and contractors, and members of the general public.

5.0 Choosing the Decommissioning Alternative

Choosing the most appropriate decommissioning alternative involves identification of candidate alternatives followed by execution of a parallel series of activities and studies. Included among these activities and studies are site characterization, risk assessment, safety analysis, and stakeholder participation. Ultimately, a record of decision, or other suitable decision document is produced identifying the most appropriate decommissioning alternative.

5.1 Step 7 - Review Data to Determine Extent of Action

Upon deciding that the time has come to proceed with decommissioning of a facility, it will be necessary for DOE or contractor personnel to identify and evaluate candidate decommissioning alternatives. These tasks should properly rely on the information contained in the decommissioning project scoping document. However, that information may need to be updated or supplemented to ensure that current, complete, and accurate data and analyses are used. The extent to which updates or supplements are needed will be influenced by the amount and nature of hazardous and radioactive contamination at the facility, and by facility deterioration, if any, that has occurred since the decommissioning project scoping document was completed.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.3, Step 7, of the *Decommissioning Implementation Guide*:

- 1. Review the decommissioning project scoping document to determine whether it needs to be supplemented or updated, and whether additional analyses are warranted.**

Completion of deactivation tasks, significant deterioration of buildings and other structures, or other changes at a facility may have occurred between completion of the decommissioning project scoping document and the

LESSON LEARNED

Revising the scope of the decommissioning project may be warranted after reviewing new data.

The Yankee Nuclear Power Station, located in Rowe, Massachusetts, was shut down in February 1992 and scheduled for decommissioning. Typically, the disposal of plant components for such a project would be deferred until after development of the decommissioning plan.

However, after reviewing data from a systematic evaluation of major plant components, project managers decided to reconsider this approach, and initiated a component removal project to dispose of four steam generators and a pressurizer prior to full scale decommissioning.

Removing these components at a guaranteed disposal fee prior to full scale decommissioning avoided the risk of future price escalations, and resulted in several million dollars in cost savings compared to deferred disposal. Further, detailed planning of the early removal activities reduced the overall project duration.

“Removal of the Steam Generators and Pressurizer at the Yankee Nuclear Power Station.” Holmgren, Bruce, and Parker, John. Yankee Atomic Electric Company. (DOE-RAPIC 12221)

decision to proceed with decommissioning. Additionally, reports of ongoing S&M may provide significant new data. For these reasons, the decommissioning project scoping document should be reviewed to identify areas which would benefit from updating or supplementation.

2. If necessary, update or supplement the data and analyses contained in the decommissioning project scoping document.

Data gathering and analyses should be performed as needed to complete the updates and supplements to the decommissioning project scoping document that were identified above.

3. Formulate a list of potential decommissioning alternatives.

The decommissioning objective and end-points stated in the decommissioning project scoping document provide the basis for identifying decommissioning alternatives. Decommissioning alternatives capable of achieving the decommissioning objective and reaching decommissioning end-points should be formulated. Each decommissioning alternative may consist of one or more specific actions.

To assist in formulating decommissioning alternatives, as well as alternatives for remedial actions during other stages of facility disposition, the former DOE Office of Environmental Restoration developed a set of tools called preferred alternatives matrices (PAMs). The purpose of PAMs is to assist DOE and contractor personnel responsible for remediating sites and facilities in doing so in the most cost efficient and responsible manner possible. The PAMs allow field personnel to focus preferred alternative selection, expedite preferred alternative implementation, eliminate the cost of excessive/redundant treatability studies, and allow preselection of effective, low-cost alternatives. The PAMs identify commercially available remediation technologies

LESSON LEARNED

When evaluating facility closure alternatives, consider in-place closure techniques.

Idaho National Engineering and Environmental Laboratory (INEEL) used an innovative approach to close the Waste Calcining Facility (WCF). The site initiated a three phase closure project consisting of (1) filling the three basement levels with grout; (2) demolishing the WCF; and (3) grouting rubble and covering with a protective concrete cap. This three phase process reduced worker potential exposure to contamination, reduced risk to the environment, generated a fraction of the contaminated waste (25 cubic yards versus 385 cubic yards), saved \$139 million (\$11 million versus nearly \$150 million), and will be finished in a quarter of the time.

"INEEL Uses Three Phase Innovative Method to Close Facility." DOE, July, 1999.

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and rank them on the basis of performance, risk of technology failure, and cost. The rankings employed in the development of the matrices were based on available information and the professional judgement of technical experts from diverse fields.

The PAMs should be consulted during formulation of the list of decommissioning alternatives. The decommissioning PAM can be accessed at the following Internet address: <http://www.em.doe.gov/define/>.

Other references which should be consulted during the formulation of the list of decommissioning alternatives include the Deactivation and Decommissioning Focus Area: <http://www.fetc.doe.gov/dd/>; Gateway to Environmental Technology: <http://www.dandd.org/get/>; and FIU Hemispheric Center for Environmental Technology: <http://www.hcet.fiu.edu/>.

Sections 4.2 and 4.3 discussed factors specified by the NCP to be considered in determining the appropriateness of a CERCLA removal action. For circumstances in which a CERCLA removal action is justified, the NCP suggests specific response actions that, as a general rule, would be appropriate to address each factor, if it is present at the site (40 CFR 300.415(e)). The NCP does not present an exhaustive list, and other response actions could also be appropriate. Nevertheless, the response actions listed in the NCP should be considered in formulating potential decommissioning alternatives for surplus DOE facilities, whether or not decommissioning will be performed as a CERCLA removal action. Such responses are listed below:

- Where humans or animals have access to a release of hazardous substances:
 - < Fence;
 - < Warning signs; and/or
 - < Other security or site control precautions.

- Where needed to reduce migration of hazardous substances off-site or to prevent precipitation or run-off from other sources, for example, flooding, from entering the release area from other areas:
 - < Drainage controls (e.g., run-off or run-on diversion).

- Where needed to maintain the integrity of the structures:
 - < Stabilization of berms, dikes, or impoundments; and/or
 - < Drainage or closing of lagoons.

- Where needed to reduce migration of hazardous substances into soil, ground or surface water, or air:
 - < Capping of contaminated soils or sludges.

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- Where the use of such chemicals will reduce the spread of the release:
 - < Using chemicals and other materials to retard the spread of the release or to mitigate its effects.

- Where such actions will reduce the spread of, or direct contact with, the contamination:
 - < Excavation, consolidation, or removal of highly contaminated soils from drainage or other areas.

- Where it will reduce the likelihood of spillage; leakage; exposure to humans, animals, or food chain; or fire or explosion:
 - < Removal of drums, barrels, tanks, or other bulk containers that contain or may contain hazardous substances.

- Where needed to reduce the likelihood of human, animal, or food chain exposure:
 - < Containment, treatment, disposal, or incineration of hazardous materials.

- Where necessary immediately to reduce exposure to contaminated household water and continuing until such time as local authorities can satisfy the need for a permanent remedy:
 - < Provision of alternative water supply.

EXAMPLE
LIST OF DECOMMISSIONING ALTERNATIVES

**Argonne National Laboratory (ANL) - East
Plutonium Gloveboxes in D-Wing, Building 212**

Decommissioning End-Point: Eliminate the risk of radioactive material release from the contaminated glovebox systems and to make the laboratories available for unrestricted use.

Alternatives Considered: 1) Decontaminate and decommission (D&D) gloveboxes at ANL-East site using ANL-East staff;
2) D&D gloveboxes at ANL-East site using contractor's staff;
3) D&D gloveboxes at contractor's site using contractor's staff;
4) Decontaminate gloveboxes at ANL-East site using ANL-East staff; reduce glovebox size at contractor site using contractor staff; and
5) Dispose gloveboxes without decontamination or size reduction.

Source: Argonne National Laboratory, *Decontamination and Decommissioning of 61 Plutonium Gloveboxes in D-Wing, Building 212 Argonne National Laboratory - East: Final Project Report*, ANL/D&D/TM-96/3, September 1996.

4. If decommissioning will not be conducted using a CERCLA process, identify any environmental permits and/or NEPA reviews that will be needed.

Activities conducted on-site to support CERCLA response actions require no Federal, State, or local permits (40 CFR 300.400(e)). However, response action activities conducted off-site must obtain all required permits. Also, all required permits must be obtained if the decommissioning project is conducted under a legal authority other than CERCLA.

In the case of a decommissioning project that must obtain permits for supporting activities, permitting requirements should be identified early and reviewed frequently. Further, filing of permit applications should be scheduled so that decommissioning project delays will not result from failure to obtain a permit in a timely manner.

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Permitting requirements will vary among decommissioning projects because of differences in Federal and State jurisdiction, and because of differences in project characteristics. Federal regulatory programs which may impose permitting requirements on DOE decommissioning projects include: 1) the RCRA hazardous waste permitting program; 2) the Clean Air Act (CAA) Title V permitting program; 3) the CAA prevention of significant deterioration (PSD) permitting program; (4) the CAA non-attainment permitting program; (5) the CWA Section 402 permitting program; and (6) the CWA Section 404 permitting program. Each program is briefly described below:

- **RCRA Permitting**

Program. RCRA requires permits for hazardous waste treatment, storage, and disposal (TSD) units, unless the TSD unit, or facility at which the unit is located, is exempt from the permitting requirement. Therefore, non-CERCLA DOE

Under RCRA Section 3006, a State that applies and is found qualified by the EPA to do so can take over administration and enforcement within the State's boundaries of the RCRA hazardous waste program. All States except Alaska, Hawaii, and Iowa are authorized by EPA to issue basic RCRA permits. The status of State authorizations to issue RCRA permits for regulatory programs created under HSWA, such as corrective action and land disposal restrictions, vary.

decommissioning projects that will treat, store, or dispose of materials meeting the definition of hazardous waste may require RCRA permits.

- **CAA Permitting Programs.** The CAA, as amended in 1990, establishes three permitting programs:

1. The Title V Operating Permit Program;
2. The PSD permit program; and
3. The non-attainment area permit program.

A State may be authorized to implement any combination, or all of these programs. In each State, the EPA implements any CAA program that the State is not authorized to implement.

1. The Title V Operating Permit Program. Under the Title V Operating Permit Program, operating permits are specifically required for the following sources, unless such sources are eligible for exemption (40 CFR 70.3(a)(1)-(5)):

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- < Any major source as defined by 40 CFR 70.2.³ ;
- < Any source subject to the Standards of Performance for New Stationary Sources set forth in 40 CFR Part 60 (referred to as the New Source Performance Standards or NSPS);
- < Any source subject to the National Emission Standards for Hazardous Air Pollutants (NESHAPS) set forth in 40 CFR Parts 61 and 63;
- < Any affected source (i.e., a source containing one or more units that are subject to CAA, Title IV acid rain reduction requirements or acid rain emission limitations); and
- < Any other source in a source category designated by the EPA Administrator.

Some DOE activities (e.g., hazardous and mixed waste treatment, storage, and disposal units) that support decommissioning of surplus DOE facilities may be required to obtain Title V Operating Permits because of radionuclide emissions. Also, some activities may emit enough other regulated air pollutants (e.g., carbon monoxide, nitrogen oxides, sulfur dioxide, particulate matter, volatile organic compounds, mercury, and lead) to be considered major sources.

If a Title V Operating Permit appears to be required for activities that support a decommissioning project, DOE and contractor personnel should consult with the responsible regulatory agency, which may be EPA or a State agency. This is particularly important until the Title V Operating Permit Program becomes more settled.⁴

³ According to Section 112 of the CAA, a "major source" for pollutants other than radionuclides is any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit, in the aggregate, 10 tons per year (tpy) or more of any hazardous air pollutant which has been listed pursuant to Section 112(b) of the Act, or 25 tpy or more of any combination of such hazardous air pollutants. For radionuclides, no definition of "major source" has been adopted for purposes of Section 112 of the CAA. Section 302 of the CAA defines a "major source" as any stationary facility or source of air pollutants which directly emits, or has the potential to emit, one hundred tons per year or more of any air pollutant (including any major emitting facility or source of fugitive emissions of any such pollutant, as determined by rule by EPA).

⁴ On March 25, 1998, EPA made available for public comment draft proposed regulations that would make significant changes to the Title V operating permit program (63 FR 14392).

2. PSD Permit Program. The PSD permit program imposes a construction permit requirement on new stationary emission sources and modifications to existing stationary sources if (40 CFR 52.21(i)):
 - < The source or modification is "major" (as defined by 40 CFR 52.21(b)(1)) for any emitted pollutant that is regulated by the CAA; and
 - < The source is located in an "attainment" or "unclassifiable" area for the pollutant emitted in "major" quantities (see 40 CFR Part 81, Subpart C).

It seems unlikely that activities at any DOE decommissioning project would require a PSD permit. However, responsible DOE or contractor personnel should verify this on a case-specific basis.

3. Non-attainment Area Permit Program. If a decommissioning facility is located in a "non-attainment" area (40 CFR Part 81, Subpart C), the PSD program does not apply with respect to any pollutant for which the area is designated non-attainment. Instead, construction of major sources of those air pollutants is prohibited, unless the State issues non-attainment area permits in accordance with a fully approved State Implementation Plan (40 CFR 52.24). Like PSD permits, it seems unlikely that any activity that would support a DOE decommissioning project would require a non-attainment area permit. However, responsible DOE or contractor personnel should verify this conclusion on a case-specific basis.

- **CWA Section 402, National Pollutant Discharge Elimination System (NPDES) Permitting Program.**

Section 402 of the CWA, as amended, establishes the NPDES program, requiring permits to discharge "pollutants" from any "point source" into "waters of the United States" (40 CFR 122.1(b)(1)). In this context, "point source" means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff (40 CFR 122.2). With respect to decommissioning projects, some pertinent examples of point sources requiring NPDES permits are listed below. (This list is not comprehensive,

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and DOE personnel responsible for permitting should consult 40 CFR Part 122 when evaluating whether an NPDES permit may be needed.)

- < Discharges from wastewater treatment facilities;
- < Discharges of storm water, including among others, discharges associated with industrial activity (40 CFR 122.1(b)(2)(iv)). For this purpose, industrial activity includes, but is not limited to the following (40 CFR 122.26(b)):
 - R Hazardous waste treatment, storage, or disposal facilities, including those that are operating under either interim status or a RCRA permit;
 - R Landfills, land application sites, and open dumps that receive or have received any industrial wastes, including those that are subject to regulation under subtitle D of RCRA;
 - R Facilities involved in the recycling of materials, including metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards; and
 - R Construction activity including clearing, grading and excavation activities except operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development or sale.
- < Any treatment works treating domestic sewage, regardless of whether pollutants will be discharged from a point source by the treatment works, unless all applicable requirements of Section 405(d) of the Clean Water Act (Disposal of Sewage Sludge) are included in another permit (e.g., a RCRA permit).

Some point sources are excluded from the requirement to obtain an NPDES permit. Pertinent examples of excluded point source discharges include:

- < Discharges of sewage, industrial wastes, or other pollutants into a publicly owned treatment works (POTW) (40 CFR 122.3(c)). To qualify for this exclusion, the discharger may have to meet pretreatment standards. NOTE: This exclusion does not apply to discharges into privately owned or Federally owned treatment works;
- < Any discharge in compliance with the instructions of an On-Scene Coordinator pursuant to 40 CFR Part 300 (National Oil and Hazardous Substances Pollution Contingency Plan) or 33 CFR 153.10(e) (Pollution by Oil and Hazardous Substances) (40 CFR 122.3(d)); and

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- < Discharges into a privately owned treatment works, unless a case-by-case determination is made otherwise (40 CFR 122.3(g) and 40 CFR 122.44(m)).

In most States, NPDES permit applications must be filed with the responsible State agency on standard forms provided by the agency. If EPA has not delegated the NPDES permitting program to a State, the permit application must be filed with EPA.

- < **CWA, Section 404, Dredge and Fill Permitting Program.**

The CWA, Section 404 program requires a permit for placing dredged or fill material into waters of the United States, including areas designated as wetlands. Certain placements of dredged or fill material are permitted under "nationwide" permits (see 33 CFR Part 330), while others may be authorized under "regional" permits. Any placement of dredged or fill material not either exempt (see 33 CFR 323.4) or authorized by a nationwide or regional permit must obtain a case-by-case permit. The Section 404 permitting program is administered by the U.S. Army Corps of Engineers.

DOE and contractor personnel should be aware that compliance with environmental laws not requiring permits may also affect decommissioning project schedules. At the Federal level, such laws include primarily NEPA, the National Historic Preservation Act (NHPA), the Endangered Species Act (ESA), the Coastal Zone Management Act (CZMA), and the Fish and Wild Life Coordination Act (FWCA). The requirements of each law are described below. The applicability should be evaluated on a case-specific basis for each DOE decommissioning project. In addition, a review to identify any other Federal and State laws that apply to a specific decommissioning project should be conducted early.

- < **NEPA.** NEPA requires that a Federal agency prepare an Environmental Impact Statement (EIS) before taking any "major Federal action significantly affecting the quality of the human environment" (NEPA §102(C)). To guide compliance, many Federal agencies have adopted NEPA implementing regulations. DOE's implementing regulations are located in 10 CFR Part 1021.

In 1994, DOE announced a NEPA policy to guide DOE personnel in evaluating the need for NEPA review of actions, including decommissioning projects, at CERCLA sites.

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The 1994 policy clarifies that separate NEPA review is not required for any action associated with a decommissioning project that is conducted as a CERCLA response action. However, it is DOE's policy that CERCLA documents for such actions address issues that would normally be addressed in NEPA documents, but that might not otherwise be addressed in CERCLA documents.

In general, DOE is taking a three-tiered approach to fulfilling NEPA requirements with respect to environmental restoration and waste management, which includes facility disposition activities. First, a Programmatic Environmental Impact Statement (EIS) has been prepared to address policy issues associated with setting cleanup priorities and evaluating alternative technologies for waste treatment. Next, site-wide EISs are planned to address the impacts of site-specific cleanup (including dispositioning of facilities) and waste management activities. Finally, individual actions, such as actions taken to decommission facilities, are to be evaluated to determine the level of NEPA review needed. Three levels of review are possible for typical individual actions: 1) categorical exclusion; 2) environmental assessment (EA); and 3) EIS (10 CFR 1021.300(a)).

DOE has simplified the selection of the appropriate level of review for individual actions by identifying, in advance, the level usually needed for various classes of individual actions. Appendices B, C, and D to 10 CFR Part 1021, Subpart D, list typical classes of DOE actions that, respectively: 1) are categorically excluded from any requirement to prepare either an EA or an EIS; 2) normally require an EA, but not necessarily an EIS; and 3) normally require an EIS. Generally, each time DOE proposes to decommission a facility under legal authority other than CERCLA, DOE personnel should consult these lists to evaluate the applicable level of NEPA review. Decommissioning solely as part of a CERCLA response action does not require NEPA review.

- < Categorical Exclusions -- A proposed action is categorically excluded from NEPA review if it fits into one of the classes of actions listed in Appendix B to 10 CFR 1021, and it would not:
 - R Threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, including requirements of DOE orders;
 - R Require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities

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(including incinerators and facilities for treating wastewater, surface water, and groundwater);

- R Disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; or
- R Adversely affect environmentally sensitive resources as such resources are defined by Section B in Appendix B to 10 CFR 1021.

Additionally, before an action can be categorically excluded, DOE must determine:

- R That there are no extraordinary circumstances related to the proposal that may affect the significance of its environmental effects; and
- R That the proposal is not connected to other actions with potentially significant impacts, related to other proposals with cumulatively significant actions, or an improper interim action.

- < Environmental Assessment. If the proposed decommissioning action is not subject to a categorical exclusion, and does not clearly require preparation of an EIS, then an EA must be prepared. The purpose of an EA is to assess whether an EIS is required (i.e., whether the decommissioning action will be a "major Federal action significantly affecting the quality of the human environment"), or a finding of no significant impact (FONSI) can be issued. Classes of actions that typically require an EA, but not necessarily an EIS are listed in Appendix C to 10 CFR 1021.
- < Environmental Impact Statement. The purpose of an EIS is to ensure that environmental information concerning the impacts of a proposed action, and appropriate alternatives to that action, are available and considered fully before decisions are made and before actions are taken (40 CFR 1502.1). Appendix D to 10 CFR 1021 lists classes of actions that normally require EISs.

Sufficient time for NEPA review by DOE must be included in any non-CERCLA decommissioning project schedule. The required time will be longest if an EIS must be prepared. To estimate an appropriate time period for NEPA review of a particular project,

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DOE personnel should consult with the DOE Office of NEPA Compliance.

A number of guidance documents that may be helpful in complying with various aspects of NEPA are available for viewing and downloading at the following Internet address:

<http://tis-nt.eh.doe.gov/nepa/tools/tools.htm>. Additionally, DOE and contractor personnel should consult DOE O 451.1A, National Environmental Policy Act Compliance Program (June 5, 1997), which establishes DOE internal requirements and responsibilities for implementing NEPA.

- < National Historic Preservation Act (NHPA). Section 106 of the NHPA requires a Federal agency with jurisdiction over a Federal, Federally-assisted, or Federally-licensed undertaking to: 1) consider the effects of the undertaking on properties included in or eligible for inclusion in the National Register of Historic Places; and 2) give the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking. Regulations implementing Section 106 have been adopted as 36 CFR Part 800, "Protection of Historic and Cultural Properties."
- < Endangered Species Act. Section 7 of the Endangered Species Act, as amended, requires Federal agencies to ensure, in consultation with the Secretary of the Interior (U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS)), that their actions are not likely to jeopardize the continued existence of any endangered species or threatened species, or destroy the critical habitat of such species (16 U.S.C. 1536(a)(2)).

To ensure that the requirements of the Endangered Species Act are met, DOE or contractor personnel responsible for decommissioning should consult with the appropriate office of the USFWS or the NMFS, as well as the appropriate State wildlife agency.

- < Coastal Zone Management Act. The CZMA is designed to preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone (16 U.S.C. 1452(1)). The Act requires Federal agencies that undertake development projects affecting the coastal zone to ensure that each

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project is, to the maximum extent practicable, consistent with the enforceable policies of the responsible State (16 U.S.C. 1456(c)(2)).

Implementing regulations for the CZMA have been adopted as 15 CFR Part 930, Subpart C, "Consistency for Federal Projects." Under such regulations, Federal agencies must (as soon as possible but at least 90 days before final approval of the proposed project) provide the State with a determination of consistency for any activity directly affecting the coastal zone (15 CFR 930.34(a)).

The Act also requires applicants for Federal permits to supply with the permit application a certification that the proposed project will comply with the enforceable policies of the State (16 U.S.C. 1456(c)(3)(A)). The requirement for certification of compliance and consistency is implemented by 15 CFR Part 930, Subpart D, "Consistency for Activities Requiring a Federal License or Permit."

It seems unlikely that many DOE decommissioning projects will be subject to the requirements of the CZMA. However, if it appears that the CZMA may apply, DOE and contractor personnel should contact a representative of the State agency responsible for implementation of the coastal zone management program, discuss DOE's proposed project with the State agency representative, and clarify the enforceable policies of the State's approved program with which the project must comply.

- < Fish and Wild Life Coordination Act. Section 2 of the FWCA requires Federal Departments and agencies to consult with the USFWS and the appropriate State wildlife agency before proposing or approving the impounding, controlling, or diverting of any stream or other body of water (16 U.S.C. 662(a)). It seems unlikely that DOE will propose impounding, controlling, or diverting a body of water in association with decommissioning. Nevertheless, if such action occurs, DOE personnel should consult with the appropriate offices of the USFWS and the State wildlife agency concerning recommendations they may have for enhancing the wildlife resource improvement and loss prevention plans.

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5.2 Step 8 - Develop Characterization Plan, Including Sampling and Analysis and Health and Safety Plan (HASP)

In order to properly evaluate which of the decommissioning alternatives is most appropriate, and to confirm that additional alternatives need not be considered, it will be necessary to have data that reliably characterize the nature and extent of contamination at the facility. Additionally, such characterization data are important to preparing the decommissioning plan because they influence such inputs to the plan as the estimate of the amount of waste to be generated and the measures necessary to protect worker and public health and safety.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.3, step 8 of the *Decommissioning Implementation Guide*:

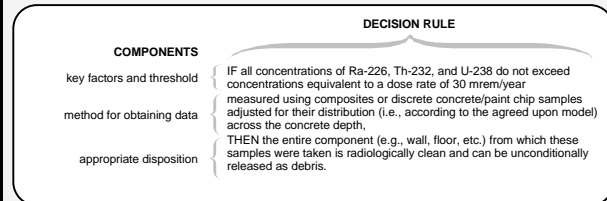
- 1. If the facility was characterized as part of deactivation, review deactivation records and documentation to determine the adequacy of the facility characterization data. If the existing data adequately characterize the facility, additional data collection should not be necessary.**

When a surplus DOE facility is deactivated, an end state is defined, and deactivation end-points are specified that delineate when the facility is ready for transfer to the decommissioning organization. Transfer is accomplished when deactivation end-points are achieved, conditions for S&M are set, and the receiving organization takes responsibility. Demonstrating completion of deactivation prior to transfer can lead to several possible types of end-points-related deactivation documents, which may be clustered into three transfer packages: 1)

LESSON LEARNED

The use of decision rules at DOE's Miamisburg Environmental Management Project (MEMP) focuses data collection and expedites the selection of decommissioning alternatives.

A decision rule represents specific criteria that the site and regulators agree are necessary to identify and substantiate decommissioning alternatives. Components of a decision rule include: 1) key factors to consider in evaluating decommissioning options; 2) the threshold at which one option is preferable; 3) methods for obtaining data to substantiate the decision; and 4) identification of the appropriate disposition option, given the specified criteria. These components are identified in the following example:



For MEMP, the site used this decision rule to determine that Building 21 was not appropriate for release without decontamination. Further, because decontamination was determined to be too costly, the site decided to demolish the building and dispose of the debris as low-level waste.

"Facility Disposition Lessons Learned from the Mound Site." DOE, November, 1997.

administrative; 2) technical; and 3) S&M support. The technical transfer package would be composed of characterization documents that describe the facility's structures, systems and components, and the conditions at completion of deactivation. Types of documents that may be included in a technical transfer package are listed in Table 1, below. However, actual documentation created at a facility will depend on the specific conditions at that facility, and will vary from facility to facility.

To evaluate whether technical data contained in the deactivation documentation characterize the facility well enough to plan decommissioning, the data quality objectives (DQO) process should be used. Available data should be reviewed during the DQO process to determine adequacy. In conformance with the graded approach, an appropriate data quality level should be chosen to avoid unnecessary complexity and cost. However, consistency with general EPA data quality expectations should be maintained. Additional characterization activities should be considered if there is insufficient knowledge of hazards to understand the hazardous substance types, quantities, forms, potential exposures, and locations.

If additional characterization data are found to be needed, the results of the DQO process conducted for the purpose of reviewing deactivation data will be used in preparing the characterization plan. The DQO process is a planning tool for data collection activities. It provides a

LESSON LEARNED

By effectively implementing the DQO process, inaccurate characterization of project scope can be avoided.

With less characterization work completed prior to starting a project, the number of assumptions and the amount of uncertainty are greater. The original Incentive Task Order for the K-25 Powerhouse Demolition Project estimated that the facility contained about 5,000 square feet of contaminated surface area. This estimate was based on historical and other preliminary characterization data. It was later determined that the facility contained additional contamination not specified in the original contract.

The subsequent change in work scope resulted in additional project costs of approximately \$200,000. Had the site been more thorough in its characterization of the facility and conscientiously followed the DQO process it could have established an accurate project scope at the beginning of the decommissioning process.

To reduce the likelihood of costly and time-consuming change orders, it is important to adequately characterize a facility during the scoping phase of decommissioning. Although task orders for decommissioning projects should be based on the most likely facility conditions, it is still important to allow for unanticipated costs during the initial phases of project planning.

"Effectively Use the DQO Process to Adequately Characterize Scope." DOE, May, 1996.

basis for balancing decision uncertainty with available resources. The DQO process is required for all significant data collection projects within EM.

Table 1: Types of Documentation in a Technical Transfer Package

Deactivation work plans and work packages as they were at completion of deactivation. The work plans may be part of the End-Points Completion Report.
End-Points Completion Report - Validation of end-points. For example, this report could be composed of end-point forms with completion signatures.
End-Point Technical Information - All documented technical criteria bases for end-points are referenced.
As-Left Condition - Include a summary of the overall physical status of the buildings and systems, and major equipment. Address access control and isolation of fluid and electrical systems. Status of fire and flood protection should be stated. If there are any unique structural anomalies, they should be described. If fixed-in-place, potentially hazardous materials have been left in the facility, that should also be mentioned.
Facility, room, and cell arrangement drawings - to the extent they exist. If significant changes were made for deactivation, some form of documentation would be useful. However, except in unique circumstances, as-builts of such changes should not be necessary.
Description/photos of spaces for which access is not anticipated during S&M.
Records for reactivating future decommissioning essential systems, and characterization useful for future decommissioning.
Equipment Technical Manuals and other information for equipment that remains operational or is mothballed - to the extent that it exists.
Documentation of current status (including drawings) of the deactivation/safe shutdown (if applicable). The documentation should address systems, such as the water, sewer, air, electric, gas, process (mechanical and chemical) and fire protection systems.
Location of fixed hazardous materials, wastes, and contamination with characterization information.
Inventory and Safeguards and Security provision for nuclear or other material remaining in the facility for which there is a requirement for accountability or protection from diversion.
Inventory of chemical and hazardous substances remaining, if any, and characterization information.
Inventory of radioactive and fissile material remaining as contamination with characterization information.
For structures, the final radiological/hazardous materials survey records, final configuration and S&M requirements, available drawings, specifications, procedures, manuals, and unplanned occurrences records applicable to the facility.
For soil, surface water, and groundwater conditions at the facility, all available data and reports that describe those conditions and the nature and extent of contamination therein. Also identification of any known assessment requirements.

2. If the facility was not characterized as part of deactivation, or if deactivation records and documentation are not adequate, prepare a characterization plan.

The characterization plan should describe the sampling and analysis and other investigations and reviews needed to characterize the facility for decommissioning. Characterization should include radiological contamination, hazardous substance contamination, and physical condition of structures. The purposes of characterization are to collect sufficient information to: 1) support analysis of decommissioning

alternatives; 2) support preparation of the decommissioning plan (including measures to protect worker and public health and safety); and 3) estimate the amount of waste to be generated during decommissioning. If decommissioning will be conducted as a CERCLA non-time-critical removal action, the characterization plan also has the purpose of satisfying the NCP requirement for a sampling and analysis plan (40 CFR 300.415(b)(4)(ii)).

In order to satisfy all of its purposes, the characterization plan should contain the following elements:

< **Field Sampling Plan.**

Describes the number, type, and location of samples and the type of analyses to be performed.

The Field Sampling Plan should be designed to support the risk assessment described in Section 5.4. As such, the data requirements will include at least the following:

- < Data that provide information about the identity and concentration of contaminants, as well as historical information concerning spills or releases of hazardous wastes and substances, and concerning the identity of hazardous wastes or substances that have been treated, stored, or disposed on-site; and
- < Data that support the existence of complete exposure pathways. Examples would include: well surveys (number and depths of wells); site or regional hydrology, geology and hydrogeology; meteorological data (wind speed and direction, precipitation types and rates, etc.); and distances from the site to potential human and ecological receptors and sensitive environments.

- **Quality Assurance Project Plan.** Describes policy, organization, and functional activities (including instrumentation and methodologies), data

LESSON LEARNED

To accurately characterize site conditions, it is important to fully understand the nature of contaminants and contaminated media.

In 1994, DOE's Savannah River Site began decommissioning Building 232-F, a tritium extraction facility that operated from 1955 until 1957. Initial efforts to characterize the facility focused on surface contamination, and tritium was identified as the major contaminant of concern. However, because tritium migrates to the subsurface of porous materials, detecting tritium contamination using smear sampling methods is unreliable. Areas at Building 232-F that were initially thought to be free of contamination were later suspected to be contaminated. The site addressed this concern by collecting and analyzing core samples to determine the extent of volumetric tritium contamination. Core samples should be considered when characterizing the extent of contamination in porous media such as concrete.

Tritium Facility Decommissioning: Pioneering Success at the Savannah River Site (October 1997)-DOE/SR-5000-510

quality objectives, documentation requirements, and any other measures necessary to achieve adequate data for use in planning and documenting the decommissioning action. The data quality requirements established by the Quality Assurance Project Plan must be at least adequate to support the appropriate level of risk assessment to be performed as described in Section 5.4.

DOE and contractor personnel responsible for facility characterization should recognize that, while individual data points should be valid and supportable, the graded approach suggests that "100 percent coverage" is not required for adequate facility characterization. For example, it is not necessary to know the total quantities of contamination present at every facility with a high degree of certainty. What is necessary is that sufficient data of an appropriate quality to support the purposes of facility characterization be available.

- **Health and Safety Plan.** Ensures adequate protection for workers, the public and the environment during the conduct of characterization activities, if DOE site-wide health and safety plans are not sufficient to cover such activities. For decommissioning activities subject to 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response* (HAZWOPER) (i.e., decommissioning activities conducted under CERCLA), preparation of a HASP is required. The HASP should cover documentation and communication to workers of the following:
 - < Potential hazards that may be encountered during characterization (including special hazardous substances such as beryllium);
 - < Appropriate training and certification;
 - < Hazard controls and requirements, including engineering/administrative controls and personal protective equipment;
 - < Work procedures; and
 - < Emergency response plan

Depending on the quantities and physical forms of radiological hazards, facilities containing such hazards may be subject to nuclear safety and radiation protection requirements that should be addressed by the HASP. Specifically, the following DOE directives covering nuclear safety should be consulted for their potential applicability:

- < 10 CFR 835, *Occupational Radiation Protection*;
- < DOE 5400.5, *Radiation Protection of the Public and Environment*;
- < DOE 5480.19, *Conduct of Operations*;

- < DOE 5480.20A, *Personnel Selection, Qualification, and Training Requirements for Nuclear Facilities*;
- < DOE 5480.21, *Unreviewed Safety Questions*;
- < DOE 5480.22, *Technical Safety Requirements*;
- < DOE 5480.23, *Nuclear Safety Analysis Reports*;
- < DOE 4330.4B, *Maintenance Management Programs*;

Guidance for preparing HASPs may be found in DOE-EM-STD-5503-94, *EM Health and Safety Plan Guidelines*. Additionally, DOE-STD-1120-98 provides information on hazard baseline documentation. Further discussion on HASPs is provided in Section 5.1.

For the specific case of decommissioning activities involving only low-level residual fixed radioactivity that remains following removal of radioactive systems, components, and stored materials, alternative requirements may be applied in lieu of the safety management requirements contained within the DOE Orders applicable to nuclear safety.

- < **Special Facility-specific Data Collection Plans.** Describe plans for collecting or supplementing data on such facility-specific subjects as the physical condition of buildings or structures and natural phenomena hazards.
- **Schedule and Budget Information.** If decommissioning will be conducted using a CERCLA process, submit the characterization plan to EPA (and other responsible regulatory agencies, if appropriate) for review and approval.

If decommissioning will be conducted as a CERCLA non-time-critical removal action and facility characterization will involve collection of environmental samples, the NCP requires that EPA review and approve sampling and analysis plans (40 CFR 300.415(b)(4)(ii)). It may also be appropriate, based on local agreements or other considerations, for the responsible State regulatory agency to review such plans when decommissioning will be conducted as a CERCLA non-time-critical removal action. Even if decommissioning will be conducted under legal authority other than CERCLA, local agreements or other considerations may make review of the characterization plan by EPA and the responsible State agency appropriate. Therefore, as required by the NCP, or as otherwise appropriate, DOE or contractor personnel should submit the characterization plan to EPA and/or the responsible State agency for review and/or approval.

5.3 Step 9 - Conduct Characterization/Document Results

If the facility being decommissioned was not characterized as part of deactivation, or if deactivation records and documentation were not adequate and a characterization plan was prepared, the characterization plan must be implemented and the data collected must be documented.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.3, Step 9, of the *Decommissioning Implementation Guide*:

- 1. Conduct all characterization work in accordance with the characterization plan.**
- 2. Document the collection and analysis of characterization data.**

The scope and level of detail of all documentation of characterization data should be determined using the graded approach. In other words, the level of detail with which analyses and information are presented should be consistent with the complexity of the facility being characterized and its potential to create risk to human health and the environment.

5.4 Step 10 - Conduct Risk Assessment

In parallel with characterizing the facility to be decommissioned, an assessment must be prepared of the environmental risks posed by the facility and by the decommissioning activities. The risk assessment should be designed to evaluate existing and imminent risks to human health and the environment in the absence of decommissioning, and to present information on the potential impacts from the decommissioning alternatives. The graded approach should be applied in determining the appropriate complexity level for the risk assessment.

The following recommended action and ensuing suggested practices and procedures, are consistent with Section 4.3, Step 10, of the *Decommissioning Implementation Guide*:

LESSON LEARNED

The pre-job briefing is a valuable opportunity for identifying and controlling potential safety hazards.

The Auxiliary Reactor Area-III Decommissioning Project at the Idaho National Environmental and Engineering Laboratory required that a 47,000 pound gas heater be lifted by crane. At the pre-job briefing, and after a thorough review of the lifting procedures, the crane operator observed that a welder would have to cut the last support while in a confined space. If the heater swung toward the welder after being released, it would pin him against the side wall of the cell. Consequently, the lift was delayed an hour so that bracing could be installed to protect the welder. The pre-job briefing provided a valuable forum for discussing safety issues, and for addressing worker concerns and recommendations.

Integrating Safety and Health During Decommissioning with Lessons Learned from INEL (DOE/EH-0546)

1. Conduct a risk assessment focusing on the environmental risks posed by the facility to be decommissioned and the decommissioning activities.

Regardless of the legal authority under which decommissioning is conducted at a facility for which DOE has responsibility, an assessment of the environmental risks posed by the facility in the absence of decommissioning, and the potential impacts from activities associated with the decommissioning alternatives will be needed. As with other investigations that support decommissioning, the graded approach should be used to determine the appropriate scope for the risk assessment. In some circumstances, a qualitative assessment of environmental risks is adequate, while in other circumstances, more sophisticated methods could be warranted. Examples of environmental risk assessment types having varying levels of sophistication that could be appropriate on a case-specific basis include the following:

- Comparison of contaminant concentration levels in the environment at the facility with published, applicable or relevant and appropriate, risk-based and chemical-specific standards (e.g., Safe Drinking Water Standards at a site where groundwater is a current or future source of drinking water). If such standards for one or more contaminants of concern are clearly exceeded, additional risk evaluation is probably not needed;
- Use of a computer-based site conceptual exposure model (SCEM) to determine if a source of contamination

LESSON LEARNED

By integrating various safety documents into a single document, workers can have easier access to all safety documents.

When decommissioning nuclear sites, numerous hazardous baseline documents are required. All of these documents provide various pieces of information ranging from what work is to be performed to what hazards are present. In addition, the documentation includes emergency response actions. If an accident or contamination event occurs, this documentation may be required to conduct the proper response.

If the needed information is located in numerous areas (e.g., an analysis of the hazards present are found in the Documented Hazard Analysis while emergency response actions are listed in the Work Packages) when an emergency occurs, responses may be delayed while the proper documents are found. By incorporating these various documents into a single document time can be saved in locating this information. A single safety document maximizes efficiency and allows for a quick response in critical situations. In the long run, having all safety documentation available in one location promotes worker and public safety in an emergency, and may save money if responses can be done quicker and safer as a result.

"Integrating Safety Documentation into a Single Document Provides a Comprehensive Resource for Workers." DOE, July, 1999.

could pose a substantial threat to human health and the environment because the exposure pathways are complete;

- Comparison of contaminant concentration levels with risk-based action levels or preliminary remediation goals already established for the DOE site at which the facility to be decommissioned is located;
- Use of a screening risk assessment based on published EPA default exposure assumptions for the current or reasonably anticipated future land use and the most sensitive receptor; and
- Use of a more rigorous quantitative risk evaluation. This type of risk assessment may be appropriate in cases where published standards are not clearly exceeded, or where data are limited or of questionable quality. When used, this type of risk assessment would likely need to consider the potential for synergistic effects of multiple contaminants, and/or multiple exposure pathways.

5.5 Step 11 - Conduct Safety Analysis

In parallel with characterizing the facility to be decommissioned and assessing environmental risks, an analysis must be prepared identifying hazards posed to workers and the public by the facility being decommissioned. The need to perform a hazards analysis is discussed in DOE P 450.4, *Safety Management System Policy*. According to this DOE policy, the safety management system consists of six components, one of which is "core functions." Five core functions are delineated, which are intended to provide the necessary structure for any work activity at a DOE facility that could potentially affect the public, the workers, and the environment. One of the five core functions is to identify, analyze, and categorize the hazards associated with the work identified as part of a DOE project. A hazard for this purpose is a source of danger (e.g., material, energy source, or operation) with the potential to cause illness, injury, or death to personnel or damage to an operation or to the environment (without regard for the likelihood or credibility of accident scenarios or consequence mitigation).

The following recommended action and ensuing suggested practices and procedures, are consistent with Section 4.3, Step 11, of the *Decommissioning Implementation Guide*:

1. Conduct a hazards analysis to assess the potential of the existing facility and the decommissioning activities to affect the health and safety of workers, the public, and the environment.

DOE and its contractors have many acceptable ways of performing hazards analyses. In early stages of a decommissioning project, such as the stage of choosing the decommissioning alternative, hazards may be identified and evaluated using broad, simple tools. For example, one such tool would be a checklist delineating hazards and assessing the potential magnitude of the harm. Such broad, simple hazards analyses will be used later as the basis for more detailed hazards evaluations required to plan specific tasks that are actually expected to occur during decommissioning.

The method and level of hazards analysis needed to support choosing a decommissioning alternative will be influenced not only by the fact that the analysis is occurring during an early project stage, but also by the type of facility to be decommissioned.

LESSON LEARNED

Designating an environment, safety and health (ES&H) oversight team and a project-specific contact person improves coordination and control over ES&H activities.

ES&H oversight activities at DOE sites can be excessive and redundant. This is often the case when prime contractors develop ES&H rules that duplicate regulations set forth by the Occupational Safety and Health Administration. The K-25 Decommissioning Powerhouse Project, which began 1993, included the decontamination, demolition, and disposition of 15 structures. The project was initially hampered by unexpected and redundant inspections.

To improve coordination and control of these inspections, the site designated a project-specific point-of-contact for all ES&H concerns and formed a DOE ES&H oversight team responsible for all aspects of the oversight process. All ES&H concerns and findings are routed through the point-of-contact, who involves appropriate members of the oversight team and others as necessary. This approach reduced redundancy and project costs, without sacrificing safety and health, by sharing information and coordinating activities of the various organizations providing oversight.

Lessons Learned for Oak Ridge K-25 Powerhouse Demolition Project (DOE/ORO/2042)

- For nuclear facilities, hazards analyses must comply with DOE O 5480.23, Nuclear Safety Analysis Reports.
- For essentially any cleanup of hazardous substances, including such cleanups that occur as part of decommissioning, whether at a nuclear facility or not, 29 CFR 1910.120 specifies requirements for hazards analysis and control of changes that could affect potential worker hazards (29 CFR 1910.120(c) and (d)).

The hazards analysis should evaluate radiological, chemical, biological, and physical hazards, as applicable, at the facility to be decommissioned. An experienced, multi-disciplined team should be assigned to conduct the assessment.

In cases where hazardous substances are present, the hazards analysis should evaluate: 1) the type, form, quantity, and concentrations; 2) location; 3) conditions under which exposure may occur; and 4) the inherent harmful characteristics of the hazardous substance (e.g., toxicity or decomposition by-products).

The hazards analysis should consider natural phenomena hazards and should identify safety structures, systems, and components that are needed to prevent or mitigate hazardous material releases due to natural phenomena events. The scope and formality of the analysis of natural phenomena hazards should be determined on a case-specific basis, taking into account the guidelines provided in DOE-STD-1120-98.

LESSON LEARNED

Safety and health (S&H) personnel should interface directly with engineering personnel to ensure that S&H analyses and considerations are clearly communicated in the early stages of decommissioning.

Decommissioning systems, processes, and equipment typically pose hazards to those responsible for associated installation, operation, maintenance, or dismantlement activities. S&H analyses should clearly communicate the health and safety consequences of engineering decisions before they are made so that hazards can be eliminated or controlled.

S&H analyses should also identify applicable regulatory requirements that must be met during the implementation of decontamination and decommissioning (D&D) activities. S&H personnel can then determine the necessary inspection criteria for ensuring compliance.

A secondary benefit of integrating S&H analyses early in the D&D process is reduction or elimination of reengineering, reanalysis, or retraining due to unforeseen S&H conditions. Avoiding these activities can significantly reduce overall project costs.

“Integrating Safety and Health During Deactivation with Lessons Learned from PUREX,” September 29, 1995, DOE/EH-0486.

The hazards analysis should rely on existing documented hazards analyses (if any) from prior phases of the facility's life cycle, provided that the conditions enumerated in DOE-STD-1120-98 are met.

Documentation of the hazards analysis should provide a formal record of all identified hazards, including those that workers may encounter during decommissioning work activities. A formal record of controls needed to support safe work execution in light of the hazards identified also should be provided.

5.6 Step 12 - Define and Conduct Activities to Inform/Involve Stakeholders

It is DOE's policy to involve stakeholders (also referred to as the public) in the Department's program operations, planning activities, and decision making. The terms "stakeholders" and "public," which are used interchangeably in this Handbook, refer to any affected or interested party, which may include representatives of State, Tribal, and local governments, Congress, other Federal agencies, external review bodies, community groups, environmental and other interest groups, business, labor, academia, professional and technical organizations, educational organizations, DOE employees and contractors, and members of the general public. In 1994, each DOE site was directed to develop its own public participation program and plans in consultation with such stakeholders. Additionally, the legal authorities under which decommissioning may be conducted (e.g., CERCLA, NEPA, RCRA, AEA) mandate specific public participation activities. Therefore, as the results of site characterization, risk assessment, and safety analysis become available, DOE and contractor personnel responsible for each decommissioning project must plan and implement stakeholder participation activities that are consistent with any

LESSON LEARNED

Involving stakeholders early in the planning process builds trust and facilitates decision-making.

Demolition of the powerhouse facilities at the Oak Ridge Reservation K-25 Plant generated about 6,500 tons of scrap metal. Per DOE requirements, the site normally would have surveyed this material for radiological contamination.

Working closely with DOE and the State, the site management and integrating contractor, implemented a less stringent approach: because the powerhouse facilities had never been used for radiological operations, the site was able to use a project-specific protocol for the free release of scrap metal, eliminating the need for costly and time-consuming radiological surveys. Using this approach, the site avoided costs of approximately \$6 million.

Ultimately, early involvement of stakeholders expedites decision making by allowing project reviews to focus more on technical issues and problem solving than on the exchange of information.

Cost-Effective Facility Disposition Planning With Safety and Health Lessons Learned and Good Practices from the Oak Ridge Decontamination and Decommissioning Program (May 1998)-DOE/EH-0568.

existing DOE site-specific public participation program. Additionally, local circumstances and agreements, and applicable legal requirements may also mandate specific public participation activities that must be identified and implemented.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.3, Step 12, of the *Decommissioning Implementation Guide*:

1. If no public participation program exists, establish such a program that meets the requirements of existing local agreements, DOE policy, and applicable regulations.

- **Local Agreements.** Local IAGs at DOE sites may contain requirements for consultation with EPA and the responsible State agency regarding cleanup activities under CERCLA and/or RCRA. To the extent that such consultations have not occurred before the point in the decommissioning process at which a decommissioning alternative will be chosen, they should be incorporated into a plan for stakeholder involvement and participation.
- **DOE Policy.** In 1994, each DOE site was directed to develop its own public participation program and plans in consultation with stakeholders. As a result, almost all DOE sites already have a designated public liaison and have adopted site-wide plans for stakeholder participation. Many DOE sites where decommissioning facilities are located also have public reading rooms or information resource centers and a designated location where required administrative record files are maintained. However, if a decommissioning project is not located at a DOE site having such an existing program, or the existing program does not adequately address the needs for stakeholder input during decommissioning, then a plan for stakeholder involvement should be prepared, taking into account the DOE policies and guidance briefly described below:
 - < In 1991, guidance on public participation in decision making associated with environmental restoration and waste management, particularly at sites subject to public participation requirements under CERCLA as amended by the 1986 Superfund Amendments and Reauthorization Act (SARA) was published by DOE's Office of Environmental Policy and Assistance, RCRA/CERCLA Division, EH-413 (formerly the Office of Environmental Guidance, EH-231). The guidance is entitled *Public Participation in Environmental Restoration Activities* [DOE/EH-0221 (November 1991)]. The document provides an overview of DOE's public participation program and summarizes the statutory and then-applicable regulatory requirements for public participation found

in CERCLA, RCRA (corrective action) and NEPA. It further discusses the integration of CERCLA/RCRA, CERCLA/NEPA and State/Federal public participation standards under the regulations as they existed at that time.

- < In October 1992, DOE's Assistant Secretary for Environmental Management (formerly Assistant Secretary for Environmental Restoration and Waste Management) issued a statement of policy on public participation, declaring that the EM program's overall public participation goal is "to create an open and accessible decision making process that results in decisions that are technically and economically feasible, environmentally sound, health and safety conscious, address public values and concerns, and can be implemented" ["Public Participation Policy for Environmental Restoration and Waste Management, U.S. Department of Energy" (October 1992)]. The policy lays out EM's public participation goal and objectives, includes definitions, discusses the need for public participation, and delineates roles and responsibilities of EM components, other DOE offices, and outside organizations.
- < The policy statement was followed by the issuance of "Public Participation Guidance for Environmental Restoration and Waste Management" (March 1993), which emphasizes public participation planning. It advocates the establishment of EM public participation planning teams at DOE Headquarters and at each Field Office or site (as appropriate) to plan and implement a coherent, comprehensive, coordinated EM public participation program for each EM site. It also describes a model for the planning process and the resultant public participation plans that will document EM's approach to involving the public in its program.
- < For easy reference, the EM Public Participation Policy Statement and Guidance were republished, along with the "EM Headquarters Public Participation Implementation Plan" in 1994 in the "EM Public Participation Desk Reference," which is available from EM.
- < The Federal Facilities Environmental Restoration Dialogue Committee (Keystone Committee) issued an Interim Report in February 1993, specifically recommending the creation of site-specific advisory boards (SSABs) as a means of involving stakeholders more directly in cleanup decisions. As a result of that report and several successes with site advisory groups, EM has embraced the idea of SSABs. Hence, SSABs have been established at major EM sites throughout the DOE complex. Also, a guidance document focusing on SSABs has been issued [DOE Office of Environmental Management, Site-Specific Advisory Board Guidance - Final (January 1996)]. DOE personnel responsible for

decommissioning should coordinate with these EM public participation programs as much as appropriate in developing a plan for stakeholder participation in the decommissioning decision-making process.

- **Applicable Regulations.** Beyond IAG provisions and DOE policies, regulations that implement Federal and State laws applicable to decommissioning activities may impose public participation requirements. If so, such requirements must be addressed by the plan for stakeholder involvement and participation. The public participation requirements established by potentially applicable Federal laws are briefly described below. It should be noted that DOE's public participation guidance (cited above) was designed to address most CERCLA and NEPA requirements.

< CERCLA. If the CERCLA non-time-critical removal action process has been determined to be an appropriate process for the decommissioning project, then the requirements listed below must be addressed in a public participation plan:

- R DOE, as lead agency, must designate a spokesperson. The spokesperson shall inform the community of actions taken, respond to inquiries, and provide information concerning the release of hazardous substances at the facility. The spokesperson shall notify, at a minimum, immediately affected citizens, State and local officials, and, when appropriate, civil defense or emergency management agencies. (40 CFR 300.415(n)(1)). As previously mentioned, most DOE sites already have a designated public liaison.
- R If DOE determines that decommissioning will last longer than 120 days, then DOE must:
 - Conduct interviews with local officials, community residents, public interest groups, or other interested or affected parties, as appropriate, to solicit their concerns, information needs, and how or when citizens would like to be involved in the decommissioning decision making process (40 CFR 300.415(n)(3)(i));
 - Prepare a formal community relations plan based on the community interviews and other relevant information. The plan must specify the community relations activities that DOE expects to undertake during decommissioning (40 CFR 300.415(n)(3)(ii)); and

- Establish at least one local information repository at or near the location of the facility being decommissioned, inform the public of any repositories established, make the administrative record file available in at least one of the repositories, and provide notice of availability of the administrative record file for public review (40 CFR 300.415(n)(3)(iii)). These actions must be completed before DOE signs the Action Memorandum documenting selection of the final decommissioning. As previously mentioned, many DOE sites have existing public reading rooms or information centers and have already designated a location for administrative record files.⁵

R DOE, as lead agency, must:

- Publish in a major local newspaper of general circulation a notice of availability and brief description of the Analysis of Decommissioning Alternatives (40 CFR 300.415(n)(4)(ii));
- Provide at least 30 calendar days for public comment on the Analysis of Decommissioning Alternatives, which may be received verbally or in writing. If, before the comment period ends, someone requests that the comment period be extended, DOE may extend the comment period. When granted, such extensions will be for at least an additional 15 days (40 CFR 300.415(n)(4)(iii)); and
- Prepare a written response to significant comments, and enter the response into the administrative record file (40 CFR 300.415(n)(4)(iv)).

R Table 2 contains a check list summarizing CERCLA public participation requirements for decommissioning projects that are conducted as CERCLA non-time-critical removal actions.

⁵ DOE, as lead agency, must compile and maintain the administrative record file for the selection of the decommissioning alternative for the facility (40 CFR 300.800). The administrative record file must be established before DOE signs the Action Memorandum documenting selection of the final decommissioning action (see Section 3.3.9.2.1 (p. ?). Requirements for the contents of the administrative record file are contained in 40 CFR 300.810 and 40 CFR 300.820.

**Table 2: CERCLA Public Participation Requirements
Decommissioning Projects Checklist**

Activity	Yes	No	N/A
Has a DOE spokesperson for the decommissioning project been designated?			
Have interviews been conducted with local officials, community residents, public interest groups, or other interested or affected parties?			
Has a formal public participation plan been prepared?			
Have a local information repository and administrative record file been established?			
Has a notice of availability of the <i>Analysis of Decommissioning Alternatives</i> and the administrative record file been published in a major local newspaper?			
Has a public comment period for the <i>Analysis of Decommissioning Alternatives</i> of at least 30 calendar days been provided?			
Have written responses to significant public comments been prepared and made available in the administrative record file?			

- < **RCRA.** If a surplus DOE facility will be decommissioned under the corrective action provisions of a RCRA permit or order, EPA guidance encourages responsible State agencies, EPA regions, and facilities to provide public participation activities that are consistent with the public participation activities associated with a CERCLA response action. EPA reasons that this should be done because a significant portion of the RCRA corrective action process is analogous to the CERCLA response action process. DOE policies and guidance on public participation are consistent with this EPA guidance. DOE and contractor personnel should be aware, however, that CERCLA public participation requirements go beyond RCRA public participation requirements, which are located in 40 CFR Part 124, *Procedures for Decisionmaking*, as referenced by 40 CFR Part 270, *EPA Administered Permit Programs: The Hazardous Waste Management Program*. Therefore, in some circumstances, it might be appropriate to provide only the public participation required by the RCRA regulations. Close coordination with the responsible regulatory agency in such circumstances is recommended.

- < NEPA. NEPA public participation requirements are fully addressed by DOE regulations, and DOE policies and guidance documents, which are discussed above in this Section.

2. In a manner consistent with the public participation program and any other applicable public participation requirements, make information about decommissioning activities available to stakeholders, and collect stakeholder comments to be considered in formulating and evaluating decommissioning alternatives.

At this early project stage, it will probably be appropriate to implement such aspects of the public participation plan as the following:

- Establish public reading room or information center, if not already done;
- Appoint a public liaison, if not already done;
- Respond to questions;
- Set up an administrative record file, if required and not already done;
- Notify affected citizens, officials and agencies; and
- Collect any stakeholder comments offered.

5.7 Step 13 - Evaluate Alternatives, Propose Response and Document Analysis of Decommissioning

Using information collected and documented during completion of the activities described above, DOE must evaluate the list of decommissioning alternatives, select a preferred alternative, and document the evaluation process. Consistent with the graded approach, the scope and complexity of the evaluation and documentation should be commensurate with the scope and complexity of the decommissioning project.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.3, Step 13, of the *Decommissioning Implementation Guide*:

1. Evaluate the decommissioning alternatives to select a preferred alternative.

Methodologies for evaluating decommissioning alternatives for the purpose of identifying the preferred alternatives may vary from purely qualitative to purely quantitative. The most likely methodology, however, will involve both qualitative and quantitative components because some characteristics of decommissioning alternatives, such as cost, lend themselves to quantitative comparison, while other characteristics, such as environmental justice considerations, do not. The graded approach should be used to define an evaluation methodology appropriate to the complexity of each decommissioning project. Some examples of characteristics of decommissioning alternatives that might be appropriate to consider during the

LESSON LEARNED

A Decision Analysis Report (DAR) is a valuable management and planning tool used for evaluating decommissioning alternatives.

Decision Analysis Reports, used to evaluate alternatives for decommissioning, are based on the hazards and complexity of a decommissioning project, as determined during facility characterization. The Idaho National Environmental and Engineering Laboratory (INEEL) used a DAR to evaluate three alternatives for decommissioning the Auxiliary Reactor Area (ARA-I), an area previously used for testing gas-cooled reactors. For each alternative, the DAR documented estimates of associated costs, waste materials generated, and immediate and long-term safety impacts. The DAR included a cost-risk-benefit summary recommending total dismantlement as the preferred decommissioning option.

DARs can benefit decommissioning programs in three ways. First, they are well documented decision reports providing a systematic and logical method to support the recommended decommissioning option. Second, consideration of potential safety impacts at the earliest stages of project development facilitates the use of engineered controls to eliminate hazards. Third, the facility characterization data and hazard evaluations provide a good foundation for later development of project safety documentation.

Integrating Safety and Health During Decommissioning with Lessons Learned from INEL (DOE/EH-0546)

evaluation are listed in Table 3. Not all of the characteristics on this list will be appropriate for every decommissioning project. Neither is the list intended to be exhaustive. Other specific characteristics may be appropriate in a particular situation. DOE and contractor personnel who are conducting the evaluation of decommissioning alternatives and selecting the preferred alternative must identify on a case-by-case basis the most appropriate characteristics to consider.

Table 3: Examples of Characteristics to Consider in Evaluating Decommissioning Alternatives

Expected ability to achieve required decommissioning objective and end-points, property release criteria, and/or facility reuse plan.
Levels of risk (e.g., environmental pollution consequences, effects on ecological resources).
Safety issues (e.g., radiological and nonradiological worker hazards, off-site human health effects).
Environmental justice considerations (i.e., would the alternative result in disproportionately high and adverse human health or environmental effects on minority populations and low-income populations?).
Expected ability to achieve resource conservation and waste minimization objectives.
Level of public interest or concern.
Implementability (e.g., technical feasibility; availability of equipment, personnel, and support services; feasibility of obtaining permits and easements; feasibility of establishing institutional controls, if needed).
Cost.
Schedule.

Based on the results of the evaluation described above, a preferred decommissioning alternative should be selected.

2. Document all aspects of evaluating alternatives and selecting a preferred decommissioning alternative.

The complexity of the project will determine the scope of the document required to record all aspects of evaluating alternatives and selecting a decommissioning alternative. The graded approach should be applied in deciding the final contents of documentation. As a starting point, the following outline suggests possible contents for an Analysis of Decommissioning Alternatives.

Suggested Contents for Analysis of Decommissioning Alternatives

- **Executive Summary**

- **Facility Characterization**
 - < Facility and site description and general background information.
 - < A description of the transition/deactivation process and the end condition achieved.
 - < A brief review of the S&M program and activities.
 - < Previous removal actions and/or cleanup work.
 - < Source, nature and extent of contamination, including analytical data, where appropriate.
 - < A summary of the safety analysis documentation in effect for the facility.

- **Identification of Decommissioning Objectives**
 - < Scope of the decommissioning action.
 - < General end condition/criteria to be achieved.
 - < Relationship to soil/water remedial action in the vicinity.

- **Identification and Description of Decommissioning Alternatives**
 - < Scope and features of each alternative.
 - < Specific end-points, release criteria or facility reuse plans.
 - < Risks and safety issues.
 - < NEPA Values (cumulative, off-site, ecological and socioeconomic impacts).
 - < Effectiveness. Include such matters as the ability to protect the environment (or, if appropriate, a description of the reverse - the environmental impact of the alternative) and the health and safety of workers and the public; the attainment of ARARs; and the achievement of decommissioning objectives.
 - < Implementability. Include such matters as technical feasibility; availability of equipment, personnel, and support services, if applicable; and administrative feasibility of obtaining licenses, easements, and institutional (administrative) controls.
 - < Nature and amount of waste generated and disposal plans.
 - < Material recycle/reuse opportunities.
 - < Cost.
 - < Schedule.

- **NEPA Process for Non-CERCLA Actions**
 - < For decommissioning actions proceeding outside the CERCLA process:
 - < Summarize and/or reference pertinent NEPA documentation prepared at the programmatic and/or site-wide levels.

- < Discuss the interface between the Analysis of Decommissioning Alternatives and other documentation (i.e., Categorical Exclusion (CX), Environmental Assessment (EA) or Environmental Impact Statement (EIS)), if any, being prepared to meet project-specific NEPA requirements (see Section 3.3.1.2.4 (p. 41)).
- **Comparative Analysis of Decommissioning Alternatives.**
 - < As a minimum, compare effectiveness, implementability, and cost.
 - < Significant stakeholder comments, if any, should be considered in the comparative analysis.
- **Preferred Decommissioning Alternative**
 - < Include rationale for selecting the preferred decommissioning alternative.
 - < For non-CERCLA actions, refer to the appropriate NEPA decision document.

5.8 Step 14 - Respond to Public Comment

In a manner consistent with the site-specific public participation program and any additional requirements imposed by applicable laws or local agreements, stakeholder comments must be formally solicited on the Analysis of Decommissioning Alternatives. Responses to significant comments must be documented and made available to the public. Comments received must be considered in selecting the final decommissioning action.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.3, Step 14, of the *Decommissioning Implementation Guide*:

1. Formally solicit comments on the Analysis of Decommissioning Alternatives in a manner consistent with the public participation program and any additional requirements imposed by applicable laws or local agreements.

In accordance with DOE policy on public participation, many DOE sites have designated public liaisons, have set up public reading rooms or information centers, and have established a location for administrative record files. These resources should be used in making the Analysis of Decommissioning Alternative available for public review, and in collecting comments, regardless of whether, when, or how comments are formally solicited.

If the decommissioning of a facility for which DOE has responsibility is being conducted as a CERCLA non-time-critical removal action, the NCP imposes the

CHOOSING THE DECOM. ALTERNATIVE: Step 14 - Respond to Public Comment

following formal public comment requirements regarding the Analysis of Decommissioning Alternatives:

- Publish a notice of availability and brief description in a major local newspaper of general circulation (40 CFR 300.415(n)(4)(ii)); and
- Provide at least 30 calendar days for public comment and provide for receiving such comments either verbally or in writing (40 CFR 300.415(n)(4)(iii)).

If the decommissioning of a facility for which DOE has responsibility is not conducted under CERCLA, then formal public participation requirements must comply with DOE's NEPA regulations. DOE has published guidance on achieving such compliance (see p.70). For additional guidance, DOE and contractor personnel should consult with the appropriate NEPA Compliance Officer or DOE's Office of NEPA Policy and Assistance.

In addition to DOE's NEPA regulations, RCRA regulations regarding public participation will apply to any decommissioning project that is not subject to CERCLA and is proceeding under corrective action provisions in a RCRA permit or compliance order. In such circumstances, Federal RCRA regulations impose no requirement for formal solicitation of public comments on the Analysis of Decommissioning Alternatives. However, if the facility being decommissioned is located in an authorized State, the State's regulations may differ. Additionally, EPA's RCRA public participation guidance encourages responsible State agencies, EPA regions, and facilities to provide public participation activities that are consistent with the public participation activities associated with a CERCLA response action. Therefore, DOE and contractor personnel responsible for decommissioning of facilities pursuant to RCRA should consult with the responsible regulatory agency (i.e., EPA region or designated State agency) and with the appropriate NEPA Compliance Officer, or DOE's Office of NEPA Policy and Assistance, to decide when and how to proceed with formal solicitation of public comments on the Analysis of Decommissioning Alternatives.

In addition to DOE's NEPA regulations, NRC or Agreement State regulations regarding public participation will apply if the decommissioning project is not subject to CERCLA and is proceeding under the decommissioning plan provisions of an NRC or Agreement State license. In such circumstances, DOE and contractor personnel responsible for decommissioning should consult with the responsible regulatory agency (i.e., NRC or designated Agreement State agency) and with the appropriate NEPA Compliance Officer or DOE's Office of NEPA Policy and Assistance to decide when and how to proceed with formal solicitation of public comments on the Analysis of Decommissioning Alternatives.

2. Prepare and document responses to significant public comments.

If the decommissioning of a facility for which DOE has responsibility is being conducted as a CERCLA non-time-critical removal action, the NCP requires that a written response be prepared to significant public comments on the Analysis of Decommissioning Alternatives (40 CFR 300.415(n)(4)(iv)).

If the decommissioning of a facility for which DOE has responsibility is not conducted under CERCLA, but formal solicitation for public comments has been made to comply with NEPA or other State or Federal regulations, then a written response should also be prepared to significant public comments as appropriate to comply with DOE's NEPA regulations and other applicable State and Federal regulations.

3. Make public comments and responses to significant comments available to the public in a manner consistent with the public participation program and requirements of applicable laws.

If the decommissioning of a facility for which DOE has responsibility is being conducted as a CERCLA non-time-critical removal action, the NCP requires that public comments and the written response to significant comments be entered into the administrative record file (40 CFR 300.415(n)(4)(iv)).

If the decommissioning of a facility for which DOE has responsibility is not conducted under CERCLA, but formal solicitation for public comments has been made to comply with NEPA or other State or Federal regulations, an administrative record file may not exist. Hence, the written response to significant comments in such a case should be made available to the public in the public reading room or information center, or in some other location consistent with the site-specific public participation program.

5.9 Step 15 - Document Final Decision

The final selection of a decommissioning alternative must be made, taking into consideration all available information, including public comments. Selection of the final decommissioning action must be documented in an Action Memorandum. The format of the Action Memorandum should be acceptable to responsible regulatory agencies.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.3, Step 15, of the *Decommissioning Implementation Guide*:

1. Select the final decommissioning action and document the basis for selection in an Action Memorandum.

CHOOSING THE DECOM. ALTERNATIVE: Step 15 - Document Final Decision

The final decommissioning action should be selected based on the conclusions of the Analysis of Decommissioning Alternatives, as modified to account for significant stakeholder comments.

An Action Memorandum should be used to document the final decommissioning action selected, and to record management approval.

If the decommissioning of a facility for which DOE has responsibility is being conducted as a CERCLA non-time-critical removal action, then it would be appropriate to follow the EPA Action Memorandum outline and format.

If the decommissioning of a facility for which DOE has responsibility is not conducted as a CERCLA non-time-critical removal action, then a modified version of the EPA Action Memorandum outline would be appropriate. A suggested format is presented below, which should be modified on a case-specific basis after consultation with the responsible regulatory agency.

CHOOSING THE DECOM. ALTERNATIVE: Step 15 - Document Final Decision

Suggested Action Memorandum Format for Documenting Approval of the Final Decommissioning Action

The memorandum should be addressed to the appropriate DOE official requesting approval of the final decommissioning action.

- **Purpose.**
 - < Request approval of the selection of a final decommissioning action. Identify and briefly describe the action and give its location.
- **Facility Conditions and Background.**
 - < Summarize the "Facility Characterization" Section from the Analysis of Decommissioning Alternatives.
- **Rationale for the Decommissioning Decision**
 - < Describe the threat being addressed and any programmatic aspects of the decision.
- **Proposed Actions and Estimated Costs**
 - < Briefly describe the recommended final decommissioning action and the alternatives considered (as necessary, refer to the attached Analysis of Decommissioning Alternatives).
 - < Describe public comments received.
 - < Describe DOE responses to public comments and how the comments affected the recommended final decommissioning action.
 - < Describe the NEPA process completed and the resulting decision document (for non-CERCLA actions).
 - < Describe the principal reasons for selecting the recommended final decommissioning action.
 - < Describe any outstanding technology issues.
 - < Describe efforts to identify ARARs and provide a list.
 - < Provide cost and schedule.
- **Recommendation**
 - < Provide a statement recommending that the final decommissioning action be approved.
- **Approval**
 - < Space for the approval signature and date.
- **Attachments**
 - < Attach documents referred to in the body of the Action Memorandum. Typical documents might include:
 - < Analysis of Decommissioning Alternatives.
 - < Significant public comments.
 - < DOE response to significant public comments.
 - < Other documents from the administrative record file.
 - < Pertinent NEPA Decision Documents.

6.0 Engineering and Planning

6.1 Step 16 - Prepare Decommissioning Project Plan, Including HASP and ISMS

The scope and detail of the decommissioning project plan should be commensurate with the scope and complexity of the decommissioning project. The decommissioning project plan should incorporate the measures necessary to protect the health and safety of workers and the public and to prevent the spread of contamination during decommissioning operations. The decommissioning project plan should provide for change control, unless change control management is addressed on a site-wide basis. When completed and approved, the decommissioning project plan will replace the decommissioning project scoping document, constituting the new technical, cost, and schedule baselines for the project, and will become the technical specifications for performing the work.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.4, Step 16 of the *Decommissioning Implementation Guide*:

1. Prepare the decommissioning project plan.

Preparation of the decommissioning project plan is discussed in Appendix E, which includes suggested functions, purposes of the plan, precursors to the plan and key supporting documentation.

Suggested Contents of a Decommissioning Project Plan

- **Introductory Material.**
- **Facility Description and History.** Focus initially on the operating/functional history. Include the planning and assessment activities that have occurred up to the present. Recount the interaction with the public/stakeholders/regulators and the impact this has had on the project.
- **Scope and Objectives of the Decommissioning Removal Action.** Discuss the overall decommissioning objective. Specify the release criteria (end condition). Include reuse/recycle criteria.
- **Summary of Characterization.** Radioactive and hazardous material contamination, as well as, physical condition and status.
- **Technical Approach**
 - < Alternatives considered.
 - < General decommissioning approach to be followed.
 - < Reference to activity specifications or other documents specifying details of the work and end-points.
 - < Release criteria to be used for decontamination of equipment, structures and the environment.
 - < The technical baselines and assumptions for the project.

- **Project Management**
 - < Management approach (maintenance and operations (M&O) contractor in-house forces, contract out, use of construction manager, etc.). Include cost/schedule control and reporting system to be employed, configuration control, and productivity improvement.
 - < Organization.
 - < Training.
 - < Quality Assurance.
 - < Lessons Learned.
 - < Cost.
 - < Schedule.

- **Worker and Environmental Protection**
 - < HASP: occupational safety, industrial hygiene, health physics.
 - < Integrated Safety Management System (ISMS): hazard identification, ES&H requirements and performance measures.
 - < ALARA Program (include how it was applied during planning).
 - < Occupational exposure estimates.
 - < Emergency preparedness and response program.
 - < Environmental compliance program, including any mitigation actions commitments.
 - < Safety analysis and review of decommissioning activities.

- **Waste Management**
 - < Waste minimization.
 - < Waste handling, packaging, transport and disposal.
 - < Waste estimates.

- **Final Site Survey**
 - < Plans and criteria.
 - < Independent verification.

- **Attachments (typical items):**
 - < Activity specification.
 - < Engineering studies.
 - < Details of Work Breakdown Structure.
 - < Details of cost estimates.
 - < Details of schedule.

LESSON LEARNED

Personnel contamination events can be significantly reduced by careful planning, training, analysis, and execution of tasks.

The ROVER area at the Idaho National Environmental and Engineering Laboratory (INEEL) is an inactive experimental fuel reprocessing facility that has been shut down since the early 1980s. The ROVER Deactivation Project included dismantlement of piping systems and processing vessels to recover residual uranium-bearing material.

Throughout the project, personnel entered the facility more than 800 times, resulting in only one personnel contamination event. Contamination events were minimized by considering the potential for contamination during project design; conducting dry runs and testing; providing health and safety training, including training on donning and doffing procedures; and ensuring that a health physicist would assist with the doffing sequence.

Personnel contamination events frequently cause project delays and increase project costs. The avoidance of such incidents during the ROVER Dismantlement Project contributed to the project's completion six months ahead of its 3-year schedule, under its \$20 million budget, and well within its 52 person-rem worker exposure target.

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2. Review existing safety analyses associated with the decommissioning project scoping document and revise as necessary to reflect the specified activities of the decommissioning project plan.

DOE-STD-1120-98, *Integration of Environment, Safety, and Health into Facility Disposition Activities* provides guidance for integrating and enhancing worker, public, and environmental protection during facility disposition activities. It also supports the implementation of an ISMS during facility disposition activities consistent with the guiding principles and core functions contained in DOE P 450.4, *Safety Management System Policy*, and DOE G 450.4-1, *Integrated Safety Management System Guide*.

LCAM and the *Decommissioning Implementation Guide* recommend that the decommissioning project plan describe work to be performed during decommissioning and methods to be used to accomplish it. The ES&H considerations associated with the use and management of subcontractors should also be considered in the ISMS approach discussed in the decommissioning project plan to ensure that subcontractor ES&H programs are in place, adequate and monitored.

Typically, facility hazard analyses are performed during the planning phases of a decommissioning project and are included in the decommissioning project scoping document, but a task-specific analysis of hazards is not conducted until the development of the decommissioning project plan. An analysis of individual tasks or jobs (i.e., discrete units of work that when combined comprise a project) should be conducted to understand the impact from worker's interactions with hazards that may be introduced as a result of specific work tasks. This analysis supports the development of work packages or other methods used in planning tasks. These task hazard analyses should be conducted throughout the life of the project as decommissioning tasks are planned and scheduled.

DOE-STD-1120-98 and DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees* and its implementation guide DOE G 440.1-1 provide guidance on the evaluation of worker hazards.

For decommissioning projects, LCAM specifies that decommissioning be conducted as a CERCLA non-time-critical removal action. Under 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response* (HAZWOPER), preparation of a HASP is required to ensure adequate controls for worker safety during the conduct of decommissioning activities conducted under CERCLA authority. The HASP should be updated in a timely manner to reflect newly identified job hazards and work site conditions, as needed, to verify that work can be conducted safely.

Guidance for the preparation of site-specific HASPs may be found in DOE-EM-STD-5503-94, *EM Health and Safety Plan Guidelines*. The information requirements for a HASP include:

- Introduction. The introduction describes the site the HASP will encompass and its applicability to operations.
- Key Personnel. Key personnel responsible for the overall safety and health effort at decommissioning activities are identified at the DOE, contractor and subcontractor level.
- Hazard Assessment. A hazard assessment should be utilized to identify inherent or potential hazards which may be encountered in the work environment associated with accomplishing a decommissioning activity.
- Training. Different levels of training are required, depending on the task to be performed. Additionally, pre-entry briefings to sites should be given, and documentation of training and pre-entry briefings should be maintained.
- Personal Protective Equipment (PPE). Appropriate PPE is required to protect the health and safety of workers from chemical, physical, radiological, and biological hazards that may be encountered.
- Temperature Extremes. Guidance should be developed to identify hazards associated with temperature extremes, how to evaluate the potential for temperature related disorders and conditions, and actions to address these hazards.
- Medical Surveillance. Medical surveillance of workers is necessary to protect the health of the worker, establish fitness for duty, and ensure documentation of exposure to hazardous materials.
- Exposure Monitoring and Air Sampling. The monitoring component of the HASP is based on all chemical, physical and radiological hazards identified in the site characterization.
- Site Control. The site control program is used to control the movement of people and equipment in order to minimize worker exposure to hazardous substances.
- Decontamination. Decontamination of personnel and equipment is accomplished following the guidelines of the EPA's "Standard Operating Safety Guide" which establishes the decontamination layout and required procedures based on the level of PPE used at the site.
- Emergency Response/Contingency Plan. A site Emergency Response Plan should be developed in accordance with requirements of 29 CFR 1910.120(1).
- Emergency Action Plan. An emergency action plan should be developed if employees are expected to evacuate the site and not participate in emergency response activities.

- Confined Space Entry. Guidelines for confined space entry procedures are derived from 29 CFR 1910.146, American National Standards Institute Recommendation Z117.1-1989, and applicable DOE orders.
- Spill Containment. Procedures should be developed to contain and isolate the entire volume of a hazardous substance spill and minimize worker exposure to such spills.

To provide a mechanism for the independent review and approval of the plans and procedures related to decommissioning activities, a planning and review committee may be established at the DOE site consisting of technical, operating, and safety personnel. This group should be independent of the decommissioning project group, and should review proposed plans and procedures and resolve differences that may arise regarding methods of operation.

3. Coordinate with regulators and the public in accordance with local agreements, requirements, DOE guidance, and permits.

The completed decommissioning project plan should be coordinated with the regulators and the public in accordance with DOE policy and guidance.

The DOE site designated public liaison should determine the most appropriate method for making the decommissioning project plan available to the regulators and the public consistent with the site's public participation plan. In the event a responsible DOE Operations Office needs other assistance determining how to make the decommissioning project plan available to the public, Operations Office personnel should contact the appropriate Headquarters lead program office.

4. Establish release criteria, using the ALARA process, for real and non-real property associated with the decommissioning project.

LESSON LEARNED

Safe Work Plans should address the possibility that pipes may contain residual product or potentially hazardous substances.

At the Weldon Spring Site, orange oxide spilled from both ends of a pipe during dismantlement activities, resulting in about one gallon of the substance dissipating onto the roof of a baghouse. The site's Safe Work Plan was later revised to address the potential for and removal of residual product from pipes. The initial work plans for all pipe decommissioning projects should include precautions that prevent spills of residual product and protect workers from exposure to potentially hazardous substances.

"Yellow Alert WSSRAP - 95-010." Weldon Spring Site Remedial Action Project (WSSRAP), Environment, Safety, Health. [Lessons Learned Alerts](#).

DOE Order 5400.5, *Radiation Protection of the Public and Environment* establishes standards and requirements with respect to protection of the public and the environment from radiation exposures.⁶

Chapter IV, "Residual Radioactive Material," of Order 5400.5 establishes radiological protection requirements applicable to cleaning up residual radioactive material at DOE sites and managing the resultant wastes and decontaminated real and non-real properties. If property is to be released from DOE control, Order 5400.5 requires that the release comply with a public dose limit of 100 mrem in a year from all sources and pathways, except medical and background. Compliance with the all-sources dose standard (i.e., 100 mrem/yr) is typically ensured by calculating derived concentration guidelines (DCGLs) using both the all-sources standard and a single-source dose constraint that is a fraction of the all-sources standard (e.g., 30 mrem/yr). Release limits are then established by applying ALARA considerations to the DCGLs.

DOE guidance and the proposed 10 CFR Part 834 also require that DOE sites complete the following four actions to protect the public and environment before release of real and non-real property containing residual radioactive material:

Real property refers to land, improvements on land, and usually, equipment or fixtures (such as plumbing, electrical, heating, built-in cabinets, and elevators) that are installed in a building in a more or less permanent manner, or that are essential to the building's primary purpose.

Non-real property refers to property that does not fall within the definition of "real property." Examples of non-real property are reusable office and industrial furniture and equipment, reusable tools, recyclable scrap metal, and recyclable concrete.

DOE-Approved Release Limits

For the purpose of this Handbook, the term "release limits" refers to authorized limits, supplemental limits, or both, depending on the context. "Authorized limits" are limits on the concentrations of residual radioactive material on the surfaces or within property that have been derived consistent with the ALARA process, given the anticipated use of the property (either restricted or unrestricted), and have been authorized by DOE to permit the release of the property from DOE control. "Supplemental limits" are also limits on the concentrations of residual radioactive material on surfaces or within property that have been derived consistent with the ALARA process, but supplemental limits are developed only when circumstances exist that cause seemingly applicable, existing authorized limits to be inappropriate or impracticable to apply.

⁶ On March 25, 1993, DOE proposed to codify and clarify Order DOE 5400.5 in *Notice of Proposed Rulemaking and Public Hearing, Radiation Protection of the Public and the Environment*.

1. The property is appropriately surveyed/measured to identify and characterize its radiological condition,
2. Residual radioactive material is determined to meet applicable release limits,
3. Required documentation is completed, and
4. The owner or recipient of the released property is appropriately notified of the radiological status of the property and the availability of required documentation.

Regarding item 2, Order 5400.5 specifies release criteria for gamma radiation exposure rates in habitable structures and on open lands, and release criteria for:

1. Specified residual radionuclides in air and water,
2. Specified residual radionuclides in soil,
3. Specified residual radionuclides on surfaces, and
4. Airborne radon decay products.

However, even in circumstances where such release criteria apply (i.e., the only contaminants present are among those for which release criteria are specified), a site-specific determination must be documented that doses to individual members of the public from property released pursuant to the criteria will be ALARA. A graded approach should be used to decide the complexity of the evaluation necessary to make such a determination. In other words, the level of detail for the analyses should be determined consistent with the complexity of the release and its potential to create risk to human health and the environment.

In circumstances where the release criteria stated in Order 5400.5 do not apply (e.g., a contaminant is present for which the Order specifies no release criteria), or are inappropriate (e.g., the future-use assumptions associated with the release criteria specified by the Order do not apply to the actual circumstances encountered), DOE must approve site-specific authorized or supplemental release limits developed using the ALARA process.

To derive site-specific guidelines for soils and buildings, 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 Order 5400.5.

In addition to complying with the requirements of Order 5400.5, DOE and DOE contractors are required to comply with legally applicable rules and regulations of other Federal, State, and local agencies when releasing property containing residual radioactive material.

Figure 1 illustrates a process developed by the Ohio Federal Facilities Forum Cleanup Standards Committee, including Mound and Fernald, to facilitate decisions about unconditional release by Federal agencies of buildings containing residual radioactive material. Although developed specifically for Federal facilities in Ohio, this process is sufficiently generic that it could be tailored for use elsewhere.

With respect to radiological characterization, the Ohio process defines a building as radiologically clean if an appropriate survey establishes that surface contamination does not exceed the surface activity concentrations or dose constraints specified in NRC Regulatory Guide 1.86 or Order 5400.5.

Figure 2 illustrates a process for satisfying both Order 5400.5 and future 10 CFR Part 834 property release restrictions when a DOE facility or activity proposes to release non-real property containing residual radioactive material for reuse and recycle. This release process is presented in the *Draft Handbook for Controlling Release for Reuse or Recycle of Non-Real Property Containing Residual Radioactive Material*.

Figure 1.

Summary Process for the Disposition of Buildings That Have Potential or Actual Radiological Contamination [Source: "Development of a Process for the Disposition of Buildings with Actual or Potential Radiological Contamination," by A. Spesard et al., WM'97 Proceedings on CD-ROM, Paper #21-48 (1997)].

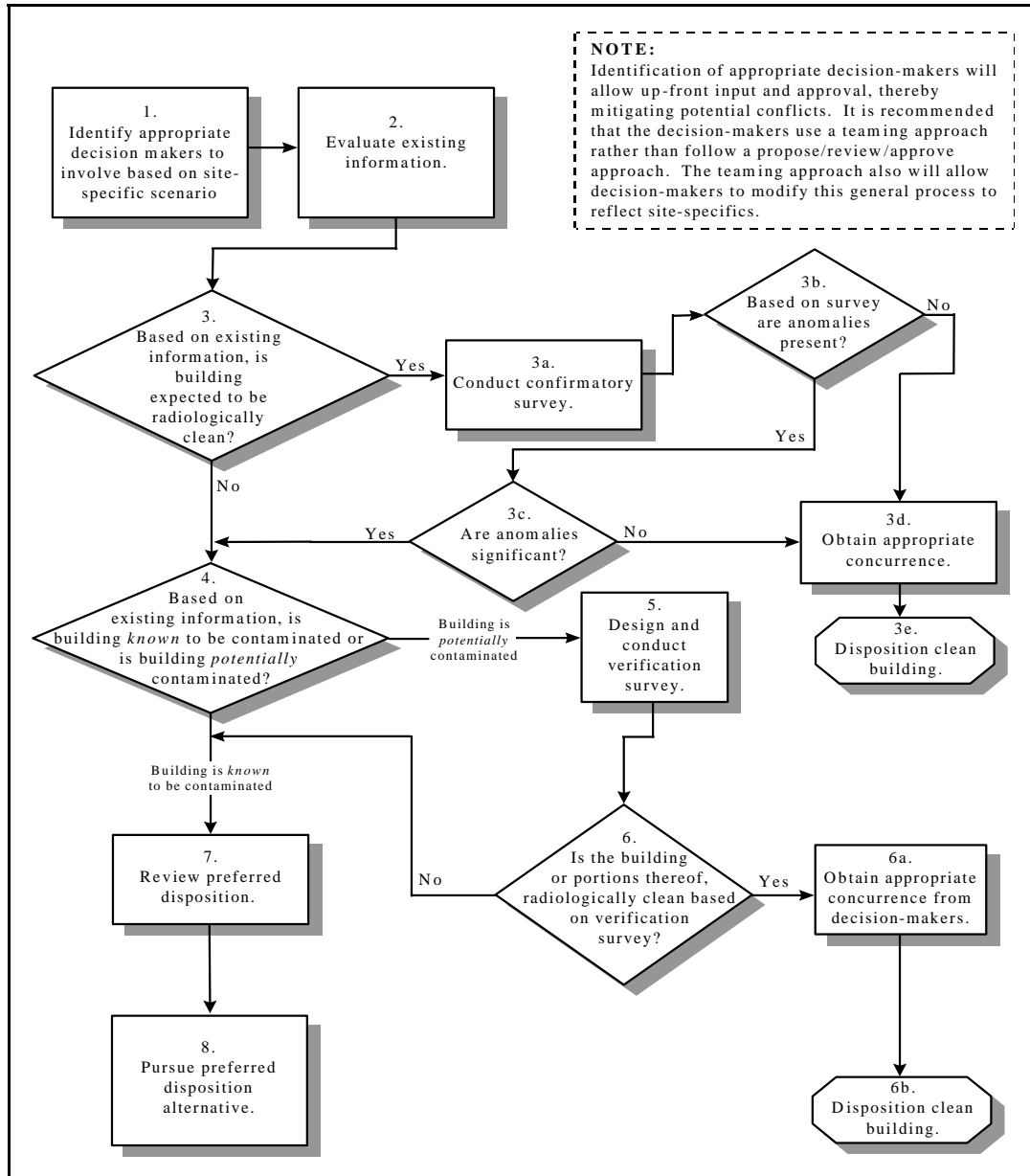
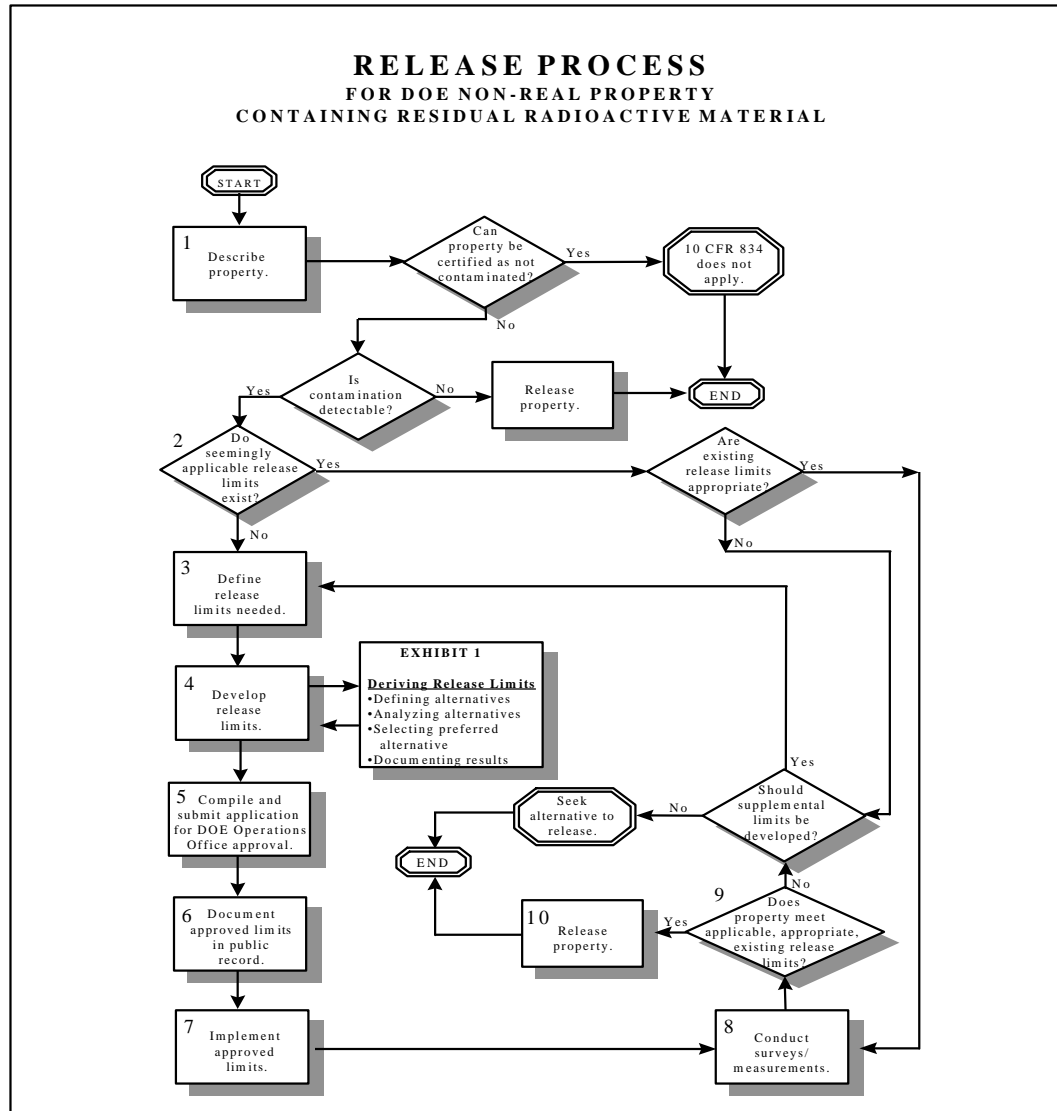


Figure 2

Release Process for DOE Non-Real Property Containing Residual Radioactive Material [Source: *Draft Handbook for Controlling Release for Reuse or Recycle of Non-Real Property Containing Residual Radioactive Material* (June 1997)]



5. Replace the decommissioning project scoping document with the decommissioning project plan which becomes the technical specifications for performing the work.

When it is completed and approved, the decommissioning project plan will replace the decommissioning project scoping document, constituting the new technical, cost, and schedule baselines for the project, and will become the technical specifications for performing the decommissioning work. Change control starts with the project's baseline being well defined and formally approved. Proposed changes to the project's baseline require approval by only the designated authorized official, as outlined in Standard Operating Practice and Procedure 2.2.2, *Managing Baseline Change Control*, which can be found in the EM-40 *Project Management Notebook*. Proposed changes should be well evaluated to identify, define, and resolve interface issues. Retroactive changes should not be made except to correct errors. Required changes should be made in a timely manner. Guidance on management of change is available in DOE-STD-1120-98, Section 3.3.5, "*Management of Change*."

6.2 Step 17 - Conduct and Document Readiness Review

The purpose of the readiness review, which should be performed by an independent organization, is to ensure that appropriate procedures are in place to effectively implement the decommissioning project plan. The readiness review confirms, before decommissioning operations start, that workers are trained and that the organization performing the decommissioning operations is prepared.

A graded readiness review should be conducted to ensure that all the necessary activities (e.g., safety and health, project plans, environmental management, training, project management) have been completed and documented prior to start of the decommissioning operations. The readiness review is necessary to ensure that all hazards have

LESSON LEARNED

The Operational Readiness Review process can be improved by applying lessons learned from previous reviews.

Based on observations of reviews conducted at other sites, staff at DOE's Y-12 Plant recommended the following guidelines for improving the Operational Readiness Review process:

- Reviews should not be conducted to achieve readiness, but rather to *verify* readiness.
- Take corrective action when deficiencies are discovered in the review process.
- Problems can be prevented by providing the Implementation Plan to oversight groups early, and ensuring that the Plan encompasses all required core objectives.
- The review is not a substitute for a routine, independent assessment at a site.
- The structure of the final report should be communicated to the review team before beginning the on-site review.

"Operational Readiness Review Process Improvement Recommendations," Lockheed Martin Energy Systems, Inc.; Y-

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. Requirements and guidance for performing readiness reviews are provided in DOE O 425.1, *Startup and Restart of Nuclear Facilities*, and DOE-STD-3006-95, *Planning and Conduct of Operational Readiness Reviews*. DOE-STD-1120-98 provides guidance for evaluating readiness during facility disposition activities to supplement the project management requirements and associated guidelines contained in LCAM and its corresponding implementation guides.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.4, Step 17, of the *Decommissioning Implementation Guide*:

1. Select organization to perform the readiness review.

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 overall responsibility of the readiness review team is to examine the aspects of the decommissioning activity and to assure themselves, management, and the DOE that the equipment, procedures, and personnel associated with the decommissioning activity are ready to begin a safe operation. The size and expertise of the readiness review team will depend upon the complexity of the decommissioning project, schedule requirements, and the scope of the review. Qualifications will be based upon expertise associated with decommissioning requirements and activities.

2. Prepare procedures, manuals, and training of personnel to perform readiness review.

The scope and rigor of activities necessary to determine "readiness" of a facility to undergo decommissioning will vary depending on the type and magnitude of hazards present, the complexity of the work to be performed, and the extent to which any previous readiness evaluations addressed facility disposition work activities and hazards.

DOE-STD-3006-95 provides detailed guidance in the preparation and conduct of readiness reviews. Guidance is provided for conducting Operational Readiness Reviews, as well as, Readiness Assessments associated with the restart or startup of a DOE nuclear facility.

3. Conduct readiness review(s) in accordance with decommissioning project plan.

The processes involved in the conduct of a readiness review may include all of the following actions depending upon the complexity of the decommissioning project and whether the readiness review is an Operational Readiness Review or a Readiness Assessment.

- Guidance on determining when to conduct an Operational Readiness Review or a Readiness Assessment is provided in DOE-STD-3006-95.
 - < Decommissioning Project Plan identifies need for readiness review;
 - < Prepare Plan-of-Action;
 - < Prepare Implementation Plan;
 - < Conduct Readiness Review;
 - < Document Results of Review;
 - < Develop Corrective Action Plans;
 - < Perform Action Tracking and Conduct Closure Methodology;
 - < Prepare Final Report; and
 - < Prepare Readiness to Proceed Memorandum.

While Operational Readiness Reviews require the development of an Implementation Plan to describe the breadth and depth to which the review will be performed, the Readiness Assessment may only require a simple checklist as presented in Appendix J of DOE-STD-1120-98.

4. Document results and conclusions of readiness review(s).

Upon completion of the readiness review a final report should be prepared which contains a brief summary of the activities reviewed, the conclusions reached, the basis for these conclusions, and the findings identified. The final report will make a statement as to whether decommissioning can proceed safely. In addition, all identified non-compliances and schedules for gaining compliance are identified and formally approved. The final report should include a Section describing lessons learned, including a discussion of both technical issues and processes identified. Differing professional opinions, observations, and non-judgmental general comments of the review team may also be presented in the final report. Content and format for the final report is presented in DOE-STD-3006-95.

5. Establish schedule and validation process for completion of open items identified in the readiness review(s) prior to start of affected decommissioning operations.

Upon completion of the readiness review and the finalization of the report, an action plan of all findings should be prepared. The action plan should contain the following elements:

1. Each finding, as written in the final report, and whether the finding is applicable prior to or after decommissioning gets underway;
2. A detailed proposed action plan for addressing deficiencies identified in each findings;
3. The proposed dates by which the actions to address each finding will be completed; and
4. If the finding is applicable after decommissioning gets underway, a description of the risks and mitigating actions, if any, to be taken during the interim which will reduce the risks associated with that finding.

Procedures to closeout findings should be documented in a facility wide requirement or within the Readiness Review Implementation Plan. These procedures should provide for monitoring and satisfactory closure of findings, including verification of closure by appropriate facility management. The procedures should require records that include the following information:

- Each finding, as written in the final report, and whether the finding is applicable prior to or after decommissioning gets underway;
- The actions proposed in the action plan and developed, submitted, and approved with the action plan completion schedule;
- A brief description of the actual corrective action taken and reasons for concluding that the corrective action(s) taken effectively addressed the finding and how referenced documents support the corrective action.;
- Signatures of appropriate facility management on appropriate forms; and
- DOE verification of completed action.

DOE-STD-3006-95 provides guidance for the satisfactory closure of findings identified in the readiness review(s) prior to start of affected decommissioning operations.

7.0 Decommissioning Operations

7.1 Step 18 - Conduct Action to Decommission Facility

Decommissioning activities should be performed to achieve the established end-points and should protect the health and safety of workers and the public and prevent the spread of contamination during decommissioning activities. A management control program should be in place to address changes in the project baseline over time. The management control system implemented should provide a process that integrates the management of funds with other guideline elements to ensure that funding impacts are reflected in project or contract baselines.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.5, Step 18, of the *Decommissioning Implementation Guide*:

1. Perform decommissioning in accordance with decommissioning project plan's scope and objectives.

2. Execute HASP and ISMS.

One of the purposes of decommissioning is to remove hazards so that control and confinement of hazardous substances is no longer needed. During the performance of decommissioning activities, hazardous substances or facility physical conditions may be discovered that have not been analyzed previously in the decommissioning project plan. Therefore, work may be necessary that has not been planned for or included in the existing HASP or ISMS. In order to ensure that the safety basis is current, adequate, and documented, it is important that a management of change (MOC) process be developed. An MOC process should evaluate all proposed activities, changes, and discoveries that may affect facility or worker safety. The MOC process should be developed for all facility classifications (i.e., nuclear, non-nuclear, radiological, and other industrial facilities) and should establish a mechanism for evaluating the significance of any change, the need for additional analysis and safety controls, the documentation affected or required by the change, and the approval and training requirements for implementing the change. An MOC screening and evaluation methodology is discussed in DOE-STD-1120-98.

3. Continue S&M.

The decommissioning stage of S&M should address maintenance and inspection activities to assure that structures intended to contain contamination remain in an acceptable condition, that contamination remains under control, that contamination does not migrate, and that the location, nature, and condition of contamination is known. The S&M program will evolve as facility systems reach their fully decommissioned state.

4. Execute management control program.

According to the formal management control system, all decommissioning projects are to establish technical, schedule, and cost baselines and subsequently update them as required. All projects should have an appropriate formal documented change control process that provides an audit trail from the project's beginning. Change control starts with the project's baseline being well defined and formally approved. Proposed changes to the project's baseline require approval by only the designated authorized official, as outlined in Standard Operating Practice and Procedure 2.2.2, *Managing Baseline Change Control*, which can be found in the EM-40 *Project Management Notebook*. Proposed changes should be well evaluated to identify, define, and resolve interface issues. Retroactive changes should not be made except to correct errors. Required changes should be made in a timely manner to minimize impacts on the project.

Current year work plans should also be prepared to be used as baselines in comparisons to evaluate progress. Decommissioning project managers should also prepare periodic reports to DOE Headquarters Division Directors indicating project progress, technical baseline performance data with variance analysis, and Progress Tracking System Reporting.

Because of the dynamic nature of facility disposition activities, work monitoring and periodic self-assessments are a particularly important aspect of a properly functioning facility disposition ISMS. It is useful to develop project-specific performance indicators and measures to monitor decommissioning work and ES&H performance while conducting decommissioning tasks. Through self-assessments, as required by DOE O 210.1, *Performance Indicators and Analysis of Operations*, Attachment 1, and DOE O 440.1A, Attachment 2, data regarding project, activity, and task performance can be gathered. Insights gleaned from this information should be integrated into project planning and work execution as quickly as practical, so that good practices and lessons learned from previous work can be used for the next project.

Lessons learned from performance measures should also be shared across the DOE complex. DOE O 225.1A, *Accident Investigations*, DOE O 231.1, *Environment, Safety and Health Reporting*, and DOE O 232.1A, *Occurrence Reporting and Processing of Operations Information*, require that information related to accidents, mishaps, and near-misses be reported and disseminated throughout the DOE complex to help prevent similar situations from being repeated.

Consistent with DOE Order 5700.6C, *Quality Assurance*, decommissioning practices should be in accordance with applicable requirements of appropriate standards such as ANSI/ASQC E4, and a quality assurance plan (QAP) should be developed and

implemented. Management controls required by DOE Order 5700.6C provide for achievement of quality in a planned and systematic manner. These systems include:

1. Quality verification and oversight activities that demonstrate the completeness and appropriateness of achieved quality;
2. Processes for planned and periodic assessments to result in improving items, processes, and quality;
3. Adequate, valid, and traceable data;
4. Assurance that structures, systems, processes, or components will perform intended functions; and
5. Assurance that an activity is performed to specified requirements.

5. Execute waste management program.

The decommissioning project plan should contain a waste management project plan (WMPP) for characterizing waste, estimating quantities of waste generated, minimizing waste generated, and processing, packaging, storing, and transporting waste generated throughout the decommissioning project. Qualifications, training, roles and responsibilities, and ES&H requirements for personnel dealing with waste should also be included in the WMPP.

Waste generated by a decommissioning project can be characterized through a three-stage approach looking at past, present, and potential future waste streams associated with the decommissioning project. The first stage, a waste stream classification stage, is conducted during engineering and planning and may include pertinent data from S&M activities. The second stage is performed along with the decommissioning operations. This stage involves nondestructive examination/nondestructive assay (NDE/NDA) requirements and input that must satisfy the disposal facility's waste acceptance criteria. The final stage also is performed during the decommissioning work. This stage provides an overview of potential requirements for radiochemistry and RCRA sampling and analyses. It evolves from the combined input of stages one and two, and requires analytical laboratory support. These analytical results help determine processing, certification, handling, safety, storage, and transportation requirements.

Waste stream characterization begins with historical site information, radiometric surveys, initial plans for radiochemistry and RCRA sampling and analysis. Information on the type of operations conducted at the decommissioning site is very important in determining sampling strategies. As much detail as possible should be provided when describing the source of contamination or waste generating operation. This will ensure that the following matters will be accurately identified:

DECOMMISSIONING OPERATIONS: Step 18 - Conduct Action to Decommission Facility

- Pollution prevention and waste minimization;
- Waste treatability groups;
- Health and safety hazards; and
- Facility and equipment needs.

Comprehensive waste stream inventories need to be developed before a complete inventory of waste stream constituents and waste form matrices can be established. Waste already in storage as a result of decommissioning activities also are to be included. Waste form matrices should consider solids, liquids, gases/vapors, soils and sludges. For each decommissioning project, waste streams should be separated into the following categories to assist in waste management:

- Sanitary waste
- Radioactive waste
- Hazardous waste
- Mixed waste
- Spent nuclear fuel

Waste streams should be further categorized into treatability groups that share similar treatment needs based on waste characteristics. A Treatability Guide was published in September 1995 to support the Federal Facility Compliance Act mixed waste inventory report. As waste is generated during the decommissioning project, it should be segregated by type of waste and treatability groups.

In determining the quantity of wastes generated during the decommissioning project, consideration should be directed at ways to eliminate or reduce waste generation. The *Pollution Prevention and Waste Minimization Guidance for Environmental Restoration Activities* provides examples of waste reduction opportunities. Article 442, "Waste Minimization," of the *Radiological Control Standard* should be consulted for requirements in this area. Additionally, techniques for performing decontamination should be considered along with methods to prevent or minimize waste generation.

For ease of handling and transport, waste should be placed in packages which are easily handled. The packaging process should consider weight and size of the waste. Final disposition of the waste also may dictate initial packaging requirements. Waste should initially be packaged such that it is not necessary to reopen the package prior to shipment. Waste container contents should be adequately characterized by the waste producer as the waste is being generated and packaged. This characterization may include the type of material, location of the waste generator, and the physical and chemical characteristics of the waste.

A facility or location may need to be established at the site or DOE facility to store waste packages that have been generated during decommissioning. This location should allow separate storage for each waste stream and for each waste form. This will minimize the handling of this waste for processing and disposal.

Waste generated during the decommissioning process may need to be processed prior to its disposal. Solid radioactive waste is routinely processed for volume reduction. Any that cannot be compacted is normally either decontaminated or disposed of, depending on a cost analysis.

Article 423, "Transportation of Radioactive Material," in the *Radiological Control Standard* addresses transportation of radioactive waste.

Each Field organization should develop and maintain a historical record of waste generated, treated, stored, shipped, and disposed at the facility under its control. Waste manifest records should be kept and accompany each waste package from generation through final disposal. After decommissioning operations are complete, waste management documentation updates to the project data package should be retained permanently in the DOE facility's archives. The project data package cannot be completed until waste disposal documentation is complete.

7.2 Step 19 - Conduct S&M Phase-Out

During the operations stage of decommissioning, S&M continues while actions are taken to achieve the decommissioning end-points. As end-points are successfully accomplished, S&M is either phased out in a manner identified in the decommissioning project plan, or converted to long-term, post-decommissioning S&M. Finally, appropriate surveys are conducted to demonstrate that decommissioning end-points have been met, and a final report is prepared.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.5, Step 19, of the *Decommissioning Implementation Guide*:

1. Conduct continuing reviews of S&M plans and activities, and update as needed to ensure continued maintenance of human safety and environmental protection during the decommissioning activities. S&M activities conducted during the decommissioning project may include the following:

- Daily health physics surveys in work areas;
- Daily health physics surveys in the radiation control areas;
- Daily monitoring of used equipment and disposable clothing;
- Daily source checks at radiation monitors e.g., hand and shoe monitors;
- Daily change out of filters in air monitors; and

- Weekly health physics surveys in radiation control areas where work was not being performed.

2. Phase-out the S&M activities in accordance with the decommissioning project plan.

7.3 Step 20 - Close Out Project and Complete Decommissioning Project Final Report

In order to release a decommissioned facility or site for use with or without radiological restrictions, it is necessary to verify, and in some cases certify, that the decontamination has been completed in accordance with DOE-approved criteria established for the project. In addition, several documents should be prepared including the final project report, the record of completion, certification docket, and the project data package. 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.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.5, Step 20, of the *Decommissioning Implementation Guide*:

1. Conduct appropriate close-out surveys (e.g., radiological, chemical, and independent verification) to demonstrate and verify decommissioning objectives have been achieved.

Planning and documentation for verification and certification of the completion of decontamination activities should begin early in the project phase so that deficiencies can be noted and corrected early rather than at the end of the project.

The ultimate goal of any decommissioning action is to ensure that resulting radiological and chemical conditions at the facility or site comply with established criteria, standards, or guidelines, and that the public and environment are thereby protected. To ensure that this goal is met, a process of verification should be performed for all decommissioning projects.

The purpose of verification is to validate the accuracy and completeness of the project's stated end condition and field measurements, and attest to the credibility of the procedures followed during the cleanup and certification operations.

The purpose of certification is to ensure that the resulting radiological, hazardous and toxic contamination conditions at the decommissioned facility comply with established criteria, standards, and guidelines and that the public and the environment are protected.

DECOMMISSIONING OPERATIONS: Step 20 - Close Out Project and Complete Final Report

The requirements and activities associated with verification and certification and the content of the certification docket are described in Appendix F. These requirements could be modified by the fact that individual decommissioning projects, performed under CERCLA removal actions, may not be final cleanup at a particular site or location. In those instances, independent verification and certification may not be required until cleanup action is complete.

2. Continue those S&M activities required for long-term remedial action or continuing site control pending final release or transfer of the property or facility.

If continued surveillance, radiological or institutional control is necessary, the DOE Field Office should ensure that the level of control that will be provided is adequate to protect the environment and the health and safety of workers and the public.

3. Prepare a decommissioning project final report, record of completion, and project data package.

Following completion of the planned decommissioning work, a Final Project Report should be prepared, which provides an overview of the project activities, accomplishments, and final facility status. The Final Project Report should be prepared by the Field Office and, if appropriate, reviewed and approved by the DOE Headquarters' program manager. The Final Project Report should contain the following information:

1. Background including facility history and project purpose.
2. Facility description including buildings and systems and pre-decommissioning status (facility condition including radiological and toxicological contamination)
3. Decommissioning and remedial action objectives including work scope (e.g., technical approach).
4. Work performed (accomplished) including:
 - Project management;
 - Project engineering;
 - Site characterization;
 - Alternatives assessment;
 - Site preparation;
 - Decommissioning operations;
 - Waste disposal;
 - Post-decommissioning radiological survey; and
 - Post-decommissioning hazardous chemical condition.

DECOMMISSIONING OPERATIONS: Step 22 - Establish LTM and/or Transfer to Remedial Action

5. Costs and schedules.
6. Waste volumes generated.
7. Occupational exposure to personnel.
8. Final facility or site condition.
9. Lessons learned, conclusions, and recommendations.
10. References.
11. Acronyms and abbreviations listings.

Upon completion of the project, a formal record of completion should be assembled. At a minimum, the record of completion should include photographs of the actual characterization and decommissioning work, a final radiation survey, a final hazardous chemical survey, if applicable, the Final Project Report, records of the completed action, independent verification survey, and any other pertinent site release information. For remote, sites, the certification docket and appropriate public notices should be included.

In some cases, the completed decommissioning action simply requires a transfer of landlordship from one DOE organization to another. If a site is not located on a Federal reservation, the formality required for site surveys and certification may be much greater than if the site is on a DOE reservation. All properties or facilities being transferred to industry to the public should have all formal site surveys, independent verification and certification reports reviewed and approved by DOE HQ prior to their release or transfer. If any remedial action work under CERCLA is to follow facility the facility decommission work, the certification of the decommissioning work should be combined with the certification of the remedial action work and incorporated into the final record of completion for the facility. The final condition of a facility or site should be officially recorded with the local land records or deeds. Final decision for record retention and final disposition is the responsibility of the respective Field Office.

The project data package provides a complete documented history of the project. A list of all pertinent documentation should be prepared in the early planning stages and updated and maintained throughout the project. Under DOE O 5820.2A, *Radioactive Waste Management*, the minimum requirements for the project data package include: the record of completion, the final radiological and hazardous chemical survey report; the Final Project Report; an independent verification survey report; the certification docket; and appropriate public notices. Upon completion, the full project data package should be retained permanently in the Field Office archives.

7.4 Step 21 - Post-decommissioning Action: Further Action Required

DECOMMISSIONING OPERATIONS: Step 22 - Establish LTM and/or Transfer to Remedial Action

Completion of decommissioning operations may not always finish the disposition phase of a DOE facility's life-cycle. Prime examples of this are facilities located at NPL sites where site plans and future land and facility uses require follow-on remedial action for soils and water bodies to complete the cleanup and are consistent with any longer term remedial activity anticipated at a site. For such facilities, the disposition phase of the life-cycle must include a post-decommissioning stage.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.6, Step 21, of the *Decommissioning Implementation Guide*:

1. Determine need for post-decommissioning activities.

Additional post-decommissioning activities may be required based upon environmental regulatory requirements under CERCLA or RCRA (if decommissioned facility is included in a RCRA-permitted facility or is otherwise subject to RCRA requirements), future land and facility uses, and agreements between DOE Program Offices. Actual post-decommissioning activities may include continuing site control activities, as necessary, pending property or facility release or transfer to another authorized party; or administrative actions consistent with the decommissioning end state and/or site plan.

7.5 Step 22 - Establish Long-Term Monitoring and/or Transfer to Remedial Action

Long-term monitoring and or remedial action may be required to comply with site plans, and regulatory and administrative requirements.

The following recommended actions and ensuing suggested practices and procedures, are consistent with Section 4.6, Step 22, of the *Decommissioning Implementation Guide*:

DECOMMISSIONING OPERATIONS: Step 22 - Establish LTM and/or Transfer to Remedial Action

1. Establish long-term monitoring.

An example of a facility requiring long-term S&M involves the decommissioning alternative which leaves contaminated materials entombed or otherwise contained onsite. In such cases, the post-decommissioning S&M plan should be tailored to provide for physical safety and security of the facility and to assure compliance with restricted end conditions established for that facility. This is typically a low-cost program that could continue for many years into the future.

2. Transfer to remedial action program.

Sites may be transferred to remedial action for final cleanup of adjacent soil or groundwater in accordance with environmental regulatory requirements and future land and facility uses.

Appendix A: Authorities

Appendix A lists authorities cited in this Handbook that were consulted.

Atomic Energy Act (AEA) of 1954, Public Law 83-703, 68 Stat. 919, as amended.

Clean Air Act, P.L. 90-148, as amended.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Title I, Public Law 96-510, 42 United States Code (U.S.C.) §§ 9601 - 9626, December 11, 1980, as amended.

Clean Water Act as amended by the *Federal Water Pollution Control Act of 1972*, P.L. 92-500, as amended.

Coastal Zone Management Act of 1972, P.L. 92-583, October 27, 1972, 16 U.S.C. 1451 et seq., as amended.

U.S. Department of Energy, *Radioactive Waste Management*, Order DOE 5820.2A, September 26, 1988.

U.S. Department of Energy, Order DOE 4700.1, *Project Management System*, Chg. 001, June 2, 1992.

U.S. Department of Energy, *Nuclear Safety Analysis Report*, DOE Order 5480.23, April 10, 1992 (Effective April 30, 1992).

U.S. Department of Energy, *Radiation Protection of the Public and the Environment*, Order DOE 5400.5, Chg. 2, January 7, 1993.

U.S. Department of Energy, *Radiation Protection of the Public and the Environment, Notice of Proposed Rulemaking and Public Hearing*, 58 FR 16268, March 25, 1993.

U.S. Department of Energy, *Public Participation*, DOE P 1210.1, July 29, 1994.

U.S. Department of Energy, Office of the Secretary of Energy, *Policy Statement on the National Environmental Policy Act*, June 14, 1994.

U.S. Department of Energy, *EM Health and Safety Plan Guidelines*, DOE-EM-STD-5503-94, December 1994.

U.S. Department of Energy, DOE O 430.1, *Life-Cycle Asset Management [LCAM]*, Chg. 1, October 26, 1995.

U.S. Department of Energy, DOE O 430.1A, *Life-Cycle Asset Management [LCAM]*, October 14, 1998.

U.S. Department of Energy, *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*, May 22, 1995.

U.S. Department of Energy, *Decommissioning Resource Manual*, DOE/EM-0246, August 1995.

U.S. Department of Energy, *Startup and Restart of Nuclear Facilities*, DOE O 425.1, Chg. 1, October 26, 1995.

U.S. Department of Energy, *Planning and Conduct of Operational Readiness Reviews (ORR)*, DOE-STD-3006-95, November 1995.

U.S. Department of Energy, *Pollution Prevention and Waste Minimization Guidance for Environmental Restoration Activities*, May 1995 (<http://www.em.doe.gov/poluprev>).

U. S. Department of Energy, *Safety Management System Policy*, DOE P 450.4, October 15, 1996.

U.S. Department of Energy, *Performance Indicators and Analysis of Operations Information*, DOE O 210.1, Chg. 002, May 1, 1996.

U.S. Department of Energy, *Environment, Safety, and Health Reporting*, DOE O 231.1, Chg. 002, November 7, 1996.

U.S. Department of Energy, *Quality Assurance*, Order DOE 5700.6C, Chg. 001, May 10, 1996.

U.S. Department of Energy, *Radiological Control Standard*, DOE-STD-XXXX-96, December 1996 [Draft Standard for Review and Comment].

U.S. Department of Energy, *Implementation Guide for Surveillance and Maintenance During Facility Transition and Disposition*, DOE G 430.1-2, September 1999.

U.S. Department of Energy, *Deactivation Implementation Guide*, DOE G 430.1-3, September 1999.

U.S. Department of Energy, *Decommissioning Implementation Guide*, DOE G 430.1-4, September 1999.

U.S. Department of Energy, Office of Nuclear Material and Facility Stabilization, *Facility Deactivation Guide Methods and Practices Handbook*, DOE/EM-0318, Revision 1, August 1999 (<http://dev.em.doe.gov/em60/deact/methods.html>).

U.S. Department of Energy, 10 CFR Part 1021, *National Environmental Policy Act Implementing Procedures*, 57 FR 15144, April 24, 1992, as revised and amended.

U.S. Department of Energy, 10 CFR Part 830, *Nuclear Safety Management*, as amended

U.S. Department of Energy, *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*, DOE/EIS-0200-F, May 1997.

U.S. Department of Energy, *Integrated Safety Management System Guide for use with DOE P 450.4, Safety Management System, and DEAR Safety Management System Contract Clauses*, DOE G 450.4-1 (Volumes 1 and 2), November 26, 1997.

U.S. Department of Energy, *Worker Protection Management for DOE Federal and Contractor Employees Guide for use with DOE O 440.1*, DOE G 440.1-1, July 10, 1997.

U.S. Department of Energy, *Draft Handbook for Controlling Release for Reuse or Recycle of Non-Real Property Containing Residual Radioactive Material* (for interim use and comment), DOE-HDBK-xxxx, June 1997.

U.S. Department of Energy, *Accident Investigations*, DOE O 225.1A, November 26, 1997.

U.S. Department of Energy, *Occurrence Reporting and Processing of Operations Information*, DOE O 232.1A, July 21, 1997.

U.S. Department of Energy, *Integration of Environment, Safety, and Health into Facility Disposition Activities*, Volume One: Technical Standard, DOE-STD-1120-98 (May 1998) (Volume 1 of 2).

U.S. Department of Energy, *Worker Protection Management for DOE and Contractor Employees*, DOE O 440.1A, March 27, 1998.

U.S. Department of Energy, U.S. Environmental Protection Agency, and U.S. Department of Defense, *Guidance on Accelerating CERCLA Environmental Restoration at Federal Facilities*, August 22, 1994.

Executive Order 12580, *Superfund Implementation*, January 23, 1987, as amended.

U.S. Environmental Protection Agency, *EPA Memorandum on Enforcement Actions at Federal Facilities Under RCRA and CERCLA*, OSWER Directive No. 9992.0, January 25, 1988.

U.S. Environmental Protection Agency, Final Rule, 58 FR 4821, *Reimbursement to Local Governments for Emergency Response to Hazardous Substance Releases*, January 15, 1993.

U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, RCRA Public Participation Manual, EPA 530-R-96-007, September 1996.

U.S. Environmental Protection Agency, Title 40, *Code of Federal Regulations* (CFR), Part 300, *National Oil and Hazardous Substances Pollution Contingency Plan*, 47 Federal Register (FR) 31203, July 16, 1982, as amended.

U.S. Environmental Protection Agency, 40 CFR Part 300, Appendix B, *National Priorities List*, 47 FR 31203, July 16, 1982, as amended.

U.S. Environmental Protection Agency, 40 CFR Part 264, Subpart G, *Closure and Post-Closure*, 45 FR 33221, May 19, 1980, as amended.

U.S. Environmental Protection Agency, 40 CFR Part 302, *Designation, Reportable Quantities, and Notification*, 50 FR 13474, April 4, 1985, as amended.

U.S. Environmental Protection Agency, 40 CFR 300.125, *Notification and Communications*, 47 FR 31203, July 16, 1982, as amended.

U.S. Environmental Protection Agency, 40 CFR Part 373, *Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property*, 55 FR 14212, April 16, 1990, as revised and amended.

U.S. Environmental Protection Agency, 40 CFR Part 110, *Discharge of Oil*, 52 FR 10719, April 2, 1987, as revised and amended.

U.S. Environmental Protection Agency, *EPA Administered Permit Programs: The Hazardous Waste Management System*, 40 CFR Part 270, 48 FR 14153, April 1, 1983, as revised and amended.

U.S. Environmental Protection Agency, 40 CFR 300.400(b), *Limitations on Response*, 47 FR 31203, July 16, 1982, as revised and amended.

U.S. Environmental Protection Agency, 40 CFR 280, Subpart F, *Release Response and Corrective Action for UST Systems Containing Petroleum or Hazardous Substances*, 53 FR 37194, September 23, 1988, as revised and amended.

U.S. Environmental Protection Agency, 40 CFR Part 124, *Procedures for Decisionmaking*, 48 FR 14153, April 1, 1983, as revised and amended.

Endangered Species Act, P.L. 93-205, 16 U.S.C. 1531, et seq., as amended.

Fish and Wildlife Coordination Act, P.L. 85-624, 16 U.S.C. 661, et seq., as amended.

General Services Administration, 41 CFR Part 101, *Federal Property Management Regulations*, as amended.

National Environmental Policy Act, P.L. 91-190, as amended.

National Historic Preservation Act of 1966, P.L. 89-655, 16 U.S.C. 470, et seq., as amended.

U.S. Nuclear Regulatory Commission, *Termination of Operating Licenses for Nuclear Reactors*, Regulatory Guide 1.86, June 1974.

Resource Conservation and Recovery Act of 1976, Public Law 94-580, October 31, 1976, as amended by Public Law 98-616 adding Section 3004(u), November 8, 1984, 42 U.S.C. 6924(u).

U.S. Army Corps of Engineers, 33 CFR Part 330, *Nationwide Permits*, 51 FR 41254, November 13, 1986.

Appendix B: Guidance References

Appendix B lists other references provided as possible sources of additional guidance on specific topics. Such references may not have been consulted in preparing this Handbook, and are provided solely for the reader's convenience.

Section Number	Section Title or Reference
3.1	<p>Additional Resource Materials for Section 3.1</p> <p>U.S. Department of Energy, <i>Implementation Guide for Surveillance and Maintenance During Facility Transition and Disposition</i>, DOE G 430.1-2, September 1999.</p> <p>U.S. Department of Energy, <i>Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5820.23 and DOE Order 5820.23, Nuclear Safety Analysis Reports</i>, DOE-STD-1027-92.</p> <p>U.S. Department of Energy, <i>Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports</i>, DOE-STD-3009-94.</p> <p>U.S. Department of Energy, <i>Integration of Environment, Safety, and Health Into Facility Disposition Activities</i>, Volume One: Technical Standard and Volume Two: Appendices, DOE-STD-1120-98, May 1998.</p> <p>Advanced Integrated Management Services, Inc. and Parson's Power, Inc., <i>Work Plan for the High Ranking Facilities Deactivation Project at Oak Ridge National Laboratory, Oak Ridge, Tennessee</i>, Rev. 1, ORNL/ER-322, March 1996.</p>
4.1 Item 1	<p>Consult with responsible EPA, State, Tribal, and/or local officials in accordance with local agreements to confirm regulatory roles during further investigations of the suspected release or threatened release.</p> <p>IAGs for the DOE sites listed are available for viewing and downloading on the Internet at http://www.em.doe.gov/ffaa/cercla.html.</p> <p>U.S. Department of Energy, <i>Model Provisions for CERCLA Federal Facility Agreements</i>, Memorandum from Ernest C. Baynard, III, Assistant Secretary, Environment, Safety and Health, May 31, 1988 (http://www.em.doe.gov/ffaa/modlang.html)</p> <p>U.S. Nuclear Regulatory Commission, 10 CFR 30.36, <i>Expiration and Termination of [By-Product Material] Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas</i>, 59 FR 36034, July 15, 1994, as revised and amended.</p> <p>U.S. Nuclear Regulatory Commission, 10 CFR 40.42, <i>Expiration and Termination of [Source Material] Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas</i>, 59 FR 36035, July 15, 1994, as revised and amended.</p> <p>U.S. Nuclear Regulatory Commission, 10 CFR 50.82, <i>Termination of [Production and Utilization Facility] License</i>, 53 FR 24051, June 27, 1988, as revised and amended</p> <p>U.S. Nuclear Regulatory Commission, 10 CFR 70.38, <i>Expiration and Termination of [Special Nuclear Material] Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas</i>, 59 FR 36037, July 15, 1994, as revised and amended.</p>

Section Number	Section Title or Reference
	U.S. Nuclear Regulatory Commission, 10 CFR 72.54, <i>Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas</i> [for the Storage of Spent Nuclear Fuel], 59 FR 36038, July 15, 1994, as revised and amended.
	U.S. Nuclear Regulatory Commission, <i>Standard Format and Content of Decommissioning Plans for Licensees Under 10 CFR Parts 30, 40, and 70</i> (Draft CE 304-4 published 12/1985), Regulatory Guide 3.65, August 1989.
	U.S. Nuclear Regulatory Commission, <i>Standard Format and Content for Decommissioning Plans for Nuclear Reactors</i> , Draft Regulatory Guide DG-1005, September 1989
	U.S. Nuclear Regulatory Commission, <i>Records Important for Decommissioning of Nuclear Reactors</i> , Draft Regulatory Guide DG-1006, September 1989.
4.1 Item 2	If warranted, notify the National Response Center
	U.S. Environmental Protection Agency, 40 CFR 350, <i>Trade Secrecy Claims For Emergency Planning And Community Right-to-know Information: And Trade Secret Disclosures to Health Professionals</i> , 53 FR 28801, July 29, 1988, as revised and amended.
	U.S. Environmental Protection Agency, 40 CFR 355, <i>Emergency Planning and Notification</i> , 52 FR 13395, April 22, 1987, as revised and amended.
	U.S. Environmental Protection Agency, 40 CFR 370, <i>Hazardous Chemical Reporting: Community Right-to-Know</i> , 52 FR 38364, October 15, 1987, as revised and amended.
	U.S. Environmental Protection Agency, 40 CFR 372, <i>Toxic Chemical Release Reporting: Community Right-to-Know</i> , 53 FR 4525, February 16, 1988, as revised and amended.
	U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, <i>Reporting Requirements for Continuous Releases of Hazardous Substances</i> , EPA/540/G-91/003, October 1990.
	U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, <i>Guidance for Federal Facilities on Release Notification Requirements Under CERCLA and SARA Title III</i> , EPA 9360.7-06, November 1990.
	U.S. Environmental Protection Agency, <i>Reportable Quantities</i> , http://www.epa.gov/superfund/oerr/techres/rq/rq.htm , April 15, 1998.
	U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly Office of Environmental Guidance), <i>Reporting Releases of Hazardous Substances Under CERCLA & EPCRA</i> , CERCLA Information Brief, EH-231-001/0490, April 1990.
	U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly Office of Environmental Guidance), <i>CERCLA Reporting Requirements, DOE Occurrence Reporting, and DOE Emergency Management System</i> , CERCLA Information Brief, EH-231-019/1093, October 1993.

Section Number	Section Title or Reference
	U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly Office of Environmental Guidance), <i>Hazardous Substance Release Reporting Under CERCLA, EPCRA §304 & DOE Emergency Management System/Occurrence Reporting Requirements</i> , Environmental Guidance, DOE/EH-0383, June 1994.
	U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly Office of Environmental Guidance), <i>Reporting Continuous Releases of Hazardous and Extremely Hazardous Substances Under CERCLA and EPCRA</i> , Environmental Guidance, DOE/EH-0441, January 1995.
	U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly Office of Environmental Guidance), <i>Clarification of Reporting Requirements Under CERCLA Section 103: Mixtures</i> , Technical Assistance Project, DOE/EH (CERCLA)-9706, June 1997.
4.1 Item 3	If warranted, notify State, Tribal, and Federal natural resources trustees.
	U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly Office of Environmental Guidance), <i>Natural Resource Damages Under CERCLA</i> , CERCLA Information Brief, EH-231-017/0693, June 1993.
	U.S. Department of Energy, Office of Environmental Policy and Assistance, <i>Natural Resource Damage Assessment Implementation Project: Savannah River Site</i> , Technical Assistance Project, DOE/EH-0510, October 1995.
4.2 Item 1	Review existing facility documentation to establish facility status.
	U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly the Office of Environmental Guidance), <i>Removal Actions Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)</i> , Chapter 3, "Release Information," Module A: Gathering Key Information, Environmental Guidance, DOE/EH-0435, September 1994.
4.2 Item 2	Evaluate whether a release or substantial threat of release of a hazardous substance warranting a CERCLA response exists at the facility.
	U.S. Environmental Protection Agency, Memorandum from Francis S. Blake to J. Winston Porter regarding: <i>Scope of the CERCLA Petroleum Exclusion Under Sections 101(14) and 104(a)(2)</i> , OSWER Directive #9838.1, July 31, 1987.
	U.S. Environmental Protection Agency, Emergency Response Program, <i>Hazardous Substances Release Reporting Triggers, Frequently Asked Questions</i> , World Wide Web @ http://www.epa.gov/oerrpage/superfnd/web/oerr/er/triggers/haztrigs/whatsub3.htm .
	U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly the Office of Environmental Guidance), <i>Removal Actions Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)</i> , Chapter 3, "Release Information," Module B: Determining Whether CERCLA Authority Applies, Environmental Guidance, DOE/EH-0435, September 1994.
	U.S. Department of Energy, <i>Integration of Environment, Safety, and Health Into Facility Disposition Activities</i> , Volume One: Technical Standard, DOE-STD-1120-98, May 1998.

Section Number	Section Title or Reference
4.2 Item 3	<p>Evaluate programmatic and cost factors.</p> <p>U.S. Department of Energy, <i>Integration of Environment, Safety, and Health Into Facility Disposition Activities</i>, Volume One: Technical Standard, DOE-STD-1120-98, May 1998.</p> <p>U.S. Department of Energy, Associate Deputy Secretary for Field Management, <i>Cost Estimating Guide</i>, DOE G 430.1-1, March 28, 1997.</p>
4.3 Item 1	<p>Identify and evaluate alternatives to proceeding immediately with decommissioning if a release or substantial threat of release of hazardous substances has been confirmed at the facility.</p> <p>U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly the Office of Environmental Guidance), <i>Removal Actions Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)</i>, Environmental Guidance, DOE/EH-0435, September 1994.</p>
4.3 Item 2	<p>Identify and evaluate alternatives to proceeding immediately with decommissioning if no release or substantial threat of release has been confirmed at the facility.</p> <p>U.S. Department of Energy, <i>Integration of Environment, Safety, and Health Into Facility Disposition Activities</i>, Volume One: Technical Standard, DOE-STD-1120-98, May 1998.</p> <p>U.S. Occupational Safety and Health Administration, 29 CFR 1910.120, <i>Hazardous Waste Operations and Emergency Response</i>, 54 FR 9317, March 6, 1989, as revised and amended.</p>
4.4 Item 1	<p>Conduct S&M according to a current S&M plan throughout each stage of the disposition phase of the facility, and update S&M plans and activities, as needed, before and during all stages of the disposition phase to ensure continued maintenance of human safety and environmental protection.</p> <p>U.S. Department of Energy, Office of Nuclear Material and Facility Stabilization, <i>Facility Deactivation Guide Methods and Practices Handbook</i>, DOE/EM-0318, Revision 1, Chapter 8, "Post-Deactivation Surveillance and Maintenance Planning," August 1999 (http://dev.em.doe.gov/em60/deact/methods.html).</p> <p>U.S. Department of Energy, Office of Environmental Management and Office of Nuclear Material and Facility Stabilization, <i>The Requirements-Based Surveillance and Maintenance Review Guide</i>, DOE/EM-0341, Undated.</p> <p>U.S. Department of Energy, <i>Implementation Guide for Surveillance and Maintenance During Facility Transition and Disposition</i>, DOE G 430.1-2, September 1999.</p>
4.5 Item 1	<p>Prepare decommissioning project scoping document.</p> <p>U.S. Department of Energy, Associate Deputy Secretary for Field Management, <i>Cost Estimating Guide</i>, DOE G 430.1-1, March 28, 1997.</p> <p>U.S. Nuclear Regulatory Commission, 10 CFR 30.36, <i>Expiration and Termination of [By-Product Material] Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas</i>, 59 FR 36034, July 15, 1994, as revised and amended.</p>

Section Number	Section Title or Reference
	U.S. Nuclear Regulatory Commission, 10 CFR 40.42, <i>Expiration and Termination of [Source Material] Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas</i> , 59 FR 36035, July 15, 1994, as revised and amended.
	U.S. Nuclear Regulatory Commission, 10 CFR 50.82, <i>Termination of [Production and Utilization Facility] License</i> , 53 FR 24051, June 27, 1988, as revised and amended.
	U.S. Nuclear Regulatory Commission, 10 CFR 70.38, <i>Expiration and Termination of [Special Nuclear Material] Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas</i> , 59 FR 36037, July 15, 1994, as revised and amended.
	U.S. Nuclear Regulatory Commission, 10 CFR 72.54, <i>Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas [for the Storage of Spent Nuclear Fuel]</i> , 59 FR 36038, July 15, 1994, as revised and amended.
	U.S. Nuclear Regulatory Commission, <i>Standard Format and Content of Decommissioning Plans for Licensees Under 10 CFR Parts 30, 40, and 70</i> (Draft CE 304-4 published 12/1985), Regulatory Guide 3.65, August 1989.
	U.S. Nuclear Regulatory Commission, <i>Standard Format and Content for Decommissioning Plans for Nuclear Reactors</i> , Draft Regulatory Guide DG-1005, September 1989.
	U.S. Nuclear Regulatory Commission, <i>Records Important for Decommissioning of Nuclear Reactors</i> , Draft Regulatory Guide DG-1006, September 1989.
5.1 Item 3	Formulate a list of potential decommissioning alternatives.
	Decommissioning PAM: http://www.em.doe.gov/define/ Deactivation and Decommissioning Focus Area: http://www.fetc.doe.gov/dd/ Gateway to Environmental Technology: http://www.dandd.org/get/ FIU Hemispheric Center for Environmental Technology: http://www.hcet.fiu.edu/
	Argonne National Laboratory, <i>Decontamination and Decommissioning of 61 Plutonium Gloveboxes in D-Wing, Building 212 Argonne National Laboratory - East: Final Project Report</i> , ANL/D&D/TM-96/3, September 1996.
5.1 Item 4	If decommissioning will not be conducted using a CERCLA process, identify any environmental permits and/or NEPA reviews that will be needed.
	U.S. Department of Energy, Office of Environmental Policy & Assistance, <i>RCRA Permitting Guide for Hazardous & Radioactive Mixed Waste Management Facilities</i> , DOE/EH[RCRA]-9705, April 1997.
	U.S. Department of Energy, Office of Environmental Policy and Assistance, Memorandum from Andrew Wallo III to Distribution regarding: <i>Information -- Air Quality Area Designations and Classifications for Department of Energy Facilities</i> , July 14, 1997 (http://tis-nt.eh.doe.gov/oepa/guidance/caa/permits.pdf).
	U.S. Department of Energy, Office of Environmental Policy and Assistance (EH-41), <i>NPDES Storm Water Permitting Regulations</i> , posted December 9, 1997, updated May 5, 1998 (http://tis-nt.eh.doe.gov/oepa/guidance/cwa/strm_may.pdf)

Section Number	Section Title or Reference
	U.S. Department of Energy, Office of Policy and Assistance (EH-41), <i>EH-41 Wetlands Update</i> , posted May 22, 1998 (http://tis-nt.eh.doe.gov/oepa/guidance/cwa/wetland.pdf)
	U.S. Department of Energy, Office of NEPA Policy and Assistance, Memorandum from Brush to Secretarial Officers and Heads of Field Organizations regarding <i>Guidance on National Environmental Policy Act (NEPA) Categorical Exclusion Determinations</i> , January 16, 1998 (http://tis-nt.eh.doe.gov/nepa/tools/guidance/cx-finl.htm)
	U.S. Department of Energy, Office of NEPA Oversight, <i>Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements</i> , May 1993. (http://tis-nt.eh.doe.gov/nepa/tools/guidance/Guidance-PDFs/iv-6.pdf)
	U.S. Department of Energy, Office of NEPA Oversight, <i>Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements</i> , May 1993. (http://tis-nt.eh.doe.gov/nepa/tools/guidance/Guidance-PDFs/iv-6.pdf)
	A number of guidance documents that may be helpful in complying with various aspects of NEPA are available for viewing and downloading at the following Internet address: http://tis-nt.eh.doe.gov/nepa/tools/tools.htm .
	DOE O 451.1A, <i>National Environmental Policy Act Compliance Program</i> (June 5, 1997)
5.2 Item 1	If the facility was characterized as part of deactivation, review deactivation records and documentation to determine the adequacy of the facility characterization data. If the existing data adequately characterize the facility, additional data collection should not be necessary.
	U.S. Department of Energy, Office of Nuclear Material and Facility Stabilization, <i>Facility Deactivation Guide Methods and Practices Handbook</i> , DOE/EM-0318, Revision 1, August 1999 (http://dev.em.doe.gov/em60/deact/methods.html).
	For guidance and other information on the DQO process, the materials available on the Internet at the following address may be useful: http://terrassa.pnl.gov:2080/DQO .
5.2 Item 2	If the facility was not characterized as part of deactivation, or if deactivation records and documentation are not adequate, prepare a characterization plan.
	U.S. Department of Energy Office of Environmental Policy and Assistance (formerly the Office of Environmental Guidance), <i>Streamlined Site Characterization Approach for Early Actions: Impact on Risk Assessment Data Requirements</i> , RCRA/CERCLA Information Brief, EH-231-025/1294, December 1994 (http://tis-nt.eh.doe.gov/oepa/guidance/cercla/streamln.pdf).
	10 CFR 835, <i>Occupational Radiation Protection</i>
	DOE 5400.5, <i>Radiation Protection of the Public and Environment</i>
	DOE 5480.19, <i>Conduct of Operations</i>
	DOE 5480.20A, <i>Personnel Selection, Qualification, and Training Requirements for Nuclear Facilities</i>
	DOE 5480.21, <i>Unreviewed Safety Questions</i>

Section Number	Section Title or Reference
	DOE 5480.22, <i>Technical Safety Requirements</i>
	DOE 5480.23, <i>Nuclear Safety Analysis Reports</i>
	DOE 4330.4B, <i>Maintenance Management Programs</i>
	U.S. Department of Energy, Office of Nuclear Safety Policy and Standards (EH-31), Memorandum to J. Psaras (EM-4) regarding <i>Hazard Categorization for Environmental Management Activities Related to Stabilization, Deactivation, Decontamination and Decommissioning, and Environmental Restoration</i> , June 9, 1997 (contained in DOE-STD-1120-98/Vol. 2, Appendix G, which is available at the following Internet address: http://tis-nt.eh.doe.gov/dd/standards/s1120-98.pdf)
	U.S. Department of Energy, DOE O 440.1A, <i>Worker Protection Management for DOE Federal and Contractor Employees</i> , March 27, 1998.
	U.S. Department of Energy, DOE G 440.1-1, <i>Worker Protection Management for DOE Federal and Contractor Employees Guide for use with DOE Order 440.1</i> , July 10, 1997.
	U.S. Department of Energy, DOE-STD-1120-98, <i>Integration of Environment, Safety, and Health into Facility Disposition Activities</i> , Volumes 1 and 2 of 2, May 1998.
5.3 Item 1	Conduct all characterization work in accordance with the characterization plan.
	U.S. Department of Energy, <i>Integrating Safety and Health During Decommissioning with Lessons Learned from INEL</i> , DOE/EH-0546, September 30, 1996 (http://www.inel.gov/environment/demolition/index.html).
	Internet Website describing new technologies used for site characterization at DOE facilities (http://www-emtd.lanl.gov/TD/Technology.html).
5.4 Item 1	Conduct a risk assessment focusing on the environmental risks posed by the facility to be decommissioned and the decommissioning activities.
	U.S. Department of Energy, Office of Environmental Policy and Assistance, <i>Non-Time Critical Removal Risk Evaluation</i> , CERCLA Information Brief, DOE/EH-413/9710, August 1997 (http://tis-nt.eh.doe.gov/oepa/guidance/cercla/critic.pdf).
	U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly the Office of Environmental Guidance), <i>Streamlined Site Characterization Approach for Early Actions: Impact on Risk Assessment Data Requirements</i> , EH-231-025/1294, December 1994 (http://tis-nt.eh.doe.gov/oepa/guidance/cercla/streamln.pdf).
	U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly the Office of Environmental Guidance), <i>CERCLA Baseline Risk Assessment Human Health Evaluation</i> , EH-231-012/0692, June 1992 (http://tis-nt.eh.doe.gov/oepa/guidance/cercla/cer-risk.pdf).
	U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, <i>Guidance on Conducting Non-Time Critical Removals Under CERCLA</i> , EPA 540-R-93-057, PB93-963402, August 1993.

Section Number	Section Title or Reference
	U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, <i>Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A, Interim Final)</i> , EPA/540/1-89/002, P-155581, December 1989.
	U.S. Environmental Protection Agency, <i>Proposed Guidelines for Ecological Risk Assessment</i> , EPA/630/R-95/002B, September 1996 (61 FR 47552; September 9, 1996).
	U.S. Department of Energy, Office of Environmental Policy and Assistance (EH-41), <i>Using the Data Quality Objectives Process During the Design and Conduct of Ecological Risk Assessments</i> , February 1997.
5.5 Item 1	Conduct a hazards analysis to assess the potential of the existing facility and the decommissioning activities to affect the health and safety of workers, the public, and the environment.
	U.S. Department of Energy, <i>Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports</i> , DOE-STD-3009-94, July 1994.
	U.S. Department of Energy, <i>Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety</i>
	U.S. Department of Energy, <i>Integration of Environment, Safety, and Health Into Facility Disposition Activities</i> , DOE-STD-1120-98, Volume 1 of 2, Sections 3.2.1 and 3.3.4 (May 1998).
5.6 Item 1	If no public participation program exists, establish such a program that meets the requirements of existing local agreements, DOE policy, and applicable regulations.
	Public Participation in Environmental Restoration Activities [DOE/EH-0221 (November 1991)].
	"Public Participation Policy for Environmental Restoration and Waste Management, U.S. Department of Energy" (October 1992).
	Public Participation Guidance for Environmental Restoration and Waste Management" (March 1993).
	DOE Office of Environmental Management, <i>Site-Specific Advisory Board Guidance - Final</i> (January 1996).
5.9 Item 1	Select the final decommissioning action and document the basis for selection in an Action Memorandum.
	U.S. Environmental Protection Agency, <i>Superfund Removal: Action Memorandum Guidance</i> , EPA/540/P-90/004, OSWER Dir. 9360.3-01, December 1990 (available on the Internet by searching at http://cioma40.cin.epa.gov:6003).
	U.S. Department of Energy, Office of Environmental Policy and Assistance (formerly the Office of Environmental Guidance), <i>Removal Actions Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)</i> , DOE/EH-0435, September 1994 (http://tis-nt.eh.doe.gov/oepa/guidance/cercla/removal/remov_all.pdf).

Appendix C: Acronyms and Abbreviations

AEA	Atomic Energy Act
ALARA	As Low as Reasonably Achievable
ARAR	Applicable, or Relevant and Appropriate Requirement
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
CX	Categorical Exclusion
DCGLs	Derived Concentration Guidelines
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DQO	Data Quality Objectives
EO	Executive Order
EA	Environmental Assessment
EIS	Environmental Impact Statement
EM	U.S. Department of Energy, Office of Environmental Management
ES&H	Environment Safety and Health
FIMS	Facility Information Management System
FM	Office of Facilities Management

FONSI	Finding of No Significant Impact
GSA	General Services Administration
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IAG	Interagency Agreement
ISMS	Integrated Safety Management System
LCAM	Life-Cycle Asset Management
M&O	Maintenance and Operational
MOC	Management of Change
NCP	National Contingency Plan
NDE/NDA	Non-destructive Examination/Non-destructive Assay
NPL	National Priority List
NRC	U.S. Nuclear Regulatory Commission
PAMs	Preferred Alternatives Matrices
PPE	Personal Protective Equipment
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RQ	Reportable Quality
S&M	Surveillance and Maintenance
SARA	Superfund Amendments and Reauthorization Act
SCEM	Site Conceptual Exposure Model
SSAB	Site-Specific Advisory Board

TSCA	Toxic Substance Control Act
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978
WBS	Work Breakdown Structure
WMPP	Waste Management Project Plan

Appendix D: Definitions

Administrative Record: A collection of documents established in compliance with the requirements set forth in section 113(k) of CERCLA, as amended, consisting of information upon which the CERCLA lead agency bases its decision on the selection of response actions. The Administrative Record file should be established at or near the facility at issue and made available to the public.

Agreement State: Any State with which the U.S. Nuclear Regulatory Commission has entered into an agreement giving the State authority to regulate radioactive materials covered by the agreement in accordance with Section 274.b of the Atomic Energy Act of 1954, as amended.

Applicable or Relevant and Appropriate Requirements (ARARs): (1) Those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental, state environmental, or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable (see NCP section 300.5). (2) Requirements promulgated under Federal or State law that specifically address the circumstances at a Superfund site. (3) A requirement that environmental laws other than those under CERCLA, may be either "applicable" or "relevant and appropriate", but not both. Identification of ARARs must be done on a site-specific basis and involves a two-part analysis: first, a determination whether a given requirement is applicable; then, if it is not applicable, a determination whether it is nevertheless both relevant and appropriate.

Atomic Energy Act: The Act (1954) which placed production and control of nuclear materials within a civilian agency, originally the Atomic Energy Commission, now the Department of Energy.

Authorization Basis: Those aspects of the facility design basis and operational requirements relied upon by DOE to authorize operation. They are considered to be important to the safety of facility operations. The authorization basis is described in documents such as the facility Safety Analysis Report and other safety analyses, Hazard Classification Documents, Technical Safety Requirements, DOE-issued safety evaluation reports, and facility-specific commitments made in order to comply with DOE Orders or policies.

Byproduct Material: The tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

Characterization: Facility or site sampling, monitoring and analysis activities to determine the extent and nature of contamination. Characterization provides the basis for acquiring the necessary technical information to select an appropriate cleanup alternative; to prepare a

decommissioning plan for safe decommissioning; and to estimate the volume of waste to be generated.

Clean Air Act: The purpose of this Act is to "protect and enhance the quality of the Nation's air resources." Its primary application is through permits to regulate new and existing facilities. Of increasing importance are the National Emissions Standards for Hazardous Air Pollutants (NESHAPs). The CAA was passed in 1970 and amended in 1977 and 1990.

Clean Water Act of 1977: Amended the Federal Water Pollution Control Act passed in 1956. Its objective is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The Act's major enforcement tool is the National Pollutant Discharge Elimination System (NPDES) permit. The CWA addresses surface water only.

Community Relations Plan: A plan for all responses lasting longer than six months that addresses local citizens' and officials' concerns about a hazardous waste release and integrates community relations activities into the technical response at a site. The CRP should help prevent disruptions and delays in response actions and partially fulfill the National Environmental Policy Act requirement for public notification and participation. If decommissioning is performed outside the CERCLA process the normal community relations program in effect at the DOE office should be followed.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): Federal statute (also known as Superfund) enacted in 1980 and reauthorized in 1986, that provides the statutory authority for cleanup of hazardous substances that could endanger public health, welfare, or the environment. Program activities include establishing the National Priorities List, investigating sites for inclusion on the list, determining their priority level on the list, and conducting, and/or supervising the ultimately determined cleanup and other remedial actions.

Contaminated Facilities: DOE facilities that have structural components and/or systems contaminated with hazardous chemical and/or radioactive substances, including radionuclides. This definition excludes facilities that contain no residual hazardous substances other than those present in building materials and components, such as asbestos-containing material, lead-based paint, or PCB-containing equipment. This definition excludes facilities in which bulk or containerized hazardous substances, including radionuclides, have been used or managed if no contaminants remain in or on the structural components and/or systems.

Contamination: Unwanted radioactive and/or hazardous material which is disbursed on or in equipment, structures, object, soil or water. Contamination may be either surface or volumetric (i.e., contamination incorporated within a solid material). Surface contamination may be either removable or fixed.

Deactivation: The process of placing a facility in a stable and known condition including the removal of hazardous and radioactive materials to ensure adequate protection of the worker, public health and safety, and the environment, thereby limiting the long-term cost of surveillance

and maintenance. Actions include the removal of fuel, draining and/or de-energizing nonessential systems, removal of stored radioactive and hazardous materials, and related actions. Deactivation does not include all decontamination necessary for the dismantlement and demolition phase of decommissioning, e.g., removal of contamination remaining in the fixed structures and equipment after deactivation.

Deactivation Final Report: The document prepared after the technical work has been performed and verified and that describes the deactivation project activities, accomplishments, final facility status, and cost and performance information.

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 a facility to retire it from service with adequate regard for the health and safety of workers and the public and protection of the environment. The ultimate goal of decommissioning is unrestricted release or restricted use of the site.

Decommissioning Final Report: The document prepared after the technical work has been performed and verified and that describes the decommissioning project activities, accomplishments, final facility status, and cost and performance information.

Decommissioning Framework: The series of action steps to be followed in completing the decommissioning of a contaminated DOE surplus facility as described in the *Decommissioning Implementation Guide*. The same framework applies whether the decommissioning is being performed under CERCLA or outside the CERCLA arena.

Decommissioning Plan: The documentation that specifies the decommissioning work to be done. A decommissioning plan or equivalent documentation is required for nuclear facilities under DOE O 430.1A.

Decontamination: The removal or reduction of residual radioactive and hazardous materials by mechanical, chemical 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 a facility.

Disposal: Final placement or destruction of toxic, radioactive, or other waste, surplus or banned pesticides or other chemicals, polluted soils, and drums containing hazardous materials from removal actions or accidental releases. Disposal may be accomplished through use of approved, secure, regulated landfills, surface impoundments, land farming, deep well injection, or incineration.

Disposition: Those activities that follow completion of program mission, including, but not limited to, surveillance and maintenance, deactivation, and decommissioning.

End-Points: The detailed specification of conditions to be achieved for a facility's spaces, systems and major equipment. Fundamental to the determination of end points is risk reduction through elimination or stabilization of hazards, effective facility containment and facility monitoring and control.

Environmental Assessment: A written environmental analysis which is prepared pursuant to National Environmental Policy Act to determine whether a federal action would significantly affect the environment and thus require preparation of a more detailed environmental impact statement.

Environmental Impact Statement (EIS): A document required for Federal Agencies by the National Environmental Policy Act for major project or legislative proposals significantly affecting the environment. A tool for decision making, it describes the positive and negative effects of the undertaking and lists alternative actions. The statement documents the information required to evaluate the environmental impact of a project. Such a statement informs decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the environment.

Environmental Remediation: Cleanup and remediation of sites contaminated with radioactive and/or hazardous substances during past DOE production activities.

Facilities: Land, buildings, and other structures, their functional systems and equipment, and other fixed systems and equipment installed therein, including site development features outside the plant, such as landscaping, roads, walks, and parking areas; outside lighting and communication systems; central utility plants; utilities supply and distribution systems; and other physical plant features.

Federally Permitted Releases: The term "Federally permitted release" means, (A) discharges in compliance with a permit under Section 1342 of title 33, (B) discharges resulting from circumstances identified and reviewed and made part of the public record with respect to a permit issued or modified under Section 1342 of title 33 and subject to a condition of such permit, (C) continuous or anticipated intermittent discharges from a point source, identified in a permit or permit application under Section 1342 of title 33, which are caused by events occurring within the scope of relevant operating or treatment systems, (D) discharges in compliance with a legally enforceable permit under Section 1344 of title 33, (E) releases in compliance with a legally enforceable final permit issued pursuant to Section 3005(a) through (d) of the Solid Waste Disposal Act (42 U.S.C. 6925(a)-(d)) from a hazardous waste treatment, storage, or disposal facility when such permit specifically identifies the hazardous substances and makes such substances subject to a standard of practice, control procedure or bioassay limitation or condition, or other control on the hazardous substances in such releases, (F) any release in compliance with a

legally enforceable permit issued under Section 1412 of title 33 of (FOOTNOTE 1) Section 1413 of title 33, (G) any injection of fluids authorized under Federal underground injection control programs or State programs submitted for Federal approval (and not disapproved by the Administrator of the Environmental Protection Agency) pursuant to part C of the Safe Drinking Water Act (42 U.S.C. 300 h et seq.), (H) any emission into the air subject to a permit or control regulation under Section 111 (42 U.S.C. 7411), Section 112 (42 U.S.C. 7412), title I part C (42 U.S.C. 7470 et seq.), title I part D (42 U.S.C. 7501 et seq.), or State implementation plans submitted in accordance with Section 110 of the Clean Air Act (42 U.S.C. 7410) (and not disapproved by the Administrator of the Environmental Protection Agency), including any schedule or waiver granted, promulgated, or approved under these Sections, (I) any injection of fluids or other materials authorized under applicable State law (i) for the purpose of stimulating or treating wells for the production of crude oil, natural gas, or water, (ii) for the purpose of secondary, tertiary, or other enhanced recovery of crude oil or natural gas, or (iii) which are brought to the surface in conjunction with the production of crude oil or natural gas and which are reinjected, (J) the introduction of any pollutant into a publicly owned treatment works when such pollutant is specified in and in compliance with applicable pretreatment standards of Section 1317 (b) or (c) of title 33 and enforceable requirements in a pretreatment program submitted by a State or municipality for Federal approval under Section 1342 of title 33, and (K) any release of source, special nuclear, or byproduct material, as those terms are defined in the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.), in compliance with a legally enforceable license, permit, regulation, or order issued pursuant to the Atomic Energy Act of 1954.

Graded Approach: The depth of detail required and the magnitude of resources expended for a particular management element to be tailored to be commensurate with the element's relative importance to safety, environmental compliance, safeguards and security, programmatic importance, magnitude of the hazard, financial impact, and/or other facility-specific requirements.

Hazard Categories: Conditions created by the presence of hazards that are classified as: 1) Category 1 are those with a potential for significant offsite consequences; 2) Category 2 are those with a potential for significant onsite consequences; and 3) Category 3 are those with a potential for only significant localized consequences.

Hazardous Substance: Used synonymously with the term "hazardous material," this includes any substance designated or reflected in 29 CFR 1910.120, to which exposure may result in adverse affects to the worker, public, or environment including: 1) any substance defined under Section 101(14) of CERCLA; 2) any biological agent and other disease-causing agent that after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any person, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunction in reproduction), or physical deformations in such persons or their offsprings; 3) any substance listed by the U.S. Department of Transportation as hazardous materials under 49 CFR 172.101 and appendices; and 4)

hazardous waste (i.e., a waste or combination of wastes as defined in 40 CFR 261.3 or substances defined as hazardous waste in 49 CFR 171.8).

Hazardous Waste: Any solid waste; concentration; or physical, chemical, or infectious characteristics that may; (A) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hazardous Waste Constituent: A constituent that causes the U.S. Environmental Protection Agency's Administrator to list the hazardous waste in part 261, subpart D, of 40 CFR 260; or a constituent listed in table 1 of 40 CFR 261.24.

Hazardous Waste Operations and Emergency Response (HAZWOPER): Regulations established by the Occupational Safety and Health Administration to govern the health and safety of employees engaged in hazardous waste operations and emergency response. The regulations are found in 29 *CFR* Part 1910.120.

Health and Safety Plan (HASP): A site plan, required by the HAZWOPER regulations and prepared and followed by any employer whose workers engage in hazardous waste operations, which addresses the safety and health hazards of each phase of site operation and includes the requirements and procedures for employee protection. Guidelines for a HASP can be found in the DOE limited standard DOE-EM-STD-5503-94

High-Level Waste: The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid, that contains a combination of transuranic waste and fission products in concentrations high enough to require permanent isolation. It also includes other highly radioactive material that the Nuclear Regulatory Commission, consistent with existing law, determines to require permanent isolation.

Information Repository: A file containing current information, technical reports, and reference documents regarding a CERCLA site. The information repository is usually located in a public building that is convenient for local residents, such as a public school, library, or city hall. The Administrative Record is often a significant portion of the information repository.

Interim Status: The period during which a hazardous waste treatment, storage, or disposal facility, which was in existence as of November 19, 1980, may continue to operate without an approved RCRA permit. To qualify for interim status a facility must have filed a Part A of the RCRA permit application. New facilities are, by definition, ineligible for interim status.

Life-cycle: The life of an asset from planning through acquisition, maintenance, operation, and disposition.

Local Agreement: An interagency agreement, tri-party agreement or other understanding that establishes a local relationship between DOE, EPA, and the State on environmental restoration.

Low-Level Waste: Radioactive waste not classified as high-level waste, transuranic waste, spent nuclear fuel, or byproduct material.

Mixed Waste: Contains both radioactive and hazardous components as defined by the Atomic Energy Act and the Resource Conservation and Recovery Act.

National Contingency Plan (NCP): A short title for the National Oil and Hazardous Substances Pollution Contingency Plan. The NCP, 40 CFR Part 300, outlines the responsibilities and authorities for responding to releases into the environment of hazardous substances and other pollutants and contaminants under the statutory authority of CERCLA and section 311 of the Clean Water Act. The NCP is the principal statutory source for the performance of DOE decommissioning as a non-time critical removal action, when CERCLA applies.

National Emission Standards for Hazardous Air Pollutants (NESHAPs): The Clean Air Act establishes limits on the release of hazardous pollutants for which no ambient air quality standard is applicable. Under the March 7, 1989 proposed ruling NESHAPs will also address radioactive releases to the air.

National Environmental Policy Act of 1969: The Act which established the requirements for conducting environmental reviews of Federal actions that have the potential for significant impact on the human environment.

National Priorities List (NPL): The Environmental Protection Agency's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under CERCLA (Superfund). A site must be on the NPL to receive money from the Trust Fund for remedial action. The list is based primarily on the score a site receives from the Hazardous Ranking System. EPA is required to update the NPL at least once a year.

National Response Center: The National Communications Center, located at U.S. Coast Guard Headquarters, continuously manned for handling activities related to CERCLA response actions. The National Response Center acts as the single point of contact for all pollution incident reporting, and as the National Response Team Communications Center.

Natural Resource Trustees: Federal officials designated by the President to act on behalf of the public as trustees for natural resources when there is injury to, destruction of, loss of, or threat to natural resources as a result of a release of a hazardous substance or a discharge of oil.

Non-nuclear Facility: Those activities, processes, or operations that may involve hazardous substances in such forms or concentration that a potential danger exists to cause illness, injury, or death to personnel within the facility site boundary or members of the public.

Non-time-critical Removal Action: This is a type of response action recognized by the U.S. Environmental Protection Agency appropriate for addressing hazardous substance threats where a planning horizon of six months or more is appropriate. Removal responses, including non-time-critical removals, are the subject of 40 CFR 300.410 and 300.415. Under a signed agreement with the U.S. Environmental Protection Agency, DOE uses a non-time-critical removal approach tailored for DOE's decommissioning of contaminated facilities. That approach comprises threat assessment; identification, analysis, and documentation of decommissioning alternatives; opportunities for public participation in the decommissioning decision; and planning and performance of decommissioning activities. Under the DOE/EPA agreement, regulatory involvement in decommissioning is determined locally.

Nuclear Facility: Those activities, processes, or operations that involve radioactive materials or fissionable materials in such form, quantity, or concentration that a nuclear hazard potentially exists to the employees or general public. Included are activities or operations that: 1) produce process or store radioactive liquid, solid waste, fissionable materials, or tritium; 2) conduct separations operations; 3) conduct irradiated materials inspection, fuel fabrication, decontamination, or recovery operations; 4) conduct fuel enrichment operations; or 5) perform environmental remediation or waste management activities involving radioactive materials.

Incidental use and generation of radioactive materials in a facility operation (e.g., check and calibration sources and use of radioactive sources in research, experimental and analytical laboratory activities, electron microscopes, and x-ray machines) would not ordinarily require the facility to be included in this definition. Accelerators and their operations are not included.

On-site: The same or geographically contiguous property which may be divided by public or private right-of-way, provided the entrance and exit between the properties is at a cross-roads intersection, and access is by crossing as opposed to going along, the right-of-way. Non-contiguous properties owned by the same person but not connected by a right-of-way which he controls and to which the public does not have access, is also considered on-site property.

Preliminary Assessment: The process of collecting and reviewing available information about a known or suspected waste site or release.

Quality Assurance/Quality Control: A system of procedures, checks, audits, and corrective activities to ensure that all research design and performance, environmental monitoring and sampling, and other technical and reporting actions are of the appropriate quality.

Readiness Review: A management review of documents, organizational structure, personnel qualifications, physical preparations and other factors to confirm that decommissioning operations (removal action, if under CERCLA) are ready to proceed. If the facility being decommissioning is classified as a nuclear facility per DOE-STD-1027-92, a graded operational readiness review (ORR) may be required in accordance with DOE Order 5480.31.

Release: The spilling,, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of a hazardous substance, pollutant, or contaminant into the environment. This includes the abandonment or disposal of barrels or other closed receptacles containing hazardous substances, pollutants, or contaminants. The National Contingency Plan also defines the term release to include a threat of release.

Remedial Action: Activities initiated to assess and clean up inactive DOE facilities or waste sites.

Removal Action: The cleanup or removal of released hazardous substances from the environment, such actions as may be necessarily taken in the event of the threat of a release..., such actions as may be necessary to monitor, assess, and evaluate the release or threat of release..., the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release.

Reportable Quantity: The amount or quantity of substances defined in 40 CFR 302 for which notification of release to the environment is required.

Resource Conservation and Recovery Act (RCRA): RCRA, an amendment to the Solid Waste Disposal Act, was passed in 1976 to address the problem of how to safely dispose of municipal and industrial solid waste generated nationwide. it establishes\ d a national policy to reduce or eliminate hazardous waste and conduct treatment, storage, or disposal to minimize its threat. RCRA was amended by the Hazardous and Solid Waste Amendments in 1984 to expand RCRA's scope and add detailed requirements

RCRA-authorized State: A State that has applied and been found qualified by the U.S. Environmental Protection Agency to take over administration and enforcement within the State's boundaries of the RCRA Subtitle C hazardous waste regulatory program in accordance with 40 CFR Part 271, Requirements for Authorization of State Hazardous Waste Programs.

Risk Assessment: The qualitative and quantitative evaluation performed in an effort to define the risk posed to human health and/or the environment by the presence or potential presence and/or the use of specific pollutants.

Sampling and Analysis Plans: If environmental samples are to be collected during a removal action, DOE must develop a sampling and analysis plan that provides a process for obtaining data of sufficient quality and quantity to satisfy data needs. Sampling and analysis plans consist of two parts:

- C Field Sampling Plan, which describes the number, type, and location of samples and the type of analyses

- C Quality Assurance Project Plan (QAPP), which describes policy, organization, and functional activities and the data quality objectives and measures necessary to achieve adequate data for use in planning and documenting the removal action.

Sanitary Waste: Waste, such as garbage, that is generated by normal housekeeping activities and is not hazardous or radioactive. The waste is disposed of in sanitary landfills. Sanitary waste also includes liquids which are treated in sewage treatment plants.

Site: A geographic entity comprising leased or owned land, buildings, or other structures required to perform program activities.

Site Inspection: The collection of information from a CERCLA (Superfund) site to determine the extent and severity of hazards posed by the site. It follows a preliminary assessment and is more extensive. The purpose is to gather information necessary to score the site, using the EPA Hazard Ranking System, and to determine if the site presents an immediate threat that requires prompt removal action.

Solid Waste: Non-liquid, non-soluble material ranging from municipal garbage to industrial waste that contains complex, and sometimes hazardous, substances. Solid waste also includes sewage sludge, agricultural refuse, demolition wastes, and residues. Technically, solid waste also refers to liquids and gases in containers.

Solid Waste Management Unit: Any discernable unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous wastes. Such units include any area at a facility where solid wastes have been routinely and systematically released.

Source Material: Uranium or thorium, other than special nuclear material or ores which contain by weight 0.05 percent or more of uranium or thorium, or any combination of these.

Special Nuclear Material: Plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the U.S. Nuclear Regulatory Commission, pursuant to the provisions of Section 2071 of title 42 U.S.C., determines to be special nuclear material, but does not include source material; or any material artificially enriched by any of the foregoing, but does not include source material.

Surveillance and Maintenance: These activities are conducted through-out the facility life cycle phase including when a facility is not operating and is not expected to operate again and continues until phased out during decommissioning. Activities include providing in a cost effective manner periodic inspections and maintenance of structures, systems and equipment necessary for the satisfactory containment of contamination and protection of workers, the public and the environment.

Toxic Substance Control Act: TSCA was enacted was enacted in 1976 to protect human health and the environment from unreasonable risk due to exposure to, manufacture, distribution, use or disposal of substances containing toxic chemicals. For example, under TSCA, any hazardous waste that contains more than 50 parts per million of polychlorinated biphenyls (PCBs) are subject to regulations under this Act.

Transfer of Facilities: The process of transferring programmatic and financial responsibility of land and/or facilities from one Program Office to another.

Transuranic Waste: Waste that is contaminated with alpha-emitting transuranic nuclides with half-lives greater than 20 years and concentrations greater than 100 nanocuries per gram of waste. Contact-handled TRU waste does not require shielding and has a surface dose rate of less than 200 millirem per hour. Remote-handled TRU waste has a surface dose rate greater than 200 millirem per hour and requires additional shielding because it presents an exposure hazard. the dose rates at the surface or remote-handled TRU waste packages fall within the 200 millirem to 1,000 rem per hour range. Some TRU waste was buried before these ranges were established. This is known as pre-1970 buried TRU waste.

Waste Minimization: The reduction, to the extent feasible, of radioactive and hazardous waste that is generated before treatment, storage, or disposal of the waste. Waste minimization includes any source reduction or recycling activity that results in either: 1) reduction of total volume of hazardous waste; 2) reduction of toxicity of hazardous waste; or 3) both.

Appendix E: Suggestions on the Functions, Purposes and Contents of a Decommissioning Plan

LCAM (DOE O 430.1A) requires that a decommissioning plan or equivalent documentation be prepared for nuclear facilities. Decommissioning plans (or equivalent documentation) may be appropriate in other cases, in accordance with the graded approach.

1. Functions/Purposes of a Decommissioning Plan

- C Functions as the detailed design for the project.
- C If provided for in local agreements, serves as the document to communicate to regulators and other stakeholders the scope and intent of the decommissioning removal action to be taken.
- C Describes the physical work to be done and the release (end condition) criteria to be achieved. Describes to the performing organization WHAT is to be done, less on the HOW to do it.
- C Describes the measures to be taken to comply with environmental regulations and requirements for the protection of workers, the public and the environment.

2. Precursors to a Decommissioning Plan (as provided for in the Decommissioning Framework)

- C Decommissioning action confirmation.
- C Project Plan defining the scope of the project, setting technical, cost and schedule baselines and describing how the project will be managed.
- C Analysis of Alternatives
 - Characterization
 - Risk Assessment (of the various alternatives)
 - Hazards Analysis (of the various alternatives)
 - Public/Stakeholder/Regulator input
 - Analysis Document (Analysis of Decommissioning Alternatives)
 - Decision Document.
- C Continuing S&M.

3. **Key Supporting Documents for a Decommissioning Plan**

- C Engineering studies to make technical decisions.
- C Waste Management Plan (waste minimization, disposition, etc.).
- C Safety Analysis (graded - related to the risk; focused on decommissioning operations).
- C Risk Assessment (focused on decommissioning operations).
- C Mitigation Action Plan (if applicable).
- C Health and Safety Plan.
- C ALARA Plan.

4. **Suggested Contents of a Decommissioning Plan**

- C Introductory Material.
- C Facility Description and History. Focus initially on the operating/functional history. Include the planning and assessment activities that have occurred up to the present (see Decommissioning Framework). Recount the interaction with the public/stakeholders/regulators and the impact this has had on the project.
- C Scope and Objectives of the Decommissioning Action. The release (end condition) will be specified. Reuse/recycle criteria included.
- C Summary of Characterization. Radioactive and hazardous material contamination as well as physical condition and status.
- C Technical Approach
 - Alternatives considered
 - General decommissioning approach to be followed
 - Reference to Activity Specifications or other documents specifying details of the work
 - The technical baselines and assumptions for the project.

C Project Management

- Management approach (M&O contractor in-house forces, contract out, use of construction manager, etc.). Include cost/schedule control and reporting system to be employed, configuration control, and productivity improvement
- Organization
- Training
- Quality Assurance
- Cost
- Schedule.

C Worker and Environmental Protection

- HASP: Occupational safety, industrial hygiene, health physics
- ALARA Program (include how it was applied during planning)
- Occupational exposure estimates
- Emergency preparedness and response program
- Environmental compliance program, including any mitigation action commitments
- Safety analysis and review of decommissioning activities.

C Waste Management

- Waste minimization
- Waste handling, packaging, transport and disposal
- Waste estimates.

C Final Site Survey

- Plans and criteria
- Independent verification.

Attachments: (typical items)

Activity Specifications
Engineering Studies
Details of WBS
Details of Cost Estimate
Details of Schedule

APPENDIX F: Verification and Certification Protocol