DOE G 435.1-1

Approved: 7-09-99

IMPLEMENTATION GUIDE
for use with DOE M 435.1-1

U.S. DEPARTMENT OF ENERGY

Distribution:
All Departmental Elements

Initiated By:
Office of Environmental Management

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IMPLEMENTATION GUIDE FOR USE WITH DOE M 435.1-1, *RADIOACTIVE WASTE MANAGEMENT MANUAL*

INTRODUCTION

This guide was developed to aid in implementing the requirements of DOE M 435.1-1, *Radioactive Waste Management Manual*. The guide has the same format as the Manual and is divided into four chapters.

Chapter I, *General Requirements and Responsibilities*
Chapter II, *High-Level Waste Requirements*
Chapter III, *Transuranic Waste Requirements*
Chapter IV, *Low-Level Waste Requirements*

The material presented in this guide provides suggestions and acceptable ways of implementing DOE M 435.1-1 and should not be viewed as additional or mandatory requirements. The objective of the guide is to ensure that responsible individuals understand what is necessary and acceptable for implementing the requirements of DOE M 435.1-1. For each requirement in DOE M 435.1-1, the guide provides:

- The objective of the requirement;
- Discussion of the technical, management, and administrative aspects covered by the requirement;
- Principles, practices, and methods for implementing the requirement, including examples;
- Performance measures for evaluating implementation of the requirement; and
- Supplemental references which may be consulted for more detailed information related to the requirement.

The guide aids in understanding what is necessary to attain compliance, facilitates effective and efficient implementation of the requirements, and offers acceptable ways to implement the requirement. As noted, the guide provides suggestions and acceptable ways of implementing the requirements, and is not mandatory. Provisions in the guide should not be construed as requirements. The approaches presented in the guidance are not the only acceptable ways of complying with any given requirement. Alternate methods that satisfy the requirements of DOE O 435.1 and DOE M 435.1-1 also are acceptable. A rationale and basis for the approaches identified in the guide has been provided and no further basis is required to implement the approaches outlined in the guide. Any implementation method selected must ensure an adequate level of safety commensurate with the hazards associated with the work. The implementation method selected must be consistent with the radioactive waste management basis.

Situation-specific attributes and application of the graded approach should always be considered in applying the information contained in this guide. Activities with greater potential consequences or hazards may require more rigor or effort to implement the requirements of DOE M 435.1-1, *Radioactive Waste Management Manual*.

Wherever possible, existing processes, programs, and documentation should be considered as possible routes to complying with the requirements of DOE M 435.1-1. Existing processes and programs generally provide mechanisms for demonstrating compliance and providing auditable records which will also meet the requirements of DOE M 435.1-1. Therefore, it should not be necessary to repeat or recreate programs into which the DOE M 435.1-1 requirements can be integrated.

Chapter I, *General Requirements and Responsibilities*, provides guidance on DOE management responsibilities and requirements that are applicable to the management of all DOE radioactive waste types. Chapter II, *High-Level Waste Requirements*; Chapter III, *Transuranic Waste Requirements*; and Chapter IV, *Low-Level Waste Requirements*, provide guidance on waste-type specific requirements to be used in conjunction with the guidance on General Requirements and Responsibilities.

Other requirements and DOE directives are referenced in DOE M 435.1-1, *Radioactive Waste Management Manual*, because their applicability to radioactive waste management facilities, operations, and activities was identified through a hazards analysis as necessary for protection of workers, the public, or the environment. It is understood and expected that requirements of this Manual may be satisfied by compliance with other requirements.

Paragraph (4) of the Introduction to the *Radioactive Waste Management Manual*, DOE M 435.1-1, states that any of the requirements in the Manual may be waived or modified through application of a DOE-approved requirements tailoring process, such as the "Necessary and Sufficient Closure Process" in DOE P 450.3 and DOE M 450.3-1 and DOE P 450.4, *Safety Management System Policy*, the applicable or relevant and appropriate requirements identification process for actions taken pursuant to the Department's CERCLA authorities, or by an exemption processed in accordance with the requirements of DOE M 251.1-1A, *Directives System Manual*. The series of manuals and implementation guides under DOE P 450.4 contain requirements and guidance for implementing the evaluation processes mentioned above that would allow a waiver or modification to any of the individual DOE M 435.1-1 requirements. Chapter VII of DOE M 251.1-1A provides the requirements, including roles and responsibilities, for exempting a DOE site or facility from any of the DOE M 435.1-1 requirements.

When the exemption process of DOE M 251.1-1A is used, the policies of the integrated Safety Management System must still be followed, and the overall effect of modifications and exemptions to individual requirements should be evaluated and a determination made that they are

not detrimental to the objectives of DOE O 435.1 and DOE M 435.1-1 for the protection of the public, workers, and the environment.

Paragraph (4) of the Introduction to the *Radioactive Waste Management Manual*, DOE M 435.1-1, also states that all DOE entities shall be in compliance with this directive within one year of issuance. Compliance is defined as implementing the requirements or an approved implementation or corrective action plan. If compliance cannot be achieved within one year, the Field Element Manager must request approval from the cognizant Program Secretarial Officer to extend the compliance date to no later than October 1, 2001. The purpose of this requirement is to encourage DOE sites and programs to implement the requirements of the Order and Manual as soon as possible, to ensure that a plan is developed for implementing requirements that will take longer than one year to implement, and to ensure that the cognizant Program Secretarial Officer is aware of those requirements for which compliance cannot be achieved in one year. Field Elements need to evaluate the state of readiness of facilities, operations, and activities under their authority for compliance with the revised radioactive waste management requirements, and invoke a systematic process for achieving full implementation as soon as possible.

Implementation or corrective action plans establish a commitment and strategy for how sites will implement the requirements by October 1, 2001, and should include objectives and milestones, including dates, for implementing the requirements on a site or facility basis.

> *Example 1: A site implementation plan addresses the requirement for Radioactive Waste Management Basis (RWMB) in one of two ways. For facilities with an existing Authorization Basis, the strategy for implementing the RWMB requirement is to review the Authorization Basis to determine whether it sufficiently covers the requirements needed for a RWMB, then issue a blanket RWMB for those facilities. For facilities which do not have an Authorization Basis, implementation of the RWMB will follow implementation of Waste Acceptance Requirements (for facilities receiving waste) and Waste Generator Requirements (for facilities generating waste).*
>
> *Example 2: A site develops an implementation plan for section III.L.(1)(b) "Vents or other mechanisms...." The site has 1,000 drums of transuranic waste in storage. Two hundred drums have been prepared to the Waste Acceptance Criteria for the Waste Isolation Pilot Plant (WIPP WAC) including having filter vents installed. Of the remaining 800 drums which are not vented, 500 drums are stored in air support storage buildings awaiting certification, and 300 drums are retrievably stored in earthen-covered berms. The site prepares an implementation plan for this requirement which summarizes how the remaining 800 drums will meet the requirement based on existing plans for management of this waste. The plan states that the 500 drums in the air support storage buildings are scheduled to be prepared to WIPP WAC during the following two years. Filter vents will be installed during the certification process. The site has plans to begin*

retrieving the bermed waste in five years. Filter vents will be installed on the drums as they are removed from the berms. The implementation plan shows the schedule and notes that although the requirement will be implemented outside of the three year implementation period, the requirement allow for vents to be installed on existing waste in storage as soon as practical (i.e., the next time the waste is actively managed).

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Chapter I

General Responsibilities and Requirements

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I. 1.A. Delegation of Authority.

Managers charged with responsibilities within this Manual may delegate authority for these tasks to another manager. All delegations of authority shall be documented.

Objective:

The objective of this requirement is to provide DOE managers with the needed flexibility in managing programs while retaining DOE responsibility and ensuring traceability of authority.

Discussion:

Delegation of authority is authorizing another DOE manager to perform the task for the manager who has been assigned the responsibility in a DOE Directive. The responsibility for ensuring that the task is performed remains with the DOE manager charged with the responsibility in the DOE Directive. Requiring that delegation be to another DOE manager retains the elements of DOE responsibility, accountability, and attention. DOE attention provides a mechanism for assigning resources necessary for successful execution of the task. Requiring documentation ensures the traceability of authority.

The delegation of authority can be made to any DOE manager at any level by the DOE manager charged with the responsibility in DOE M 435.1-1. Any managers who fall in the management chain between the manager who has been assigned the responsibility in DOE M 435.1-1 and the manager who is charged the responsibility for the task have no responsibility for the task themselves but should be notified of the delegation by a copy of the memorandum of record. The delegation of authority can be revoked at any time and delegated to a different DOE manager by the DOE manager charged with the responsibility in DOE M 435.1-1. The manager delegated the authority for a task may further delegate this authority to another manager but must notify the DOE manager charged with the responsibility of this re-delegation, with a copy to other managers, as appropriate for their information. The performance of tasks by other DOE staff or contractors can be assigned by the DOE manager with the authority to perform a task without affecting the delegation of authority. The manager charged with the responsibility in DOE M 435.1-1 needs to ensure the delegation of authority is successful. This can be achieved by periodically discussing the task with the manager to whom the authority was delegated, or requiring a written report from that manager describing how the task is being implemented.

The delegation of authority can be indefinite or for a specific time period, but the selected time period should be clearly identified in the documentation of the delegation of authority. The documentation of the delegation of authority can be accomplished by a memorandum of record which should be maintained as an auditable record. The documentation of the delegation of

authority should clearly describe the authority being delegated; identify any terminating condition(s) or a termination date of the delegation, as appropriate; identify the DOE manager to whom authority is being delegated; contain a mechanism for acknowledgment of receipt; and be managed as an auditable record as long as the delegation is in effect. A delegation of authority that contains these elements should be considered complete and meets the Manual requirement.

> *Example: The Field Element Manager is assigned responsibility in DOE M 435.1-1 for ensuring development of, review, approval, and implementation of closure plans for low-level waste disposal facilities. The Field Element Manager delegates authority for these responsibilities to the DOE Radioactive Waste Manager at the site in a memorandum. The Radioactive Waste Manager does not report directly to the Field Element Manager but is two levels removed in the management chain. The memorandum states that the Radioactive Waste Manager is responsible for ensuring development of, review, approval, and implementation of closure plans for all of the site's low-level waste disposal facilities. The memorandum establishes the effective date as the date that the Radioactive Waste Manager acknowledges receipt of the memorandum and states that this delegation is in effect until revoked by the Field Element Manager. The manager who falls in the management chain between the manager charged with the responsibility and the one who is delegated the authority is copied in the memorandum. The memorandum is identified as a quality assurance record that must be maintained in accordance with the Quality Assurance Program's record keeping requirements.*

Delegations of authority should be reviewed whenever a change in DOE management takes place (e.g., there is a reorganization or a manager leaves). These reviews should evaluate the status of the delegation of authority to establish its continued validity over time or under the changed circumstances.

Compliance with this requirement is demonstrated if all DOE managers who have been delegated authority for DOE M 435.1-1 have documentation that describes the authority being delegated, identifies the time period for the delegation, and contains an acknowledgment of the receipt of the delegation of authority. This documentation must be maintained as an auditable record.

Supplemental References:

1. DOE, 1997. *Manual of Safety Management Functions, Responsibilities, and Authorities*, DOE M 411.1-1, U.S. Department of Energy, Washington, D.C., October 8, 1997.

I. 1.B. Use of Guidance.

Additional information supporting the requirements in this Manual is contained in the Implementation Guide for use with DOE M 435.1-1, *Radioactive Waste Management Manual*. This Guide, DOE G 435.1-1, *Implementation Guide for DOE M 435.1-1*, shall be reviewed when implementing the requirements of this Manual. The Guide provides additional information and acceptable methods for meeting the requirements. Other methods may be used but must ensure an adequate level of safety commensurate with the hazards associated with the work and be consistent with the radioactive waste management basis.

Objective:

The objective of this requirement is to ensure that individuals responsible for DOE radioactive waste management operations, facilities, and activities understand what is necessary and acceptable for implementing the requirements of DOE O 435.1, *Radioactive Waste Management*, and DOE M 435.1-1, *Radioactive Waste Management Manual*. By understanding the objective of these requirements, individuals responsible for managing radioactive waste should be able to take the appropriate action even in situations not previously discussed in the requirements.

Discussion:

The *Implementation Guide for DOE M 435.1-1*, DOE G 435.1-1, serves as a tool to assist personnel in gaining a comprehensive understanding of how to implement DOE O 435.1 and DOE M 435.1-1 requirements. Guidance for each requirement discusses the technical, management, and administrative aspects of the requirement and identifies acceptable principles, practices, and methods for implementing the requirement. Performance measures for evaluating acceptable implementation of each requirement are also presented. The guidance also includes examples to help illustrate concepts being discussed. These examples are based on hypothetical situations and should not be used as the basis for adapting specific technical standards. Users need to evaluate real situations to identify the hazards which need to be managed and establish the appropriate technical standards. The guide, in many cases, also provides a list of supplemental references that may benefit the individuals responsible for implementing DOE O 435.1 and DOE M 435.1-1. The referenced documents may, in some instances, be regularly updated. Users are responsible for ensuring that the most current versions of these documents are available to affected workers and are referenced as appropriate.

Although the requirements in DOE M 435.1-1 were prepared to be as clear and concise as possible, they may be interpreted differently among users. The guidance provides contextual information and explanation to aid users in understanding the purpose and intent of the requirements. Reviewing the guidance can facilitate use of more consistent approaches to

implementing the requirements throughout the complex and prevent over or under-interpretation of the requirements. The information is intended to facilitate understanding of intent, scope of application, graded application, degree of effort, and, if possible, measurable standards.

The guide also serves as the mechanism for further elaboration and emphasis on concepts which are important to consider in the implementation of requirements, and describes acceptable ways of implementing the requirements. The guidance describes situation-specific considerations and application of the graded approach and necessary and sufficient processes, which can be considered in applying the requirements. In addition, many requirements of DOE M 435.1-1 can be met with existing processes, programs, and documentation.

Although DOE M 435.1-1 stipulates that the guidance must be reviewed, this does not mean that all personnel are responsible for reviewing all guidance. The intent of the requirement is that personnel responsible for performing particular work processes are accountable for correctly understanding and interpreting the DOE M 435.1-1 requirements that apply to the work they perform. For example, those personnel who are responsible for translating specific DOE M 435.1-1 requirements into controlling documents and operating procedures at the sites should understand how to effectively and efficiently implement them.

> *Example: Site Z has constructed a new facility for storing transuranic waste. Facility personnel responsible for preparing the waste acceptance criteria read DOE O 435.1 and DOE M 435.1-1 to identify relevant requirements. Based on their review, they determine that they need to review the General Requirements and Responsibilities guidance for Radioactive Waste Management Basis, Radioactive Waste Acceptance Requirements, Radioactive Waste Generator Requirements, Training and Qualification, Storage, and Waste Declassification. They also read guidance corresponding the Transuranic Waste Requirement for Definition of Transuranic Waste, Management of Specific Wastes, Radioactive Waste Management Basis, Contingency Actions, Waste Acceptance, Waste Certification, Waste Transfer, Packaging and Transportation, and Storage. The review reminds the storage facility personnel of other sources of information which need to be considered in developing the waste acceptance criteria, including the safety analysis, the Waste Acceptance Criteria for the Waste Isolation Pilot Plant, and the DOE directives addressing safeguards and securities, records management, and the Safety Management System. Equipped with all of these resources, waste acceptance criteria that provide for safe receipt and storage of transuranic waste are developed.*

The guide aids in understanding what is necessary to attain compliance, facilitates effective and efficient implementation of the requirements, and offers acceptable ways to implement the requirement. Guidance documents, including technical standards, can assist in implementing requirements. This guide is intending to provide useful information and methodologies on how a

requirement might be implemented. The guidance includes background information regarding the intent of the requirement and its technical underpinnings.

Unlike the requirements specifically set forth in a rule or Order, the provisions in guidance documents are not mandatory. Failure to follow a guidance document does not in itself indicate noncompliance with a specific requirement – a finding of noncompliance must be based on a failure to satisfy the requirement. The guidance provided in implementation guides and standards referenced therein are considered acceptable methods to satisfy requirements. The approaches presented in the guidance are not the only acceptable ways of complying with any given requirement. Alternative methods that satisfy the requirements of DOE O 435.1 and DOE M 435.1-1, are also acceptable. Any implementation method selected must ensure that an adequate level of safety commensurate with the identified hazards associated with work is achieved and be consistent with the radioactive waste management basis. Generally it is expected that site documents (e.g., program plans, procedures, waste acceptance criteria) will provide documentation showing that a requirement is being met consistent with the guidance. However, personnel can employ alternative methods that may be more appropriate for specific situations.

To the extent that a unique or different approach other than that addressed in the guidance does not otherwise have a documented rationale or basis, it will be necessary to create one. Documentation should identify the alternative method and should include a technically defensible reason for using the alternative approach. The Integrated Safety Management standards identification processes already have safeguards to address the adequacy of standards and these should be the processes used for making and documenting any such decisions.

Compliance with this requirement is demonstrated by key individuals being familiar with the intent of DOE M 435.1-1 requirements based on their review of the guidance, and sites meeting DOE M 435.1-1 requirements by establishing processes described in the guidance. Sites meeting DOE M 435.1-1 requirements in a way different than described in the guidance will be able to demonstrate that an adequate level of safety commensurate with the hazards associated with the work is being maintained, that the method is consistent with the radioactive waste management basis, and if necessary, documentation of the rationale for the alternative approach.

Supplemental References:

1. DOE, 1998. *Directives System* and *Directives System Manual*, DOE O 251.1A and DOE M 251.1-1A, U.S. Department of Energy, January 30, 1998.

2. DOE, 1995. *Performance Indicators and Analysis of Operations Information*, DOE O 210.1, U.S. Department of Energy, Washington, D.C., September 27, 1995.

3. DOE, 1995. *Environment, Safety, and Health Policy for the Department of Energy Complex*, DOE P 450.1, U.S. Department of Energy, Washington, D.C., June 15, 1995.

4. DOE, 1996. *Identifying, Implementing and Complying with ES&H Requirements*, DOE P 450.2A, U.S. Department of Energy, Washington, D.C., May 15, 1996.

I. 1.C. Radioactive Waste Management.

All radioactive waste subject to DOE O 435.1, *Radioactive Waste Management,* and the requirements of this Manual shall be managed as high-level waste, transuranic waste, low-level waste, or mixed low-level waste.

Objective:

The objective of this requirement is to ensure that all DOE radioactive waste is managed as one of the established waste types, and to eliminate the creation of other waste categories or the management of radioactive waste outside of the requirements established in DOE M 435.1-1. It is also the objective of this requirement to ensure that the radioactive waste is managed safely and effectively within the established programs for high-level waste, transuranic waste, low-level waste, or mixed low-level waste.

Discussion:

The DOE system for management of radioactive waste has evolved over the last several years into four complex-wide program areas. The first three correspond to the radioactive waste types identified in DOE O 435.1: high-level waste, transuranic waste, and low-level waste. The fourth program, for management of mixed low-level waste, evolved separately from the low-level waste management program due to the hazardous portion of the waste also being subject to the *Resource Conservation and Recovery Act* (RCRA). Mixed low-level waste, being a subset of low-level waste, must be managed in accordance with the low-level waste requirements of DOE M 435.1-1 and the applicable requirements of RCRA.

The evolution of the management of high-level waste and transuranic waste, based on the driving statutes for their management, has not resulted in separate programs for mixed high-level or mixed transuranic waste. Rather, the programs for those waste types address the combined programmatic planning aspects of storage, treatment, and disposal of mixed and non-mixed waste varieties of those waste types.

Management of wastes containing radioactivity that do not meet the definitions of the radioactive waste types in DOE O 435.1 and DOE M 435.1-1 (i.e., 11e.[2] byproduct material, residual radioactive material as defined in the *Uranium Mill Tailings Radiation Control Act* [UMTRCA], or naturally occurring radioactive material [NORM]) should continue to be managed under the provisions of the UMTRCA, 40 CFR Part 192, or DOE 5400.5, *Radiation Protection of the Public and the Environment,* as applicable. However, DOE M 435.1-1 allows for small quantities of these wastes to be managed in accordance with Chapter IV, Low-Level Waste Requirements (see the Guidance on DOE M 435.1-1, Section IV.B). Waste in quantities too large for acceptance at DOE low-level waste disposal sites shall be managed according to the requirements

of 40 CFR Part 192, and disposed of at specially designated DOE sites or tailing disposal sites established under the *Uranium Mill Tailings Radiation Control Act of 1978*.

During the development of the requirements in DOE M 435.1-1, a safety and hazards analysis was performed to identify operational activities which presented potential hazards that needed to be mitigated. The analysis was conducted on the waste types that have been established through federal legislation and regulation, i.e., high-level, transuranic, low-level, and mixed low-level waste. In order to ensure that the public, workers, and the environment are protected in the course of radioactive waste management, any waste managed by the Department, pursuant to DOE M 435.1-1, must be identified as one of these waste types and managed within the appropriate program. For many years some sites have identified as special case waste that would otherwise meet the definition of high-level, transuranic, or low-level waste. This term was initially used for any waste that did not have a disposition path and evolved to encompass waste which needed special attention. This requirement is intended to preclude the categorization of a radioactive waste as a special-case waste or something other than high-level, transuranic, low-level, or mixed low-level waste, and avoid potential problems associated with the waste not being recognized by and managed within one of the existing waste type programs discussed above. Table I-1.C provides examples of different waste streams and how they could be categorized by waste type and by waste management program.

Table I-1.C. Examples of Waste Type and Program Identification

Previous Designation or Description of Waste	***DOE O 435.1 Designation***	***Management Program***
DOE Equivalent to GTCC	Low-Level Waste	LLW or MLLW
Surplus Sealed Sources with No Potential Reuse	Low-Level Waste or Transuranic Waste	LLW or TRU
Special Performance Assessment Required (SPAR)	Low-Level Waste or Transuranic Waste	LLW, MLLW, or TRU
Waste Samples from Control Runs of DWPF	High-Level Waste or	HLW
	Waste Incidental to Reprocessing if determined to be so	LLW, MLLW, or TRU

Example: A site with a low-level waste disposal facility has waste that has been accumulating in storage over the last 20 years. The waste is contaminated with less than 100 nCi/g (3700 Bq/g) of transuranic radionuclides so it does not meet the definition of

transuranic waste. Even though the transuranic radionuclide concentration is less than 100 nCi/g (3700 Bq/g), the low-level waste disposal facility performance assessment does not project that the waste can be disposed with a reasonable expectation of meeting the disposal performance measures. Rather than categorize the waste as a special case, performance assessment-limited waste, the site correctly categorizes the waste as a low-level waste and includes it as such in the site radioactive waste management program. Since it is included as a low-level waste and there is not an identified path to disposal, plans will be developed for resolving conditions which prevent its disposal, and its existence will be reported to Headquarters for consideration in complex-wide planning.

This requirement mandating the management of all radioactive wastes as one of the waste types is not intended to force a presumption about the hazards of managing a waste, nor to automatically define the management steps to be followed based on the categorization of a radioactive waste. Instead, it is intended to promote safe management and timely disposal by ensuring that all wastes subject to DOE O 435.1, including legacy waste and various wastes traditionally called special case wastes, are managed within one of the four existing waste programs. The hazards associated with the waste should still be the most important factor in determining the appropriate management steps for the waste. Therefore, it would be appropriate, for example, to manage all remote-handled waste in one location, even if some of it has been categorized as transuranic waste and some as low-level waste, as long as the waste containers are distinctly marked and segregated, if necessary to deter cross-contamination.

Example 1: The Defense Waste Processing Facility has a piece of failed equipment that is contaminated as a result of high-level waste operations. Site personnel characterize the failed equipment to determine the radioactive species and inventories. By applying the "waste incidental to reprocessing" process described in DOE M 435.1-1, Chapter II, High-Level Waste Requirements, site personnel determine that the failed equipment is low-level waste because it meets the evaluation criteria of Section II.B and can be disposed of in the onsite low-level waste disposal facility.

Example 2: A site has a waste known to be contaminated with transuranic radionuclides that has been accumulating in storage over the last 20 years. Because a method for disposing of the waste has not been determined, the waste has been called a special case waste. Site management determines that the waste meets the definition of transuranic waste. This categorization does not mean that the waste will necessarily be disposed of at WIPP. However, it establishes the program in which the waste will be managed and also the Manual requirements for managing the waste. Site management must ensure that the waste is appropriately managed as a transuranic waste, considering the hazards of managing it, and managed to achieve disposal in an appropriate waste disposal facility.

If a legacy waste is not characterized and the waste type is not known, then the organization responsible for the waste should:

- decide the program under which the waste should be managed;
- identify whether there is a path forward for disposition of the waste;
- delineate any issues associated with further management steps, including whether it requires further characterization;
- provide plans for accomplishing the steps needed to achieve disposal; and
- include this information in the documentation of the Site-Wide Radioactive Waste Management Program.

  Example: A piece of equipment remaining from certain processes no longer conducted at the site is in storage at Building 400. The equipment has been declared waste, but is not fully characterized. It has lead shielding which is known to be contaminated, and based on the processes it was used for, is called mixed low-level waste. It is included in the FY 1999 Site-Wide Radioactive Waste Management Program documentation as mixed low-level waste without a path forward for disposal, and management steps are described to fully characterize the equipment to confirm the waste type designation and to begin an options analysis for treatment and disposal. (Note: Documentation in this case is the information in the update to the Site's FFCA Treatment Plan.)

Figure 1 provides a logic diagram to assist in determining the proper waste type and the appropriate program for managing wastes. Guidance for each waste type chapter should also be consulted for more detailed information about characterization of specific wastes or waste streams. As noted above, any waste managed by the Department, pursuant to DOE M 435.1-1, must be identified as high-level, transuranic, low-level, or mixed low-level waste, and managed within the appropriate program. For many years some sites have identified as special case waste that would otherwise meet the definition of high-level, transuranic, or low-level waste. This term was initially used for any waste that did not have a disposition path and evolved to encompass waste which needed special attention. Special case waste designations should not be used, nor should separate systems and/or management programs be established outside the existing radioactive waste programs.

The Assistant Secretary for Environmental Management is responsible for developing and maintaining complex-wide programs for managing the three radioactive waste types (DOE M 435.1-1, Section I.2.B.(1)). Guidance on that requirement discusses the important elements to be included in a waste type management program. The guidance also explains how

this responsibility can be met through the existing four waste type specific programs. Specific guidance for the mixed low-level waste management program, which supplements the guidance on General Requirements, is provided in the guidance for a complex-wide low-level waste program, DOE M 435.1-1, Section IV.C.

Compliance with this requirement is met by demonstrating that all radioactive wastes are correctly categorized as high-level waste, transuranic waste, low-level waste, or mixed low-level waste, and that all waste and waste streams are managed under one of the four existing waste type specific management programs. For waste that is not adequately characterized, the Site-Wide Radioactive Waste Management Program documentation should detail the plans for management of this waste under one of the four programs and should include a step for confirming the waste type categorization.

Supplemental References:

1. *Resource Conservation and Recovery Act of 1976,* as amended, October 21, 1986.

2. NRC, 1969. "Proposed Rule Making, 10 CFR Part 50 Licensing of Production and Utilization Facilities," *Federal Register,* Vol. 34, No. 8712, U.S. Nuclear Regulatory Commission, Washington, D.C., June 3, 1969.

3. *Nuclear Waste Policy Act of 1982,* as amended, January 7, 1983.

4. *Low-Level Radioactive Waste Policy Amendments Act of 1985,* as amended, January 15, 1986.

5. *Waste Isolation Pilot Plant Land Withdrawal Act of 1992,* as amended, October 30, 1992.

6. EPA. *Identification and Listing of Hazardous Waste,* 40 CFR Part 261, U.S. Environmental Protection Agency, Washington, D.C.

7. DOE, 1990. *Radiation Protection of the Public and the Environment,* DOE 5400.5, U.S. Department of Energy, Washington, D.C., February 8, 1990.

8. *Uranium Mill Tailings Radiation Control Act,* as amended, 42 U.S.C. 7901 et seq., 1978.

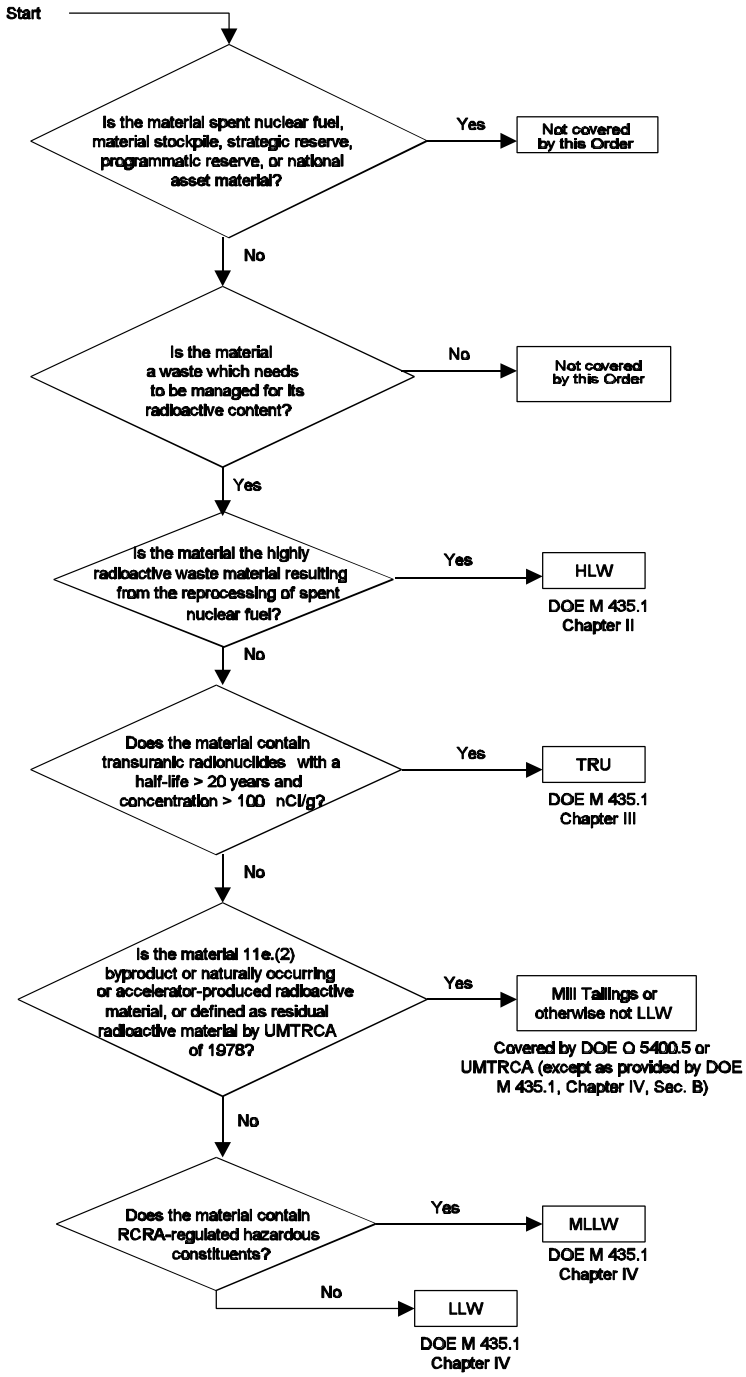

Figure 1 Logic Diagram for Waste-Type/Program

I. 1.D. Analysis of Environmental Impacts.

Existing and proposed radioactive waste management facilities, operations, and activities shall meet the requirements of 10 CFR Part 1021, *National Environmental Policy Act Implementing Procedures*; and DOE O 451.1A, *National Environmental Policy Act Compliance Program*. All reasonable alternatives shall be considered, as appropriate. Nothing in this Order is meant to restrict consideration of alternatives to proposed actions.

Objective:

The objective of this requirement is to ensure the protection of the public, workers, and the environment in the management of radioactive waste, and in particular, compliance with the requirements of the *National Environmental Policy Act.*

Discussion:

The safety and hazards analysis indicated that comprehensive evaluation and documentation of alternatives to radioactive waste management operations and activities was one way of ensuring that risks associated with the management of radioactive waste were understood, and avoided if possible. Additionally, compliance with the requirements of the *National Environmental Policy Act* (NEPA) is required for all Departmental actions. The requirements analysis concluded that the current set of requirements invoked by 10 CFR Part 1021, *National Environmental Policy Act Implementing Procedures*, and DOE O 451.1A, *National Environmental Policy Act Compliance Program*, adequately addressed the controls which were needed to effect such a program.

Under 10 CFR Part 1021, the Department adopts in full the regulations for implementing the *National Environmental Policy Act* published by the Council on Environmental Quality (CEQ) at 40 CFR Parts 1500 through 1508. 10 CFR Part 1021 lays out the procedures DOE decision making must follow and the general requirements for implementing the CEQ requirements for Department of Energy projects. In accordance with these requirements, the Department must review all actions to determine the significance of potential environmental impacts and, as appropriate, prepare environmental assessments and environmental impact statements; prepare, analyze, and consider alternatives; and provide for public participation in the Department's decision making processes.

DOE's Office of Environment, Safety, and Health (EH) has published extensive guidance on implementation of CEQ regulations and performing required NEPA analysis for DOE projects in a two volume set entitled, *National Environmental Policy Act Compliance Guide*. This guidance contains all the relevant sections of laws, and all Executive Orders, DOE policies, and policies from other governmental agencies that need to be considered in complying with NEPA

requirements for DOE projects, including those involving radioactive waste management facilities, operations, and activities. No additional guidance on complying with NEPA requirements or to evaluate radioactive waste management facilities, operations, and activities is needed.

Supplemental References:

1. DOE. *National Environmental Policy Act Implementing Procedures*, 10 CFR Part 1021, U.S. Department of Energy, Washington, D.C.

2. CEQ. *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*, 40 CFR Parts 1500-1508, Council on Environmental Quality, Executive Office of the President, Washington, D.C.

3. DOE, 1998. *National Environmental Policy Act Compliance Guide*, Volumes I and II, U.S. Department of Energy, Washington, D.C., August 1998.

I. 1.E. Requirements of Other Regulations and DOE Directives.

The following requirements and DOE directives are required for all DOE radioactive waste management facilities, operations, and activities as applicable. Any of the requirements for the following Departmental directives may be waived or modified through application of a DOE-approved requirements tailoring process, such as the "Necessary and Sufficient Closure Process" in DOE P 450.3 and DOE M 450.3-1 and DOE P 450.4, *Safety Management System Policy*, or by an exemption processed in accordance with the requirements of that directive or DOE M 251.1-1A, *Directives System Manual*.

Objective:

The objective of this requirement is to ensure the protection of the public, workers, and the environment in the management of radioactive waste through the implementation of controls required in other regulations and DOE Directives.

Discussion:

The safety and hazards analysis conducted during development of DOE O 435.1 and DOE M 435.1-1 was a comprehensive analysis which evaluated all functions of radioactive waste management from generation to post-closure of disposal facilities, and which considered potential impacts on the public, workers, and the environment. The analysis identified numerous weaknesses and conditions requiring controls that are addressed in other existing DOE directives or Federal regulations. During the requirements analysis, these directives and regulations were evaluated to determine if they adequately address the weaknesses and conditions identified in the safety and hazards analysis. It was determined that many of the directives and regulations include all of the controls necessary. Rather than repeating or paraphrasing existing requirements within DOE O 435.1 and DOE M 435.1-1, the current requirement invokes the controls of those directives and regulations in order to provide full regulation of the activities undertaken in the management of radioactive waste.

In the case of a few of the directives and regulations evaluated, certain controls were considered too generic to adequately address the specific needs in management of radioactive waste, but most of the controls were found to be adequate. Also, in the case of a few of the directives and regulations, emphasis on certain important requirements in them was considered necessary to ensure adequate protection of the public, workers, and the environment. In both of these cases, the current requirement invokes the controls of the existing directive or regulation, and additional requirements are added in DOE M 435.1-1. The need for additional controls is included in the guidance discussions addressing each of the existing directives or regulations which has been invoked.

The safety and hazard analysis conducted in support of the DOE O 435.1 and DOE M 435.1-1 requirements was conducted using generalized assumptions and generic facilities. It is recognized that this may have resulted in the directives list in this Section containing one or more directives that do not apply to certain facilities. This list is not meant to force a facility to comply with those directives, rather, the facility should continue to comply with only the applicable directives.

> *Example: Facility A is not a nuclear facility or activity. Therefore, the requirements of DOE O 420.1 and other nuclear safety orders are not being followed at Facility A. No additional requirements are invoked to replace these requirements, nor is there any implication that a provision of DOE M 435.1-1 is being violated.*

It is expected that the responsibilities which are assigned in these directives and regulations will be adhered to, as well as the requirements for processing exemptions and other administrative requirements. It is also expected that any implementation guidance which already exists for the other directives or regulations will be followed. The guidance discussions that follow include specific implementation guidance for radioactive waste management facilities which augments whatever implementation guidance already exists.

Waivers, Modifications, and Exemptions. Because the comprehensive safety and hazards analysis is the basis for inclusion of the controls of the other existing DOE directives and regulations in DOE M 435.1-1, the controls should be met to ensure the public, workers, and the environment are protected. However, since the safety and hazards analysis was conducted using generic scenarios for radioactive waste management, it is recognized that facility-specific requirements may be different. There are structured processes through which the requirements of DOE directives invoked in this section of DOE M 435.1-1 may be determined to be unnecessary or satisfied through application of some other requirement. See DOE P 450.3 and DOE M 450.3-1 on Necessary and Sufficient Closure Process. Also, an exemption may be requested and granted for DOE requirements which can be demonstrated to be unnecessary for protection of the public, workers, or the environment. Consistent with the guidance implementing the *Safety Management System Policy*, DOE P 450.4, this requirement does not allow exemptions from regulations or other requirements which are mandated by law. Regulatory relief from these regulations and requirements must be obtained by the contractor. See DOE M 450.3-1 and 48 CFR 970.5204-7(8).

The process that is used to justify a requirement as unnecessary or adequately addressed (e.g., "Necessary and Sufficient Closure Process" in DOE P 450.3 and DOE M 450.3-1 and DOE P 450.4, *Safety Management System Policy*) should be documented in accordance with the requirements and guidance of that process. If an exemption is used to demonstrate a requirement does not need to be met, the exemption should be documented in accordance with the process and requirements in the directive from which an exemption is being requested. If the subject directive does not have requirements for exemptions, then the requirements for exemptions in DOE M

251.1-1A, *Directives System Manual*, should be followed. Additionally, the documentation should be managed as an auditable record as long as the requirement is considered unnecessary or an exemption is in effect. Documentation that identifies a requirement as being unnecessary or adequately addressed, through the use of an accepted process and which meets the requirements of that process, should be considered complete and in compliance with the DOE M 435.1-1 requirement.

Each of the regulations and DOE directives invoked by the current requirement is identified below, and a discussion follows that includes information on why the regulation or directive is specifically identified in DOE M 435.1-1. Also, where needed, information on implementing the regulation or directive at DOE radioactive waste management facilities, operations, and activities is included, as well as references to other guidance sections that discuss the implementation of requirements in these regulations or directives.

I. 1.E.(1) Analysis of Operations Information. Data that measure the environment, safety, and health performance of radioactive waste management facilities, operations, and activities shall be identified, collected, and analyzed as required by DOE O 210.1, *Performance Indicators and Analysis of Operations Information*.

Discussion:

The functional and requirements analyses conducted in development of DOE O 435.1 and DOE M 435.1-1 concluded that an effective system for identification, monitoring, and analysis of important data and measurements of environment, safety, and health performance was an effective measure for identifying potential issues before they begin to propagate throughout the system or begin to present themselves at other facilities in the complex. The Complex-Wide and Site-Wide Radioactive Waste Management Programs required by DOE M 435.1-1 should include such a feedback mechanism as part of the evaluation process.

The requirements analysis indicated that the programs in compliance with DOE O 210.1, *Performance Indicators and Analysis of Operations Information*, were sufficient for effecting this type of program for radioactive waste management. The program should track and analyze appropriate measures of radioactive waste management performance in order to identify potential problems requiring technical or management attention before the safety of workers, the public, or the environment, is threatened. More guidance on an effective feedback mechanism for radioactive waste management programs can be found in guidance on DOE M 435.1-1, Sections I.2.B.(1) and I.2.F.(1). The Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 98-1, *Department of Energy Plan to Address and Resolve Safety Issues Identified by Internal Independent Oversight*, March 10, 1999, contains additional guidance for feedback and tracking systems.

I. 1.E.(2) Classified Waste. Radioactive waste to which access has been limited for national security reasons and cannot be declassified shall be managed in accordance with the requirements of DOE 5632.1C, *Protection and Control of Safeguards and Security Interests*, and DOE 5633.3B, *Control and Accountability of Nuclear Materials*.

Discussion:

During the safety and hazards analysis, no significant risks were identified concerning the management of DOE classified waste. However, the requirements analysis did conclude that any classified radioactive waste should continue to be managed appropriately, and if this meant that its classified status must be maintained, then the current requirements invoked by the Department for protecting and controlling classified materials were sufficient.

On the other hand, the requirements analysis also concluded that, if possible, the management of waste as classified should be continued only if necessary. Therefore, DOE M 435.1-1 contains a requirement to declassify or render suitable for unclassified radioactive waste management to the extent practical (DOE M 435.1-1, Section I.2.F.(17)) so it can be managed efficiently with other like wastes, which would help ensure consistency of controls and probably be less expensive. Guidance is provided on DOE M 435.1-1, Section I.2.F.(17) for making as much radioactive waste as practical suitable for unclassified management, thereby minimizing the amount that must continue to be managed as classified waste.

I. 1.E.(3) Conduct of Operations. Radioactive waste management facilities, operations, and activities shall be conducted in a manner based on consideration of the associated hazards. Waste management facilities, operations, and activities shall meet the requirements of DOE 5480.19, *Conduct of Operations Requirement for DOE Facilities*.

Discussion:

The safety and hazard analysis indicated that many weaknesses and conditions which could lead to potential radiation exposures and environmental contamination could be prevented through effective analysis of functions being conducted in management of waste and establishment of procedures to control the activities that would lead to the desired results. These types of required controls are already implemented by compliance with DOE 5480.19, *Conduct of Operations Requirement for DOE Facilities*, and this requirement serves to emphasize the continued importance of effective conduct of operations as a protective measure, especially in light of some of the complex activities that are needed in radioactive waste management. No additional guidance is provided here for implementing these requirements for radioactive waste management facilities, operations, or activities.

I. 1.E.(4) Criticality Safety. Radioactive waste management facilities, operations, and activities shall be covered by a criticality safety program in accordance with DOE O 420.1, *Facility Safety*.

Discussion:

The safety and hazard analysis identified that situations which could lead to criticality were a particularly high-risk aspect of radioactive waste management because the consequences of a rare event of this type could be catastrophic. The Department already requires a criticality safety program in compliance with DOE O 420.1, *Facility Safety*. This DOE M 435.1-1 requirement serves to emphasize that a criticality program in accordance with DOE O 420.1 must be in place for radioactive waste management facilities, operations, and activities for which criticality is an important consideration. No additional guidance is provided here for implementing these requirements for radioactive waste management facilities, operations, or activities.

I. 1.E.(5) Emergency Management Program. Radioactive waste management facilities, operations, and activities shall maintain an emergency management program in accordance with DOE O 151.1, *Comprehensive Emergency Management System.*

Discussion:

The safety and hazards analysis identified that an emergency management program which institutes precautions against potential situations which could lead to worker and public radiation exposures, and which can effectively respond to emergencies is a mitigating measure that should be in place for all radioactive waste management facilities, operations, and activities. The requirements analysis indicated that the programs required to be in compliance with DOE O 151.1, *Comprehensive Emergency Management System*, would be sufficient.

The safety and hazard analysis also revealed a few weaknesses and conditions concerning radioactive waste management that required special emphasis due to the consequences of accidents involving liquid radioactive waste. Therefore, additional requirements for contingency actions for radioactive waste management facilities, operations, and activities are found in each of the waste type chapters, and implementation guidance on the requirements (DOE M 435.1-1, Sections II.H, III.E, and IV.E) should be consulted for discussions on meeting those requirements by incorporating actions into the existing emergency response programs of DOE O 151.1.

I. 1.E.(6) Environmental and Occurrence Reporting. Radioactive waste management facilities, operations, and activities shall meet the reporting requirements of DOE O 231.1, *Environment, Safety and*

***Health Reporting*, and DOE O 232.1A, *Occurrence Reporting and Processing of Operations Information*.**

Discussion:

The functional and requirements analyses conducted in development of DOE O 435.1 and DOE M 435.1-1 concluded that a system for monitoring and reporting important environmental data and occurrences of certain actions or off normal events was an effective measure for mitigating radioactive waste management problems. Reporting is especially important for identifying potential issues before they propagate through the system or for identifying problems and issues before they present themselves at other facilities in the complex. The requirements analysis indicated that the programs already in place in compliance with DOE O 231.1, *Environment, Safety, and Health Reporting*, and DOE O 232.1A, *Occurrence Reporting and Processing of Operations Information*, were sufficient for effecting this type of program for radioactive waste management.

The Complex-Wide and Site-Wide Radioactive Waste Management Programs should incorporate these feedback mechanism as part of the evaluation process. More guidance on effective feedback mechanisms for radioactive waste management programs can be found in guidance on DOE M 435.1-1, Sections I.2.B.(1) and I.2.F.(1).

I. 1.E.(7) Environmental Monitoring. Radioactive waste management facilities, operations, and activities shall meet the environmental monitoring requirements of DOE 5400.1, *General Environmental Protection Program*, and DOE 5400.5, *Radiation Protection of the Public and Environment*.

Discussion:

The safety and hazard analysis identified that monitoring for releases of radiation and radioactive material to the environment was an especially important mitigating factor for potential weaknesses and conditions in radioactive waste management. The requirements analysis concluded that the environmental monitoring programs and plans, as required by DOE 5400.1, *General Environmental Protection Program;* and DOE 5400.5, *Radiation Protection of the Public and Environment*, implemented monitoring that would address the kinds of concerns evaluated in the analysis.

However, monitoring of disposed radioactive waste, because it must remain effective for a long time period following cessation of operations, presents a unique challenge. Additional monitoring of low-level waste disposal facilities is addressed in DOE M 435.1-1, Section IV.R. Implementation guidance for those requirements should be consulted for information on

incorporating additional low-level waste disposal facility performance monitoring into the environmental monitoring program and plans already required to be in compliance with the subject DOE Orders on environmental monitoring.

I. 1.E.(8) Hazard Analysis Documentation and Authorization Basis. Radioactive waste management facilities, operations, and activities shall implement DOE Standards, DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE 5480.23, Nuclear Safety Analysis Reports,* and/or DOE-EM-STD-5502-94, *DOE Limited Standard: Hazard Baseline Documentation,* and shall, as applicable, prepare and maintain hazard analysis documentation and an authorization basis as required by DOE O 425.1A, *Startup and Restart of Nuclear Facilities*, DOE 5480.21, *Unreviewed Safety Questions*, DOE 5480.22, *Technical Safety Requirements*, and DOE 5480.23, *Nuclear Safety Analysis Reports*.

Discussion:

The safety and hazard analysis that was conducted in development of DOE O 435.1 and DOE M 435.1-1 considered a generic or composite facility, operation, or activity in determining the risks associated with management of radioactive waste. During the analysis, it was recognized that for an actual facility, operation, or activity, the real risks posed could be different than those used in development of the set of requirements in the Manual. This requirement was included to ensure that, where appropriate, hazard analysis and documentation was prepared for actual facilities in accordance with the established DOE directives covered, so that if any more severe risks did exist with any radioactive waste management facilities, operations, or activities, then appropriate controls would be developed to mitigate them. Guidance that discusses the authorization basis that may be developed in implementing DOE O 425.1A, *Startup and Restart of Nuclear Facilities*, DOE 5480.21, *Unreviewed Safety Questions*, DOE 5480.22, *Technical Safety Requirements*, and DOE 5480.23, *Nuclear Safety Analysis Reports*, appears in discussions of the radioactive waste management basis requirement, DOE M 435.1-1, Section I.2.F.(2).

Supporting the implementation of the DOE Orders are two DOE Standards: DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, and DOE-EM-STD-5502-94, *DOE Limited Standard: Hazard Baseline Documentation*. The first Standard establishes guidance for the preparation and review of hazard categorization and accident analyses techniques as required in DOE 5480.23 and therefore, applies only to nuclear facilities, i.e., Hazard Category facilities/operations 1, 2, and 3. The second is a DOE-EM Limited Standard that establishes uniform Office of Environmental Management guidance on hazard baseline documents that identify and control radiological and

non-radiological hazards for all Office of Environmental Management facilities including nuclear, radiological, non-nuclear, and industrial.

Supplemental References:

1. DOE, 1992. *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, DOE-STD-1027-92, U.S. Department of Energy, Washington, D.C., December 1992.

2. DOE, 1994. *DOE Limited Standard: Hazard Baseline Documentation*, DOE-EM-STD-5502-94, U.S. Department of Energy, Washington, D.C., August 1994.

I. 1.E.(9) Life-Cycle Asset Management. Planning, acquisition, operation, maintenance, and disposition of radioactive waste management facilities shall be in accordance with DOE O 430.1A, *Life-Cycle Asset Management*, and DOE 4330.4B, *Maintenance Management Program*, including a configuration management process to ensure the integrity of physical assets and systems. Corporate physical asset databases shall be maintained as complete, current inventories of physical assets and systems to allow reliable analysis of existing and potential hazards to the public and workers.

Discussion:

The hazards analysis and requirements analysis conducted in development of DOE O 435.1 and DOE M 435.1-1 indicated that effective planning throughout the entire life of a facility or process, coupled with a maintenance program to maintain facilities and systems in proper working order, and configuration management to orderly track changes and decisions made in the life of a facility or operation, were effective ways to avoid problems in management of radioactive waste. DOE O 430.1A, *Life-Cycle Asset Management*, provides for the kind of planning and configuration management envisioned by the development process, and is cited in this requirement for emphasis. Likewise, the maintenance process required by DOE 4330.4B, *Maintenance Management Program*, would achieve adequate maintenance for radioactive waste management facilities, operations, and activities, and is also cited for emphasis. The guidance for the following requirements should be consulted for incorporation of aspects of implementation of the process and programs required by these Orders into radioactive waste management facilities, operations, and activities: DOE M 435.1-1, Section II.P.(2); Section III. M.(2); and Section IV.M.(2).

However, both the safety and hazards and the requirements analyses indicated that some of the specific weaknesses and conditions which could be experienced with management of radioactive

waste are not covered by the planning required by DOE O 430.1A, *Life-Cycle Asset Management*. Specific weaknesses identified that were not adequately addressed by DOE O 430.1A requirements dealt with planning and facility closure when waste streams requiring additional management or which had no path to disposal were involved. An emphasis on life-cycle planning for cradle-to-grave management of waste streams from facilities, operations, and activities was thought to cover these weaknesses and conditions that need controlling in the management of radioactive waste. Therefore, the concept of life-cycle planning for waste streams is introduced in DOE O 435.1 and DOE M 435.1-1. The incorporation of life-cycle planning for radioactive waste is discussed in guidance for the Complex-Wide and Site-Wide Radioactive Waste Management Programs (DOE M 435.1-1, Sections I.2.B.(1) and I.2.F.(1)), and the Radioactive Waste Generator Requirements (DOE M 435.1-1, Section I.2.F.(7)).

I. 1.E.(10) Mixed Waste. Radioactive waste that contains both source, special nuclear, or by-product material subject to the *Atomic Energy Act of 1954*, as amended, and a hazardous component is also subject to the *Resource Conservation and Recovery Act* (RCRA), as amended.

Discussion:

The potential additional risks posed by mixed radioactive waste due to the hazardous constituents involved, and the complexities of managing mixed radioactive waste, have been recognized for years. This requirement acknowledges the regulation of the hazardous constituents of mixed radioactive wastes in accordance with the *Resource Conservation and Recovery Act* (RCRA), as amended or in accordance with state hazardous waste regulations promulgated under RCRA authority. Each of the waste type chapters in DOE M 435.1-1 contains additional requirements for mixed radioactive wastes. Guidance for those additional requirements (DOE M 435.1-1, Sections II.C, III.B, and IV.B.(1)) should be consulted to find discussions on management of radioactive mixed waste under DOE O 435.1. Also, implementation guidance on the Department's management of mixed low-level waste is in the guidance on the Complex-Wide Low-Level Waste Management Program requirement, DOE M 435.1-1, Section IV.C.

I. 1.E.(11) Packaging and Transportation. Radioactive waste shall be packaged and transported in accordance with DOE O 460.1A, *Packaging and Transportation Safety*, and DOE O 460.2, *Departmental Materials Transportation and Packaging Management*.

Discussion:

The Department of Transportation maintains regulations covering the transportation of radioactive materials, and DOE will continue to meet these requirements for all applicable transportation situations. This requirement emphasizes the need to continue to meet DOE O

460.1A, *Packaging and Transportation Safety*, and DOE O 460.2, *Departmental Materials Transportation and Packaging Management,* for all transportation of radioactive waste. However, the safety and hazard analysis revealed weaknesses and conditions concerning packaging of radioactive waste and waste containers that are not sufficiently covered in the existing transportation regulations because of the long time frames radioactive waste needs to be managed compared with the short time radioactive waste is in transport. Therefore, additional requirements for packaging and transportation of radioactive waste are found in each of the waste type chapters, and guidance for the requirements (DOE M 435.1-1, Sections II.O, III.L, and IV.L) should be consulted for discussions on meeting those requirements.

I. 1.E.(12) Quality Assurance Program. Radioactive waste management facilities, operations, and activities shall develop and maintain a quality assurance program that meets the requirements of 10 CFR 830.120, *Quality Assurance Requirements*, and DOE O 414.1, *Quality Assurance*, as applicable.

Discussion:

The safety and hazards analysis indicated that a strong quality assurance program is appropriate because of the risks posed by the management of DOE's radioactive waste. The analysis of requirements concluded that most of the requirements already imposed for quality assurance programs in 10 CFR 830.120, *Quality Assurance Requirements and Responsibilities,* and DOE O 414.1, *Quality Assurance*, would establish a sufficient program to maintain the quality of products and processes needed for radioactive waste management. Some specific additional quality assurance program requirements are invoked for high-level waste management in DOE M 435.1-1, Section II.G, and the guidance for those requirements should be consulted to determine how they can be implemented within the quality assurance programs already in place as a result of compliance with 10 CFR 830.120 and DOE O 414.1.

I. 1.E.(13) Radiation Protection. Radioactive waste management facilities, operations, and activities shall meet the requirements of 10 CFR Part 835, *Occupational Radiation Protection,* and DOE 5400.5, *Radiation Protection of the Public and the Environment*.

Discussion:

The protection of humans and the environment from the dangers of radiation due to radioactive waste management facilities, operations, and activities is a fundamental requirement of the revised DOE O 435.1, *Radioactive Waste Management,* and is invoked in DOE O 435.1, Section 4, *Requirements*. This DOE M 435.1-1 requirement emphasizes the need to ensure that the requirements of 10 CFR Part 835, *Occupational Radiation Protection,* and DOE 5400.5,

Radiation Protection of the Public and the Environment, are met for radioactive waste management facilities, operations, and activities.

An important element of these DOE directives is the As Low As Reasonably Achievable (ALARA) process. The Manual contains a specific requirement for the Field Element Manager to ensure that the ALARA principles are incorporated for radioactive waste management facilities, operations, and activities. The guidance on that Manual requirement (DOE M 435.1-1, Section I.2.F.(12)) should be consulted for additional information in implementing the ALARA principles for activities covered by this Manual.

I. 1.E.(14) Records Management. Radioactive waste management facilities, operations, and activities shall develop and maintain a record-keeping system, as required by DOE O 200.1, *Information Management Program*, and DOE O 414.1, *Quality Assurance*. Records shall be established and maintained for radioactive waste generated, treated, stored, transported, or disposed. To the extent possible, records prepared in response to other requirements may be used to satisfy the documentation requirements of this Manual. Additional records may be required to satisfy the regulations applicable to the hazardous waste components of mixed waste.

Discussion:

The safety and hazards analysis demonstrated that management of information important to understanding the risks posed by radioactive waste and the needs for establishing controls was an important control in and of itself. This mitigating factor showed up in many places in the analysis, and the requirements analysis indicated that DOE O 200.1, *Information Management Program*, and DOE O 414.1, *Quality Assurance*, provided for the necessary programmatic considerations in establishing effective records and information management.

However, some of the specific controls which were thought necessary for managing the technical adequacy and accuracy needed for radioactive waste records, especially considering the magnitude of consequences that could be involved and the long time frames associated with disposal of waste, are not specific enough in these two orders. Thus, there are specific references in many places in all three waste type chapters to establishing a particular kind of record, what the record may be used for, and some indication of the time the record must be kept. These additional considerations are then discussed in the guidance that explains that requirement in detail. It is intended that the programmatic recordkeeping requirements of the particular site will incorporate the necessary changes and accommodations to implement the intent of the DOE M 435.1-1 recordkeeping requirement.

Records for Waste Generated, Treated, Stored, Transported, and Disposed. The requirement states that records shall be established for radioactive waste generated, treated, stored, transported, or disposed. The intention of this part of the requirement is to emphasize that records should be kept throughout the entire life-cycle of the waste, including after it is disposed. To that end, there are specific requirements for recordkeeping in waste certification, waste transfer, high-level waste disposal, low-level waste storage, and radioactive waste management basis sections of DOE M 435.1-1. Site- or facility-specific recordkeeping requirements for any radioactive waste management functions that are deemed necessary in addition to the requirements called out in DOE M 435.1-1 should be established in order to maintain the information important to protection of the public, workers, and the environment.

Use of Other Documentation Requirements. It is possible that documentation required by other DOE directives, regulations, or site- or facility-specific requirements may contain all the necessary information needed and be maintained adequately for radioactive waste management recordkeeping. To the extent practical, any other recordkeeping requirements that are already being complied with should be used, or modified if appropriate, to meet the recordkeeping requirements of DOE M 435.1-1. It is not intended that duplicate or additional recordkeeping be established to meet DOE M 435.1-1 requirements where sufficient recordkeeping already exists.

Mixed Waste Documentation Requirements. Additional recordkeeping and records management requirements may be needed for radioactive mixed waste to comply with Federal and/or State hazardous waste requirements. This part of the requirement stands as a reminder that the hazardous waste records requirements must still be complied with regardless of the records management requirements for the radioactive contaminants being addressed in DOE M 435.1-1. Unless it is agreed to by the appropriate regulators for the hazardous component of mixed waste, the recordkeeping requirements of DOE M 435.1-1 do not necessarily achieve compliance with the separate requirements for the hazardous component of the waste.

I. 1.E.(15) Release of Waste Containing Residual Radioactive Material. The process for determining and documenting that waste is suitable to be released and managed without regard to its radioactive content shall be in accordance with the criteria and requirements in DOE 5400.5, *Radiation Protection of the Public and the Environment*.

Discussion:

The requirements analysis indicated that controls for the management of radioactive waste in DOE M 435.1-1 may not be necessary for wastes that may have low concentrations of residual radioactive material. Consistent with DOE 5400.5, *Radiation Protection of the Public and the Environment*, this requirement allows the determination of waste streams that may be managed without regard to their radioactivity. The current requirements in DOE 5400.5, *Radiation*

Protection of the Public and the Environment, along with implementation guidance established by the Office of Environment, Safety, and Health, for making and documenting these determinations should be consulted for appropriately managing waste streams without regard to their radioactive content.

I. 1.E.(16) Safeguards and Security. Appropriate features shall be incorporated into the design and operation of radioactive waste management facilities, operations, and activities to prevent unauthorized access and operations, and for purposes of nuclear material control and accountability, where applicable; and shall be consistent with DOE O 470.1, *Safeguards and Security Program*.

Discussion:

The requirements analysis concluded that the current requirements delineated in DOE O 470.1, *Safeguards and Security Program*, adequately provide for the safeguarding of classified information and material as well as security for radioactive waste management facilities, operations, and activities. Therefore, DOE O 470.1 is cited in DOE M 435.1-1 for emphasis. No additional implementation guidance is considered necessary to address any special needs of the required programs due to the management of radioactive waste.

I.1.E.(17) Safety Management System. Radioactive waste management facilities, operations, and activities shall incorporate the principles of safety management as described in DOE P 450.4, *Safety Management System Policy*, and DOE P 450.5, *Line Environment, Safety and Health Oversight*, and meet the requirements of the safety management systems sections of 48 CFR Chapter 9, *Department of Energy Acquisition Regulations* and DOE M 411.1-1, *Manual of Safety Management Functions, Responsibilities, and Authorities.*

Discussion:

DOE P 450.4, *Safety Management System Policy*, establishes the Department's policy that a formal, organized process shall be used for planning, performing, assessing, and improving the safe conduct of work. DOE P 450.5, *Line Environment, Safety and Health Oversight*, establishes the Department's policies that line management conduct environment, safety and health line oversight in a cost-effective, coordinated, integrated, and efficient manner that is seamless to contractors and that value is placed on the Department's line managers and contractors working together to identify and ensure resolution of environment, safety and health concerns. In keeping with this Departmental policy, the principles of integrated safety management were embodied in the technical analyses and processes used to determine the essential requirements of the DOE

Order and Manual on radioactive waste management. The core functions for implementing these principles are (1) define the scope of work; (2) analyze the hazards; (3) develop and implement hazard controls; (4) perform work within the controls; and (5) provide feedback and continuous improvement.

Requirements for these policies are set forth in Chapter 9 of Title 48, the *Department of Energy Acquisition Regulations*, and in DOE M 411.1-1, *Manual of Safety Management Functions, Responsibilities, and Authorities.* These requirement sets are invoked in DOE M 435.1-1 not only because of the flowdown of the Departmental policies, but also because the implementation of the policies in the Order and Manual were done through evaluating generic situations on a complex-wide basis. The actual implementation of the policies for radioactive waste management facilities, operations, and activities is required on an actual site- and facility-specific basis. Guidance for implementation of a compliant integrated safety management system is found in DOE G 450.4-1A, *Safety Management System Guide*. No additional guidance is needed for implementing a system for radioactive waste management facilities, operations, and activities.

I. 1.E.(18) Site-Evaluation and Facility Design. New radioactive waste management facilities, operations, and activities shall be sited and designed in accordance with DOE O 420.1, *Facility Safety,* and DOE O 430.1A, *Life-Cycle Asset Management.*

Discussion:

The safety and hazards analysis demonstrated that the selection and evaluation of a suitable site plus an appropriate facility design that considered the characteristics of the site chosen were effective mitigation measures to prevent potential problems with the management of radioactive waste, especially when the long-time frames required for effective management of disposed waste are considered. The provisions of DOE O 420.1, *Facility Safety*, and DOE O 430.1A, *Life-Cycle Asset Management*, were evaluated and found to be adequate in providing the necessary controls in radioactive waste management. In addition to these Orders, refer to the DOE Handbook, DOE-HDBK-1132-99, *Design Considerations*. This Handbook includes information and considerations for the design of systems typical to nuclear facilities, design considerations specific to various types of special facilities, and information useful to various design disciplines. The Handbook specifically includes design considerations for confinement systems and radiation protection and effluent monitoring systems as well as good practices and design principles that should be considered in specific design disciplines.

The DOE M 435.1-1 waste-type chapters contain specific requirements to supplement DOE O 420.1 and DOE O 430.1A for radioactive waste management facilities. DOE M 435.1-1 (Sections II.P, III.M, and IV.M) contains detailed additional requirements for both site evaluation and facility design.

The intent of the specific facility design requirements in each waste type chapter is to have them applied to all radioactive waste management facilities, both existing and new. However, it is recognized that in some cases it may not be practical, or possible, to apply these requirements to existing facilities or operations. In such cases a graded application of the requirement, or an exemption to the requirement, may be warranted. Use of a graded application or exemption to the requirements may be due to limited programmatic usage, a short service life, or other reasons that make long-term, capital intensive upgrades unreasonable. The guidance for the DOE M 435.1-1 waste type specific facility design requirements contain discussions for conducting adequate facility designs for radioactive waste management facilities, operations, and activities and additional discussions on the application of a graded approach to achieving compliance with the requirements.

I. 1.E.(19) Training and Qualification. A training and qualification program shall be implemented for radioactive waste management program personnel, and shall meet the requirements of DOE O 360.1, *Training*, and DOE 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*.

Discussion:

The safety and hazards analysis indicated that an effective mitigating measure for a large number of weaknesses and conditions that could arise in management of radioactive waste was an effective program for qualification and training of personnel. The requirements analysis indicated that DOE's current programs implementing DOE O 360.1, *Training*, and DOE 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities* were adequate in establishing effective radioactive waste management personnel qualification and training programs.

It is expected that some changes, additions, or improvements to the existing radioactive waste management personnel qualification and training programs would be needed to train personnel on the new and revised requirements of DOE O 435.1 and DOE M 435.1-1. The Field Element Manager is assigned a specific responsibility in DOE M 435.1-1, Section I.2.F.(11) to ensure that this training and re-qualification is reflective of each individuals specific job responsibilities and the changes and improvements made to the radioactive waste management Order. Guidance on DOE M 435.1-1, Section I.2.F.(11) should be consulted for more discussion about the implementation of a radioactive waste management qualification and training program.

I. 1.E.(20) Waste Minimization and Pollution Prevention. Waste minimization and pollution prevention shall be implemented for radioactive waste management facilities, operations, and activities to meet the requirements of Executive Order 12856, *Federal Compliance with*

***Right-to-Know Laws and Pollution Prevention Requirements*, and Executive Order 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition*, and DOE 5400.1, *General Environmental Protection Program*.**

Discussion:

The safety and hazards analysis indicated that an effective mitigating measure in management of radioactive waste was to avoid potential weaknesses and conditions through minimization of waste. The requirements analysis indicated that DOE's current programs implementing Executive Order 12856, *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements and Responsibilities*, and Executive Order 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition*, and DOE 5400.1, *General Environmental Protection Program*, were adequate in establishing effective waste minimization programs. In addressing this subject, the NRC endorsed EPA's *Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program* (*59 FR 31114*). This guidance should be reviewed for applicability to site waste minimization issues, and establishing a waste minimization program. For emphasis, the Field Element Manager is assigned a specific responsibility in DOE M 435.1-1, Section I.2.F.(3) to ensure that a waste minimization program is fully implemented.

I. 1.E.(21) Worker Protection. Radioactive waste management facilities, operations, and activities shall meet the requirements of DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*.

Discussion:

The safety and hazards analysis indicated that many risks were posed by the management of radioactive waste that were related to non-radioactive characteristics of the waste, and/or by activities that would need to be carried out on the waste regardless of its radioactive content. A few examples of these activities are: conducting activities in tight spaces, handling of heavy, unstable packages, and operation of forklifts. The requirements analysis concluded that the requirements of DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees* adequately covered these risks and should be cited in DOE M 435.1-1 for completeness. DOE O 440.1A invokes external Occupational Safety and Health Administration requirements (e.g., 29 CFR Part 1910, *Occupational Safety and Health Standards)* for both DOE Federal and contractor personnel, along with several industrial and consensus standards for safe workplaces, such as the American Society of Mechanical Engineers' *Boiler and Pressure Vessel Safety Code*, and the National Fire Protection Association's *Electrical Safety Requirements for*

Employee Workplaces. No additional implementation guidance is needed for implementing DOE O 440.1A for radioactive waste management facilities, operations, or activities.

Supplemental References:

1. DOE. *Nuclear Safety Management, Quality Assurance Requirements,* 10 CFR 830.120, U.S. Department of Energy, Washington, D.C.

2. DOE, 1995. *Facility Safety*, DOE O 420.1, U.S. Department of Energy, Washington, D.C., October 13, 1995.

I. 2.A. Program Secretarial Officers.

Program Secretarial Officers with radioactive waste management facilities, operations, or activities are responsible within their respective programs for ensuring that the Field Element Managers meet the requirements of DOE O 435.1, *Radioactive Waste Management,* and this Manual.

Objective:

The objective of this requirement is to ensure DOE Headquarters management attention and oversight of Field Offices' management of radioactive waste.

Discussion:

This requirement applies to any Program Secretarial Officer (PSO) that has responsibility for facilities, operations, or activities involving the management of radioactive waste. PSOs should be cognizant of Field radioactive waste management activities under their purview and provide appropriate oversight of Field Element Manager's implementation of DOE O 435.1 and DOE M 435.1-1.

A key to successful compliance with any DOE Directive is oversight. This is particularly true of directives which, like DOE O 435.1 and DOE M 435.1-1, have performance-oriented requirements that call for review and approval of site- or facility-specific implementation of procedures and other controls to ensure the requirements are being met. Oversight is defined (DOE M 435.1-1, Attachment 2) as:

> The responsibility and authority assigned to line management to assess the adequacy of DOE and contractor performance. Independent Oversight refers to the responsibility and authority assigned to the Assistant Secretary for Environment, Safety, and Health to independently assess the adequacy of DOE and contractor performance.

The DOE complex has initiated the integrated Safety Management System under Secretarial policies DOE P 450.4, *Safety Management System Policy*, DOE P 450.5, *Line Environment, Safety, and Health Oversight*, and DOE P 411.1, *Safety Management Functions, Responsibilities, and Authorities Policy*. These policies are invoked by DOE M 435.1-1, I.1.E.(17) for the purposes of emphasis and clarity. DOE P 450.4 provides the overall goals and objectives of the DOE integrated Safety Management System. Core function No. 5, "Provide Feedback and Continuous Improvement," calls for a system of evaluations and reporting in order to continuously improve in achieving the goals and requirements for safety and protection of the environment. DOE P 450.5 explains that line management has the responsibility for oversight of

DOE facilities, operations, and activities, including those involving management of radioactive waste.

It is expected that the revised requirements of DOE O 435.1 and DOE M 435.1-1 will be incorporated into contractor self-assessments established under the integrated Safety Management System, and incorporated into the Field Office oversight of the contractor programs, as appropriate. Similarly, under the Safety Management System policies, PSOs have the responsibility to monitor the Field Office oversight and participate in Field Office oversight functions, as appropriate. Likewise, under the Safety Management Systems policies, the Assistant Secretary for Environment, Safety, and Health (EH-1) has the responsibility to assess the adequacy of Field Office and contractor performance, and it is expected that the revised DOE O 435.1 and DOE M 435.1-1 requirements will be assimilated into the Assistant Secretary for Environment, Safety, and Health's programs for independent oversight at his/her discretion.

> *Example: The Assistant Secretary for Defense Programs (DP-1) has been delegated the responsibility for waste management at the Kansas City Plant. He has delegated the authority for this responsibility to DP-24, the Office of Site Operations. DP-24 directs personnel in his organization to conduct an annual evaluation at the Kansas City Plant during which they assess the site's implementation of DOE O 435.1 and DOE M 435.1-1. DP-24 is advised of any non-compliance issues and in turn advises DP-1 of these issues.*

Compliance with this requirement is demonstrated by appropriate incorporation of DOE O 435.1 and DOE M 435.1-1 requirements within the functions, responsibilities, authorities, and requirements explained in the set of Safety Management System directives. This results in thorough and effective oversight of radioactive waste management facilities, operations, and activities, and assurance that the public, workers, and the environment are protected from the hazards associated with management of radioactive waste.

Supplemental References:

1. DOE, 1997. *Safety Management Functions, Responsibilities, and Authorities Policy*, DOE P 411.1, U.S. Department of Energy, Washington, D.C., January 28, 1997.

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

3. DOE, 1997. *Line Environment, Safety and Health Oversight*, DOE P 450.5, U.S. Department of Energy, Washington, D.C., June 26, 1997.

4. DOE, 1997. *Manual of Safety Management Functions, Responsibilities, and Authorities*, DOE M 411.1-1, U.S. Department of Energy, Washington, D.C., October 8, 1997.

5. DOE, 1992. *Environmental Audit Program Guidance*, DOE/EH-0232, U.S. Department of Energy, Washington, D.C., January 1992.

6. DOE. *Performance Objective and Criteria for Conducting DOE Environmental Audits*, DOE/EH-0229, U.S. Department of Energy, Washington, D.C.

I. 2.B. Assistant Secretary for Environmental Management.

The Assistant Secretary for Environmental Management is responsible for:

(1) Complex-Wide Radioactive Waste Management Programs. Establishing and maintaining integrated Complex-Wide Radioactive Waste Management Programs for high-level, transuranic, low-level, and mixed low-level waste. These programs shall use a systematic approach to planning, execution, and evaluation to ensure that waste generation, storage, treatment, and disposal needs are met and coordinated across the DOE complex.

Objective:

The objective of this requirement is to ensure development of complex-wide programs that result in the safe and efficient management of all DOE high-level, transuranic, low-level, and mixed low-level waste. The programs are to ensure coordination among DOE sites and among Headquarters program offices. Such programs provide Headquarters and Field personnel a common basis for carrying out the radioactive waste management programs' missions.

Discussion:

The Department is responsible for managing radioactive waste in a manner that is protective of the public, workers, and the environment. To accomplish this in the most efficient manner, and to make the best use of resources, programs for managing the various waste types need to be coordinated among Headquarters Program Offices and among the DOE sites. Radioactive waste subject to the *Radioactive Waste Management Order* (DOE O 435.1) and the Manual (DOE M 435.1-1) is to be managed within one of four waste-type programs in accordance with the Radioactive Waste Management requirement of the Manual (DOE M 435.1-1, Section I.1.C). The complex-wide programs must respond to current needs affecting the safe, effective, and efficient management of waste. The complex-wide programs should provide a vision of the final disposition of each waste type for the complex, yet need to be responsive to the issues that arise at individual DOE sites.

The Assistant Secretary for Environmental Management is assigned responsibility for maintaining programs for managing each waste type to ensure that there is a focal point for managing the wastes and ensuring integration across the complex. Integration across the complex involves coordinating treatment, storage, and disposal to allow the needs of one site to be met by capabilities at another site, if practical. To that end, activities at individual DOE sites should support the complex-wide program by providing data needed for complex-wide planning (e.g., waste inventories and projections, facility capacities) and by budgeting for and executing site activities that lead to accomplishing complex-wide program goals. Conversely, the complex-wide

program should also be supportive of the site programs by establishing realistic goals and resolving complex-wide issues (e.g., disposal configurations, equity issues, certain issues affecting waste with no path to disposal), and should be developed with cognizance of individual site constraints (e.g., agreements with State or local governments, compliance orders).

In addition to ensuring integration across the complex, assigning the Assistant Secretary for Environmental Management responsibility for program development and maintenance also provides a focal point for coordination across all Headquarters Program Offices. Thus, regardless of whether other Headquarters program offices (e.g., Defense Programs, Science) have responsibility for various waste management activities, the Assistant Secretary for Environmental Management is responsible for ensuring that activities are coordinated within the waste type programs.

The requirement calls for a program for each waste type. This is consistent with the way DOE manages the radioactive waste types and allows the focus of the program to be on the characteristics and/or legal and regulatory requirements specific to the waste type. For example, the regulatory constraints on disposal vary among the waste types. DOE plans to dispose of high-level waste in a geologic repository so the end point objective of the high-level waste program is to convert the waste into a form that meets the waste acceptance criteria for the repository. Federal legislation provides for the disposal of defense transuranic waste in a geologic repository, separate from the spent nuclear fuel/high-level waste repository. Waste characteristics and the need to coordinate transportation to the repository provides the common basis for having a transuranic waste management program. The Department's policy and regulatory authority for onsite disposal of low-level waste establishes the underlying basis for addressing this waste within a program; and in part, because of the overlay of external requirements, mixed low-level waste is addressed within a separate program.

Although individual programs for the waste types are established at the complex-wide level, separate programs for each waste type are not required at the DOE sites. Rather, the site programs are to be developed in a manner that the Field Element Manager deems appropriate, as long as the site programs support the individual complex-wide programs (see guidance for Site-Wide Waste Management Program).

A systematic approach for managing each waste type should provide all of the organizations involved in the program with a common framework within which they can discharge their responsibilities. The program framework should identify the overall mission of the program, the key program participants, participants roles, and expected accomplishments. The top-level functions of the program are *planning* or formulation, *execution*, and *evaluation*. The *planning function* identifies the organizations or sites responsible for implementing the strategies and activities directed at accomplishing the program mission. Under the *execution function* of the program, each organization performs the work for which it is responsible. For example, site

personnel would perform the activities associated with storing, treating, and disposing of waste and Headquarters personnel would perform the necessary coordination, data collection and analysis, and further complex-wide planning. The *evaluation function* provides the means of improving the program by learning from the experience gained through execution of the program. Each of these functions is discussed in more detail below.

Planning. A systematic approach to planning involves identifying and defining those aspects of the program necessary for the sites to execute their individual responsibilities. The planning should be consistent with DOE policies, other programs, and controlling or higher level documents that specify DOE policy or direction.

> *Example: The waste type programs need to be consistent with the overall plan for clean up of DOE sites developed under the auspices of the Assistant Secretary for Environmental Management. The Assistant Secretary's plan is a higher level document establishing policy and direction for environmental restoration and waste management activities in the Department.*

The complex-wide program for each waste type should be defined in terms of *scope*, *mission*, *goals* and *objectives*, *priorities*, and *interfaces*. As used here, the term scope means the boundaries of the program, such as the waste and the waste management facilities and activities that are included in the program. The *mission*, and *goals* and *objectives* provide program participants a common view of what the program is intended to accomplish in the short and long term. The *priorities* address the order of importance of the goals, objectives and activities to be accomplished. A priority may be based on the need to complete a fairly minor activity in order to support a subsequent activity. The *interfaces* describe where and how the program interactions occur, both within the program and with other organizations and facilities outside of the program. A key interface for each waste type program is the interaction with the other waste type programs since there are occasions when waste exits one program and enters another programs (e.g., see guidance on Waste Incidental to Reprocessing).

In order to ensure that waste management needs will be met (e.g., sufficient waste storage capacity), it is necessary to have data on inventories of waste and estimates of future waste receipts to compare with current and projected facility capacities. These data provide the basis for determining the strategy for meeting current and future waste management needs. A strategy for meeting waste management needs may include constructing new facilities (permanent or mobile), using commercial facilities or capabilities, coordinating among DOE sites, or combinations of these and other actions. The Assistant Secretary also needs to ensure that *National Environmental Policy Act* (NEPA) analyses are performed to support policy-making and configuration decisions.

Lastly, the planning function includes developing and submitting a budget request to implement the planned program activities. Depending on organizational responsibilities assigned at Headquarters, the Assistant Secretary for Environmental Management may not be responsible for funding all waste management activities. However, in exercising the responsibility assigned by this requirement, the Assistant Secretary should be cognizant of the funding for waste management being requested by other Program Offices to ensure that waste management activities are integrated. In performing budget planning, it is necessary to plan for events far enough into the future to allow sufficient lead time for the Federal funding process. Generally, this requires identifying major expenditures two or three years in advance.

Implementation of the program planning activities may be provided for by existing actions undertaken by or on behalf of the Assistant Secretary for Environmental Management. To the extent the planning function is already met by ongoing activities (e.g., the annual budget submittal, existing waste type program plans), no additional effort is required to fulfill this responsibility.

Execution. Execution of the waste management programs involves those activities taken to implement planning. At the complex-wide level, execution will involve performing the studies and analyses that form the basis for resolving issues and conducting future planning. At the site level, execution includes the generation, storage, treatment, and disposal of waste. In addition, program execution includes data collection and documentation associated with waste management activities, as well as construction and procurement activities necessary to provide future waste management capabilities.

Evaluation. An important part of a systematic approach to the waste management programs is evaluating the work accomplished during the execution phase. Progress should be measured against programmatic goals established during the planning phase. In addition, success should be measured against parameters established to evaluate protection of the public, workers, and the environment. The evaluation should include the following elements:

Performance Measures. Metrics should be used in evaluating performance against program, and environmental, health, and safety goals should be selected and agreed to by Headquarters and the field;

Performance Data. Performance data should be collected from across the complex to enable evaluation of performance relative to the measures selected above;

Performance Evaluation and Reporting. Collected data should be reduced into a form that allows it to be analyzed against the metrics and to allow it to be interpreted and evaluated for performance and trends; and

Feedback. Information should be provided for use in the planning process and for use by the sites in improving performance. Feedback should be in the form of recommendations for potential changes to program policies, goals, priorities, strategies, or interfaces. Additionally, feedback may include recommendations on methods to improve protection of the environment, and human health and safety, either through top-level management actions (e.g., administration of contractor award fees) or working level management actions (e.g, changes to site operating practices and/or procedures).

The process of *planning*, *execution*, and *evaluation* is iterative. The lessons learned from the activities undertaken during one fiscal year, or changes in the assumptions on which the program strategy was based, will require revising the program planning. This in turn will affect the execution of the program, and therefore the performance measures that will be included in the evaluation step.

Compliance with this requirement is demonstrated if complex-wide waste type programs exist for high-level, transuranic, low-level, and mixed low-level waste. These programs should result in safe and efficient management of all DOE radioactive waste and ensure coordination among DOE sites and programs.

Supplemental References:

1. DOE, 1997. *Safety Management Functions, Responsibilities, and Authorities Policy*, DOE P 411.1, U.S. Department of Energy, Washington, D.C., January 28, 1997.

2. DOE, 1997. *Manual of Safety Management Functions, Responsibilities, and Authorities*, DOE M 411.1-1, U.S. Department of Energy, Washington, D.C., October 8, 1997.

3. DOE, 1996. *DOE Low-Level Waste System Description Document*, U.S. Department of Energy, Office of Environmental Management, September 1996.

I. 2.B.(2) Changes to Regulations and DOE Directives. Ensuring changes to regulations and DOE directives are reviewed and, when necessary, incorporated into revisions of this Manual to ensure the basis for safe radioactive waste management facilities, operations, and activities is maintained.

Objective:

The objective of this requirement is to ensure that changes to pertinent regulations and other DOE directives are evaluated and incorporated into revisions to radioactive waste management directives to keep current with new information and practices.

Discussion:

The Assistant Secretary for Environmental Management is responsible for ensuring changes to regulations and DOE directives are reviewed and evaluated for their impact on safe radioactive waste management. The results of the review should be used to assess the need to revise DOE O 435.1, *Radioactive Waste Management* and the associated Manual and Contractor Requirements Documents. When warranted, these documents are to be revised to ensure protection of workers, the public, and the environment.

New information leads to changes in regulations and other DOE directives, and practices used in the management of radioactive waste. This information and the changes should be evaluated and, when appropriate, incorporated into revisions of DOE O 435.1, *Radioactive Waste Management*, or DOE M 435.1-1, *Radioactive Waste Management Manual*, so that DOE radioactive waste management requirements and practices are consistent with requirements and practices within DOE and in commercial radioactive waste management. If the review of a change in a regulation or directive leads to the potential need for a revision, the determination of the need and rationale for a revision should be documented. The documentation should be maintained as an auditable record as long as the directive is in effect.

> *Example: The DOE directive on environmental and occurrence reporting is revised and a new version issued. The Order and associated documents are reviewed and primarily administrative requirements (e.g., the way DOE does business) are changed. A review of the technical basis document does not reveal any reliance on the administrative requirements of the revised order for protection of workers, the public, or the environment. Therefore, the results of the review lead to the conclusion that there is no need to revise DOE O 435.1, Radioactive Waste Management. This conclusion is documented and maintained as a quality assurance record. Additionally, however, a change to a technical requirement which was relied upon to address a weakness or condition associated with radioactive waste management is assessed to determine impact on the protection of workers, the public, and the environment. A significant impact is identified that warrants a revision to the requirements of DOE M 435.1-1. The method of effecting the revision (change page, memorandum, order revision, etc.) should be documented and managed as a quality assurance record.*

Compliance with this requirement is demonstrated by the existence of a systematic process of reviewing new and proposed directives and regulations for their impact on the basis for safe management of DOE radioactive waste. Documented conclusions from the reviews provide evidence that the process is being implemented.

Supplemental References: None.

I. 2.C. Assistant Secretary for Environment, Safety, and Health.

The Assistant Secretary for Environment, Safety and Health is responsible for providing an independent overview of DOE radioactive waste management and decommissioning programs to determine compliance with DOE environment, safety, and health requirements and applicable Environmental Protection Agency (EPA) and state regulations, including:

(1) Advising the Secretary of the status of Departmental compliance with the requirements of DOE O 435.1, this Manual, and applicable provisions of other DOE Orders.

(2) Conducting independent appraisals and audits of DOE waste management programs.

(3) Reviewing site Waste Management Plans with regard to compliance with DOE environment, safety, and health requirements.

Objective:

The objective of this requirement is to ensure that the existing role of the Office of Environment, Safety and Health for providing independent oversight is maintained and understood.

Discussion:

The role of the Assistant Secretary for Environment, Safety and Health is to conduct independent oversight of DOE activities, including radioactive waste management. The purpose of this oversight is to determine compliance of DOE Headquarters and Field Element programs with DOE Environment, Safety and Health regulations and applicable EPA and state regulations.

During the development of DOE M 435.1-1, it was recognized that explicit inclusion of this statement within the General Requirements and Responsibilities Chapter would serve to clarify this role.

The inclusion of this requirement/responsibility is not expected to change any current reporting, oversight, or compliance arrangements within the Department, rather it further clarifies existing roles and responsibilities.

Supplemental References:

1. DOE, 1997. *Manual of Safety Management Functions, Responsibilities, and Authorities*, DOE M 411.1-1, U.S. Department of Energy, Washington, D.C., October 8, 1997.

2. DOE, 1988. *General Environmental Protection Program*, DOE 5400.1, U.S. Department of Energy, Washington, D.C., November 9, 1988.

3. DOE, 1990. *Radiation Protection of the Public and the Environment*, DOE 5400.5, U.S. Department of Energy, Washington, D.C., February 8, 1990.

I. 2.D. Deputy Assistant Secretary for Waste Management.

The Deputy Assistant Secretary for Waste Management is responsible for:

(1) Complex-Wide Radioactive Waste Management Program Plans. Developing, implementing, and maintaining integrated Complex-Wide Radioactive Waste Management Program Plans for high-level, transuranic, low-level, and mixed low-level waste. Each plan shall, at the DOE complex-wide level, describe the functional elements, organizations, responsibilities, and activities that comprise the system needed to store, treat, and dispose of radioactive waste in a manner that is protective of the public, workers, and the environment. In addition, the plans shall:

(a) Present a waste management strategy that integrates waste projections and life-cycle waste management planning into complex-wide facility configuration decisions; and

(b) Describe the approach to research and technology development being pursued to improve safety and/or efficiency in managing radioactive waste.

Objective:

The objective of this requirement is to ensure that complex-wide plans provide an overarching strategy for making and implementing waste management decisions. The overarching strategy provides site personnel a framework within which they can formulate and execute plans for managing wastes at the individual sites.

Discussion:

The *Radioactive Waste Management Manual*, DOE M 435.1-1, Section I.2.B.(1), assigns the Assistant Secretary for Environmental Management responsibility for establishing and maintaining complex-wide management programs for each waste type. This responsibility is fulfilled through the planning, execution, and evaluation of these programs. The current requirement assigns the responsibility for a complex-wide program plan for each waste type to the Deputy Assistant Secretary for Waste Management. These plans are to provide a clear picture of the waste type program and its direction, and serve as a mechanism for documenting most of the planning functions of the programs. Although assigned to the Deputy Assistant Secretary, the development of these plans is a cooperative and iterative effort with the site representatives and other affected programs. Whereas the Field Element Managers are to develop and implement site

programs that support the complex-wide plan, the complex-wide plan should be developed based on the inventory, facility status, constraints, and needs of the individual sites.

Definition of Waste Management Program. The following topics are to be addressed in the waste type program plans to define the program in a manner that conveys the extent and intent of the program.

Mission. The program plans should provide a succinct statement of the overall purpose of the program. The mission statement should reflect the expectation to safely manage each waste type throughout all stages of waste management and should reflect disposal of waste as part of the mission.

Example: The Low-Level Waste Management Program mission statement states - The mission of the Department of Energy Low-Level Waste Management Program is to develop, implement, and coordinate a nationally integrated program for low-level waste treatment, storage, and disposal that uses a combination of Federal and private facilities to meet the needs of waste generators while fully protecting workers, the public, and the environment. Safety of operations and timely disposal of waste are high priorities for the Department.

Goals, Objectives, and Milestones. A key element of the complex-wide waste type program plans is the identification of program goals, objectives, and major milestones. Goals to be defined in the program plans may be general and apply to the complex as a whole, or they may be site-specific goals, based on input from the field, that are major events for the program (e.g., opening the Waste Isolation Pilot Plant). One of the complex-wide goals that should be defined in the plans is the expected end-state for the waste type. That is, the end of the life-cycle for the particular waste type should be one of the long-term goals of the program. The complex-wide goals should be specific, long-term measures of the waste type program's progress, and the goals should be challenging, yet achievable. To support the periodic assessment of the program's progress, the goals should be measurable.

Objectives should be established as interim measures of progress towards meeting the program goals. The objectives may be established as complex-level objectives, or may reflect key events at individual sites that are significant to measuring progress in the program.

Milestones are more specific events, e.g., decision points, completion of specific studies or analyses, or operation of specific facilities, which have a date of completion associated with them. Milestones are to be established in support of the goals and/or objectives. As with the goals and objectives, milestones may be established for activities being addressed

at the complex-wide level, or may represent major activities that are to be completed at a specific site consistent with site programs (see DOE M 435.1-1, Section I.2.F.(1)). The following examples shows program goals, supported by objectives, and specific milestones.

Example 1:

Goal: Convert Environmental Management high-level waste to a form that can be accepted by the Office of Civilian Radioactive Waste Management.

Objective: Vitrify all of the high-level liquid waste at the Savannah River Site.

Milestone: Produce 250 canisters of vitrified Savannah River Site high-level waste in conformance with Environmental Management Waste Acceptance Product Specification during FY 1999.

Example 2:

Goal: Provide for disposal of all transuranic waste.

Objective: Dispose of defense transuranic waste at the Waste Isolation Pilot Plant.

Milestone: Begin disposal operations at the Waste Isolation Pilot Plant by September 1998.

Milestone: Remove all packaged transuranic waste from the Rocky Flats Environmental Technology Site by December 2XXX.

Priorities. The complex-wide program should establish priorities which are then reflected in the goals and objectives of the program. The priorities for the program may be influenced by a number of different factors, including legal commitments or agreements, predecessor-successor relationships of related program activities, timing of the availability of a technology or facility, and funding considerations.

Example 1: A prioritization of activities in the high-level waste management program has resulted in a decision to construct and start operation of vitrification facilities at the Savannah River Site and the West Valley Demonstration Project, followed by facilities at Hanford and the Idaho National Engineering and Environmental Laboratory. These priorities are based on availability of funding and the stage of technology development and readiness at these sites.

Example 2: An example of prioritization for the Transuranic Waste Management Program would be deciding to open the transportation corridors through New Mexico, Colorado, Wyoming, Utah, and Idaho prior to opening corridors through eastern states. This priority is based on the sites that are expected to ship waste to the Waste Isolation Pilot Plant first.

Boundaries and Interfaces. The program plans should clearly define the boundaries or scope of the program and describe the internal and external interfaces which must be managed. The complex-wide plans should define what is within the program boundary, including a general description of the wastes to be managed. Part of defining the boundaries or scope in the waste type program plans includes identifying the internal interfaces. The internal interfaces include the interactions among organizations or activities that have different funding sources, but are part of the DOE waste management (e.g., high-level, transuranic, low-level, or mixed low-level waste) programs. Internal interfaces are defined through the identification of organizations and responsibilities discussed in a following subsection.

Interfaces external to a waste type program should also be defined in the program plan. The interfaces exist between waste type programs, with generators, and with external entities. First, interfaces between waste type programs need to account for transfers of waste between the programs. Transfer may be necessary to accommodate waste that changes from one waste type to another (e.g., as a result of assay or a waste incidental to reprocessing determination), or from generating a waste as a result of managing another waste type (e.g., high-level waste treatment generates a secondary low-level waste stream). An important outcome of identifying interfaces with other waste type programs is ensuring that all waste (subject to DOE O 435.1) under the Department of Energy's purview is being managed within one of the waste type programs.

Example: Pretreatment of high-level waste at the Savannah River Site results in a high-volume stream of salt solution. Through application of the waste incidental to reprocessing process, a determination is made that the salt solution should be managed as low-level waste. The high-level and low-level waste programs establish an interface that ensures that the waste is safely managed according to the appropriate set of requirements.

Second, each of the programs needs to identify interfaces with the generators of each waste type. The program plan should document the sources of waste that the program will manage. Whereas some waste is generated by activities within the program, waste is also generated by the Environmental Restoration Program, Defense Programs, Science Programs, and Nuclear Energy Programs.

Third, the program plan should document interfaces with organizations external to the Department of Energy. This could include external regulatory agencies (Federal or State) as well as commercial facilities.

Constraints. The program plans should discuss significant constraints on the planning and execution of each waste type program. As used here, the term constraints has a broad meaning including program assumptions, Departmental policies which direct or restrict certain waste management actions, external regulations, etc. Key assumptions that may impact planning at the complex-wide level include major policies, current and out-year program funding, expected programmatic or activity decisions, and expected contract awards.

Example: A key assumption affecting the management of low-level waste is that the six currently operating low-level waste disposal facilities will continue to operate for the next two years. Therefore, there would be no significant changes to existing generator-disposal facility relationships.

Organization and Responsibilities. The organizational and functional responsibilities of the participants in the complex-wide waste type programs, and their interrelationships, should be described in the program plans. This description should include the identification of the organizations within both the Headquarters and Field organizations, and a discussion of their respective roles in formulating, executing, and evaluating the waste type programs. The plan should include organization and interface charts that define the roles, responsibilities, and authorities for each of the major program participants, as well as required lines of communication.

Example: For the Low-Level Waste Management Program, the Program Plan identifies the entity responsible for supporting the Deputy Assistant Secretaries for Waste Management and Environmental Restoration in the review and evaluation of disposal facility performance assessments and composite analyses.

Integrated Program Strategy. The program plan provides a description and basis for the strategy being pursued to fulfill the program mission and meet the program goals. The strategy addresses the life-cycle management of waste from generation and generation reduction through the plans and approaches for effecting disposal of waste. The strategy also needs to recognize that part of the life-cycle management of the waste may include continued safe storage of legacy waste pending the ability to dispose of it. The strategy needs to be consistent with the assumptions described earlier and should be developed considering the following elements:

- Technical and programmatic issues;
- Waste projections;
- Life-cycle waste management planning;

- Waste minimization and pollution prevention;
- Research and development; and
- Implementation of DOE O 435.1.

Technical and Programmatic Issues. Major issues that impact the safe management of waste, including regulatory issues; expected changes in Federal, State or local statutes; and major technical issues should be discussed in the plan. Among the issues included in the plan should be problems identified by the sites that would best be addressed at a complex-wide level (e.g., resolving certain issues that result in waste with no path to disposal). Examples of these types of problems are issues that need to be negotiated at the Federal level (with Headquarters of another Federal agency or Congress) or issues that occur at multiple sites that would benefit by a common resolution. In addition to identifying the issues, the plan should describe proposed solutions or steps towards resolving them (e.g., obtaining data, completing studies).

Example 1: A major issue that should be addressed at the complex-wide level for transuranic waste management is the disposition of non-defense transuranic waste. There is currently no path to disposal for non-defense transuranic waste. The plan should address the development of information and other steps necessary to support resolution of the issue.

Example 2: In the high-level waste management program, a key technical and regulatory issue is the high-level waste tank closure process. The plan identifies technical issues that need to be resolved, such as appropriate methods to solidify and stabilize residues that remain in the tank, and regulatory issues such as the waste categorization of the tanks. The activities and schedule for resolving these issues is identified in the plan.

Waste Projections. The waste projections element of the programs plans should identify the minimum data requirements that must be included in waste projections, a consistent projections methodology, data quality objectives, and evaluation of data uncertainties, maintenance of data quality, and a periodic review and assessment of waste projections data quality. The collection of waste projections data should be focused on promoting the safe and efficient life-cycle management of waste. Therefore, data collection is an element in ensuring that sufficient storage, treatment, and disposal capacity will be available to handle current and future wastes.

Example: Projections of low-level waste volumes are necessary to ensure that sufficient disposal capacity will be available, either within DOE and/or at commercially-operated facilities. Therefore, the types of information that would be needed include the volumes of waste that would be generated in different time periods, and the inventories and/or

concentrations of key radionuclides. Through a cooperative effort among personnel from the complex-wide program, the generating sites, and DOE disposal sites, a determination is made as to what actions are necessary to ensure adequate waste disposal capacity.

Life-cycle Waste Management Planning. At the complex-wide level, personnel working on the program plan should consider the management needs for all of the waste included in the program when mapping out a strategy. In so doing, personnel developing the strategy should consider the volumes and characteristics of waste in storage and those projected to be generated. The availability of waste management facilities to safely and expeditiously manage the types and amounts of waste should be considered in developing the program strategy. For much of the waste, management through its entire life cycle will be possible using existing or planned facilities. The strategy for these types of waste should then focus on actions to improve efficiency and safety in effecting disposal. If appropriate, the strategy should consider the use of non-DOE facilities for meeting waste management needs.

Example 1: In the Transuranic Waste Management Program, a strategy is developed that calls for the use of mobile equipment for certifying waste at small generator sites. Use of the equipment results in program cost savings by avoiding the construction of facilities for waste certification at multiple sites. Program efficiency is also achieved by being able to coordinate the schedule for the mobile equipment with the schedule for shipping waste to WIPP.

Example 2: Use of non-DOE facilities to help meet waste management needs occurs in the management of mixed low-level waste for disposal where DOE capabilities do not currently exist. A commercial facility that has the necessary radioactive materials license and RCRA permit provides disposal of mixed low-level waste which cannot currently be transferred to a DOE site for disposal. The use of the commercial facility is determined to be in the best interest of DOE and an exemption has been approved. The DOE strategy to allow disposal of small volumes of mixed low-level waste at a commercial facility promotes compliance with agreements and external regulations at the individual DOE sites, and reduces the costs and risks associated with storage.

The strategy should also account for managing the wastes that do not have an apparent path to disposal. The complex-wide plan should provide sufficient information that site personnel can use to determine whether activities being taken at the complex-wide level address the issues that prevent disposal or whether the site should take individual actions to resolve the issues.

Example: For transuranic waste that currently cannot be disposed at WIPP, a strategy might be to address the issues preventing disposal of the waste. In this case, personnel with non-defense wastes that could otherwise meet the WIPP waste acceptance criteria would rely on the efforts being taken by Headquarters to resolve the issue.

Waste Minimization and Pollution Prevention. The complex-wide plan should acknowledge the role that waste minimization and pollution prevention play in the management of radioactive waste. The plan should reference any applicable pollution prevention program plans which address commitments concerning the particular waste type.

Example: The program plan for low-level waste or mixed low-level waste references the Pollution Prevention Program Plan that documents a Secretarial commitment to reduce the generation rates for the waste types by 50 percent by the end of 1999 (compared to the 1993 generation rates). This commitment is then translated into a program goal for the low-level waste and mixed low-level waste programs.

Research and Development (R&D) Activities. The complex-wide plan should address the research and development being done to address multi-site issues related to disposal and other waste management issues. This provides a basis for the sites to determine what issues need to be addressed at the site level.

Example: In the Transuranic Waste Management Program, research is being performed to re-evaluate the potential for generation of explosive gases in transuranic waste containers. If the research concludes that gases are not generated in closed transuranic waste containers, the need for sampling and/or venting prior to placement into the TRUPACT II could be eliminated for transportation. This research being undertaken by a central organization may benefit all shippers of transuranic waste.

Implementation of DOE O 435.1. The program plan should consider the time and cost of implementing the *Radioactive Waste Management Order,* DOE O 435.1 and the supporting Manual, DOE M 435.1-1 when establishing program goals and objectives. In the near term, the complex-wide strategy must include attaining compliance with the Order as one of its goals. Individual objectives may address significant facilities at individual sites.

Example: Completion of a performance assessment and composite analysis for low-level waste disposal facilities, and issuance of a Disposal Authorization Statements, are appropriate key objectives for inclusion in the Low-Level Waste Management Program Plan. These are required to comply with DOE M 435.1-1 and are significant to the overall low-level waste management program.

The program plan also provides a mechanism for documenting means by which the program progress and compliance can be evaluated. The plan should indicate the types of evaluations that are going to take place and at what level in the organizational structure they will occur. The evaluation and oversight responsibilities should include a clear delineation between the roles of Headquarters, Field, and contractor organizations. Periodic evaluations of program activities will provide the basis for determining progress toward achieving the program goals and provide the feedback necessary to improve performance of the waste-type programs.

Examples of evaluation and oversight activities include:

- *Contractor self-assessments;*
- *Field oversight assessments;*
- *Progress Tracking System reporting; and*
- *Quarterly Management Reviews.*

Compliance with this requirement is demonstrated if a program plan is developed for each of the waste types specified in DOE M 435.1-1. The program plans should convey the overall purpose (end-point) of the program, the responsibilities for accomplishing different program activities, and a strategy that reflects the uncertainties and constraints that affect management of the specific waste type.

Supplemental References:

1. CAO, 1997. *The National TRU Waste Management Plan*, Revision 1, DOE/NTP-96-1204, U.S. Department of Energy, Carlsbad Area Office, Carlsbad, NM, December 18, 1997.

2. DOE, 1997. *DOE Low-Level Waste Program Management Plan*, Revision 0, DOE/LLW/PMP-001, U.S. Department of Energy, Washington, D.C., March 1997.

I. 2.D. Deputy Assistant Secretary for Waste Management.

The Deputy Assistant Secretary for Waste Management is responsible for:

(2) Waste Management Data System. Establishing and maintaining a system to compile waste generation projection data and other information concerning radioactive waste management facilities, operations, and activities across the complex.

Objective:

The objective of this requirement is to ensure information and data concerning the management of radioactive waste is collected and compiled at the DOE complex level. Compilation of waste management information promotes safe management of radioactive waste by supporting the integration and optimization activities, and life-cycle waste management planning across the DOE complex.

Discussion:

To effectively manage radioactive waste, the Department is dependent on information and data which describe its waste, both previously generated and projected, as well as the facilities and systems used to manage the waste. In the development of DOE O 435.1 and DOE M 435.1-1, collecting and managing this information was determined to be an important function for the safe and effective management of radioactive waste. The information and data are generated and developed as a result of site-specific compliance with various requirements including DOE M 435.1-1.

The "waste management data system" is a general description used to describe systems and processes needed to collect, compile, and report information in a uniform and consistent manner. The specific mechanisms for collecting the data and information will vary based on changes in management approach and implementation methodology. However, the information and data that are to be managed originate from many diverse sources so consistent reporting is important. The data must be collected and reported in a manner that makes them useful to the complex-wide waste-type programs and plans required by DOE M 435.1-1, Sections I.2.B and I.2.D. For instance, information on waste with no path to disposal needs to be included in the data system to allow evaluations which could lead to common solutions that would benefit multiple sites. Also, data need to be collected to support the evaluation phase of waste management by depicting progress made in the program.

The development and documentation of data requirements are to be completed for all information to be collected from the field. Use of data requirements ensures consistency and provides a basis

for accurate reporting. Data requirements describe the information requested, why it's requested, and how to report it. Information and data will generally be collected for each DOE site in the complex. Typically, the following information and data for high-level waste, transuranic waste, low-level waste, and mixed low-level waste are to be included in the waste management data system:

- Quantities of past, current, and projected waste, by waste type and year;
- Waste characteristics;
- Waste management life-cycle plans, including final disposition and no path to disposal information;
- Facility and operational information including capacities; and
- Barriers to disposition and technology needs.

Example: Information on DOE field waste management activities is provided to DOE-HQ through the "Accelerating Cleanup: Paths to Closure" reporting process using various systems and tools. The information is used to generate a DOE report that includes disposition maps used to help depict the waste management life cycle and any barriers that may exist for final waste stream disposition.

Compliance with this requirement is demonstrated by the existence of systems and processes for the collection and management of complex-wide information about DOE radioactive waste. The data systems should be updated on a routine basis, and support capacity and facility planning, resource and budget planning, integration and efficiency efforts, and lessons learned.

Supplemental References:

1. DOE, 1998. *Accelerating Cleanup: Paths to Closure*, DOE/EM-0362, U.S. Department of Energy, Washington, D.C., June 1998.

2. DOE, 1996. *Low-Level Waste Projection Program Guide*, U.S. Department of Energy, Office of Environmental Management, Washington, D.C., December 18, 1996.

I. 2.E. <u>Deputy Assistant Secretaries for Waste Management and Environmental Restoration</u>.

The Deputy Assistant Secretary for Waste Management and the Deputy Assistant Secretary for Environmental Restoration are responsible for:

(1) Disposal. Reviewing and approving, along with EH-1, transuranic waste disposal facility performance assessments and other disposal documents as required in waste specific chapters for which DOE is responsible for making compliance determinations. Reviewing and approving performance assessments and composite analyses, or appropriate CERCLA documentation, for low-level waste disposal facilities, and issuing disposal authorization statements.

(a) The Deputy Assistant Secretaries shall establish a review panel consisting of DOE personnel to review low-level waste disposal facility performance assessments and composite analyses, review appropriate CERCLA documentation, recommend low-level waste disposal facility compliance determinations to the Deputy Assistant Secretaries, and develop disposal authorization statements.

(b) The Deputy Assistant Secretaries shall issue disposal authorization statements containing conditions that low-level waste disposal facilities must meet in order to operate with an approved radioactive waste management basis.

Objective:

The objective of this requirement is to ensure that the evaluations conducted in the performance assessment for a transuranic waste disposal facility, and in the performance assessment (or appropriate CERCLA documentation) and composite analysis (or appropriate CERCLA documentation) for a low-level waste disposal facility, are found by DOE to be technically adequate, logical, complete, and defensible for establishing the controls on disposal of waste for protection of the public and the environment into the future. The evaluations and controls should result in a reasonable expectation that the standards of 40 CFR Part 191 will be met at the transuranic waste disposal facility or in a reasonable expectation that the performance objectives of Chapter IV of DOE M 435.1-1 will be met at the low-level waste disposal facility.

Discussion:

During the development of the requirements of DOE O 435.1 and DOE M 435.1-1, the safety and hazard analyses indicated that disposal is a critical activity requiring controls. Disposal is the final waste management function performed, yet the potential hazards from disposed radioactive waste will continue far into the future. Thus, there are specific requirements for the protection of the public, workers, and environment that are critical to maintaining safe and effective disposal of radioactive waste. Analyses conducted in a performance assessment for a transuranic and a low-level waste disposal facility (or appropriate CERCLA documentation for a low-level waste disposal facility), and the composite analysis (or appropriate CERCLA documentation) for a low-level waste disposal facility, are critical in determining the nature and extent of the controls that need to be put in place at the facility being evaluated. The review and approval of these evaluations is extremely important for management of transuranic and low-level waste to ensure it is being conducted safely and effectively. Therefore, the review and approval of these evaluations are assigned as the responsibility of senior management within the Office of Environmental Management.

The requirement states that it is the responsibility of the Deputy Assistant Secretaries for Waste Management and Environmental Restoration, within their respective programs, to review and approve certain radiological assessments for transuranic and low-level waste disposal facilities and to issue the disposal authorization statement based on the reviews. The discussions that follow provide guidance on the requirement for review and approval of the documents and issuance of the disposal authorization statement. The discussion begins with an explanation for excluding certain waste disposal from the DOE M 435.1-1, Section I.2.E.

Disposal of Transuranic Waste at WIPP and High-Level Waste. Requirement 4.d of DOE O 435.1 identifies WIPP and facilities and operations licensed by the Nuclear Regulatory Commission (NRC) or an Agreement State as having special requirements that supplement, or in many cases, replace requirements in DOE O 435.1 and DOE M 435.1-1. Requirement 4.d of the Order effectively ties the protection of the public, workers, and the environment--the major objective of DOE O 435.1--to key external legal drivers and regulations that achieve these goals at certain facilities managing DOE radioactive waste. Key among the facilities currently under external regulation for public, worker, and environmental protection are WIPP (certified by EPA), the proposed high-level waste repository (regulated by the NRC), and commercial waste treatment and disposal facilities utilized by DOE (regulated by the NRC or Agreement States) for treatment and disposal of low-level and mixed low-level waste. A DOE facility for the disposal of commercial (NRC licensed) Greater-than-class C (GTCC) low-level waste will also be regulated by the NRC, as specified in 10 CFR Part 61, Section 61.55 (a)(2)(IV) (see additional discussion on commercial (NRC licensed) GTCC in the guidance on the Complex-Wide Low-Level Waste Management Program (DOE G 435.1-1, Section IV.C)).

One effect of this requirement is that the design, construction, operation, closure, analysis of, licensing, permitting, and regulation of disposal of DOE transuranic waste at WIPP, and high-level waste at a proposed geologic repository, are evaluated and controlled by regulations and requirements outside of the DOE directives system. Based on the safety and hazard and requirements analyses conducted in the development of DOE O 435.1, and the review and approval of permitting and licensing documentation by other government organizations, it was concluded that there is no need to repeat any specific requirements from these external regulations within DOE M 435.1-1, or to define new requirements for disposal.

> *Example: The NRC requirements for siting, design, facility performance, package design, quality assurance, and training and certification of operators for a high-level waste disposal repository are found in 10 CFR Part 60, Disposal of High-Level Radioactive Wastes in Geologic Repositories. No additional disposal requirements were determined to be necessary for inclusion in Chapter II of DOE M 435.1-1.*

The only requirements for disposal found in DOE M 435.1-1, Chapter II, *High-Level Waste Requirements*, and DOE M 435.1-1, Chapter III, *Transuranic Waste Requirements*, for disposal at WIPP, reference the regulatory drivers that have created the external requirements for disposal of these wastes. Guidance for Chapters II and III contains additional discussions concerning these drivers, and the disposal of high-level waste and transuranic waste.

Disposal of Transuranic Waste (not at WIPP). In cases where the Department disposes of transuranic waste in a facility other than WIPP (e.g., Greater Confinement Disposal at the Nevada Test Site), the Department is responsible for determining compliance with 40 CFR Part 191 and issuing a disposal authorization statement. Therefore, the requirement includes the responsibility for reviewing and approving performance assessments for a transuranic waste disposal facility for which DOE must make a compliance determination (i.e., other than WIPP). The Deputy Assistant Secretary for Waste Management and the Deputy Assistant Secretary for Environmental Restoration, along with EH-1, are responsible for reviewing and approving performance assessments for transuranic disposal facilities other than WIPP. A process similar to that described below for reviewing and approving low-level waste disposal facility performance assessments will be required. In developing the review criteria, DOE staff should evaluate the following:

- General provisions including purpose, scope, definitions, conditions of approval, and alternative provisions;
- Compliance certification including completeness and accuracy of submissions and reference materials;

- General requirements addressing inspections, quality assurance, models and computer codes, waste characterization, future state assumptions, expert judgment, and peer review;

- Containment requirements considering application of release limits, scope of performance assessments, consideration of drilling events in performance assessments, and results of performance assessments;

- Assurance requirements including active and passive institutional controls, monitoring, engineered barriers, and consideration of natural resources; and

- Individual and groundwater protection requirements considering the protected individual, exposure pathways, underground sources of drinking water, and the scope and results of the performance assessment.

Example: The Field Element Manager of a site with a small amount of transuranic waste that cannot be accepted for disposal at the Waste Isolation Pilot Plant confers with Headquarters and decides to construct a small transuranic waste disposal facility. The Manager directs the preparation of a performance assessment that provides a reasonable expectation of meeting the performance measures in 40 CFR Part 191 for the onsite facility. Since the facility is not WIPP, following approval at the site, the performance assessment is submitted to Headquarters for approval. The Deputy Assistant Secretary for Waste Management assigns the task of establishing criteria and conducting a review to a staff member. The staff member assembles a review team of technically qualified DOE and contractor staff. The team develops criteria for the review based on the Department's criteria for review of low-level waste disposal facility performance assessments. Upon completing its review, the team provides a recommendation to the Deputy Assistant Secretary who makes a final determination and documents it in a memorandum to the Field Element Manager.

Since 40 CFR Part 191 defines performance assessment, the contents of a performance assessment, and requirements for compliance, the transuranic waste chapter only contains reference to the 40 CFR Part 191 standards. Guidance on the transuranic waste disposal requirements in Section III.P of this document should be consulted for additional discussion.

Disposal of Low-Level Waste. Although some of DOE's low-level waste is disposed at commercial facilities, much of it is still disposed at DOE-owned and operated low-level waste disposal facilities. The Department meets its responsibilities under the *Atomic Energy Act of 1954*, as amended, by providing the requirements for protection of the public, workers, and the environment for its low-level waste disposal facilities in DOE O 435.1 and DOE M 435.1-1. Meeting the low-level waste disposal requirements remains a responsibility of DOE managers at

Headquarters and in the Field. DOE M 435.1-1, Chapter IV, *Low-Level Waste Requirements*, includes the detailed low-level waste disposal requirements. At the Headquarters level, the Deputy Assistant Secretaries for Waste Management and Environmental Restoration are responsible for reviewing and approving the performance assessments and composite analyses (or reviewing appropriate CERCLA documentation) for low-level waste disposal facilities and for issuing disposal authorization statements. For purposes of DOE O 435.1 and DOE M 435.1-1, the term "appropriate CERCLA documentation" means the written materials prepared to demonstrate compliance with the substantive requirements of DOE M 435.1-1 for low-level waste disposal facilities managed under CERCLA. Specifically included in such written materials are crosswalks between CERCLA requirements and DOE M 435.1-1 requirements which are used as the basis for issuance of a disposal authorization by the Deputy Assistant Secretary for Environmental Restoration.

Low-Level Waste Performance Assessment and Composite Analysis Reviews. Performance assessments are conducted to demonstrate that there is a reasonable expectation that low-level waste disposed of at a DOE facility will not result in exceeding low-level waste disposal facility performance objectives contained in DOE M 435.1-1, Chapter IV, *Low-Level Waste Requirements*, and related performance measures associated with protection of the public from disposed low-level waste. Composite analyses are conducted as a planning tool to analyze the interaction of other radioactive source terms at a site along with the low-level waste disposal facility to minimize the likelihood that current low-level waste disposal activities will result in the need for future corrective or remedial actions, and to protect the public and environment, consistent with Departmental limits on total allowable public doses of radiation from all sources.

Performance assessments and composite analyses are reviewed to determine that they are complete, comprehensive, reflective of site- and facility-specific conditions, are supported by appropriate rationale, and therefore, are defensible. These reviews are performed to provide the information to the Deputy Assistant Secretary for Waste Management or the Deputy Assistant Secretary for Environmental Restoration to conclude there is a reasonable expectation that the disposal performance objectives of Chapter IV will be met and will continue to be met.

Review Panel. The Deputy Assistant Secretaries for Waste Management and Environmental Restoration must formally establish a panel or group to review performance assessments and composite analyses. At the time of issuance of DOE O 435.1 and DOE M 435.1-1, the Low-Level Waste Disposal Facility Federal Review Group was established by the Deputy Assistant Secretaries for Waste Management and Environmental Restoration to manage the reviews of low-level waste disposal facilities prepared in accordance with DOE 5820.2A and DNFSB 94-2 commitments and make recommendations regarding performance assessment and composite analysis approvals and issuance of disposal authorization statements. The Low-Level Waste Disposal Facility Federal Review Group has been guided by the *Department of Energy LLW Disposal Facility Federal Review Group Performance Assessment and Composite Analysis*

Review Guidance Manual, Revision 0. Following issuance of DOE O 435.1, Revision 0 of the Low-Level Waste Disposal Facility Federal Review Group Manual will be revised to reflect any new guidance for reviews and approvals of performance assessments and composite analyses in accordance with DOE O 435.1 and DOE M 435.1-1 and will be issued as a DOE G 435.1-1 guide. The Low-Level Waste Disposal Facility Federal Review Group reports its findings on performance assessment and composite analysis reviews directly to the Deputy Assistant Secretaries.

> *Example: The Brown Site Low-Level Waste Disposal Facility Composite Analysis is submitted to Headquarters by the Field Element Manager for review. The Deputy Assistant Secretaries for Waste Management and Environmental Restoration convene the Low-Level Waste Disposal Facility Federal Review Group, who in turn selects a Team Leader to form the Brown Site Review Team to evaluate the Brown Site composite analysis against the Review Guide. The Low-Level Waste Disposal Facility Federal Review Group prepares a report based on the Brown Site Team review and submits their findings to the Deputy Assistant Secretary, Office of Waste Management. Based on the Low-Level Waste Disposal Facility Federal Review Group's findings, the Deputy Assistant Secretary makes a decision on approval of the composite analysis.*

Performance Assessments and Composite Analysis Approvals & Issuance of Disposal Authorization Statement. A review of a performance assessment and/or composite analysis performed by the Low-Level Waste Disposal Facility Federal Review Group or a similar review panel produces a report in the form of a compliance evaluation that is transmitted to the appropriate Deputy Assistant Secretary. The report recommends whether the disposal facility operations are to be approved, approved with conditions, or disapproved. The *Review Guide* contains detailed guidance on the compliance evaluation and approval recommendation.

The Deputy Assistant Secretary is responsible for issuing a disposal authorization statement in accordance with DOE M 435.1-1, Section IV.P.(5). The disposal authorization statement provides Headquarters approval of the performance assessment and/or composite analysis, and includes conditions deemed necessary for long-term protection of the public and the environment from the low-level waste disposal facility. In this fashion, the disposal authorization statement should be viewed as analogous to a license for a low-level waste disposal facility that would be issued by the U.S. Nuclear Regulatory Commission or an Agreement State. The disposal authorization statement will be issued to the Field Element Manager responsible for the disposal facility. The Field Element Manager must consider any conditions in the disposal authorization statement that are to be incorporated into the radioactive waste management basis (see DOE M 435.1-1, Section IV.D.(4)) for the facility. Additional detailed guidance on disposal authorization statements can be found in the guidance on DOE M 435.1-1, Chapter IV, *Low-Level Waste Requirements.*

Example: The Deputy Assistant Secretary for Waste Management and the Deputy Assistant Secretary for Environmental Restoration jointly issue the Disposal Authorization Statement Concerning Operation of the Brown Site Low-Level Waste Disposal Facility to the Field Element Manager. The Statement refers to the compliance evaluation prepared by the Brown Site Composite Analysis Review Team, which contains six conditions that must be implemented at the facility in order for operations to continue safely in accordance with the performance objectives. The compliance evaluation was reviewed by the Low-Level Waste Disposal Facility Federal Review Group, which transmitted its recommendation for approval with conditions, those conditions and a draft disposal authorization statement to the Deputy Assistant Secretaries.

CERCLA Documentation. As discussed in guidance for DOE M 435.1-1, Section I.2.F.(5), Environmental Restoration, Decommissioning and Other Cleanup Waste, environmental restoration remedies involving the development and management of radioactive waste disposal facilities under the CERCLA process are to meet the substantive requirements of DOE O 435.1. The original guidance on this topic was articulated in: 1) Policy for Demonstrating Compliance with DOE 5820.2A for Onsite Management and Disposal of Environmental Restoration Low-Level Waste under the *Comprehensive Environmental Response, Compensation, and Liability Act*, May 31, 1996 (DOE, 1996); and 2) Guidance for Complying With DOE 5820.2A, *Radioactive Waste Management*, for Onsite Management and Disposal of Low-Level Waste (LLW) from Environmental Restoration Activities (Alm, 1997). The major concepts of these policies are:

- The CERCLA requirements and DOE M 435.1-1 requirements include significant overlap in their substantive requirements given both are designed to ensure safe management and disposal of waste;

- The CERCLA process is to be used to comply with the requirements of DOE M 435.1-1 for environmental restoration actions;

- The substantive requirements of DOE M 435.1-1 should be directly incorporated into the CERCLA process to the extent practical and consistent with site-specific technical and regulatory issues; and

- The Department must demonstrate compliance with the substantive requirements of DOE M 435.1-1 to fulfill its responsibilities under the *Atomic Energy Act of 1954*, as amended.

When a proposed environmental restoration response at DOE sites on the National Priorities List (NPL) involves the development and management of a radioactive waste management facility, the CERCLA process will be used to assess the performance of the disposal facility. Subject to final

regulatory approval, the CERCLA process is expected to incorporate the substantive requirements of DOE M 435.1-1 as described in this section. For sites not on the NPL, DOE may initiate a response action in accordance with CERCLA under the authority assigned by Executive Order 12580, *Superfund Implementation.* In this case, if the remedy under consideration involves the development and management of a radioactive waste disposal facility, then the requirements of DOE M 435.1-1 are to be incorporated into the CERCLA documentation as described in this section, as appropriate, subject to final regulatory approval. There may be situations at non-NPL sites where DOE chooses to implement a remedy using its authority under the *Atomic Energy Act of 1954*, as amended, in which case the procedural requirements of DOE M 435.1-1 would also apply.

When consideration is being given to a cleanup response that requires development and management of a radioactive waste disposal facility under CERCLA, in most cases an analysis satisfying the requirement for a performance assessment will be prepared as part of the project-specific CERCLA document. The analysis is often contained in the Feasibility Study and is prepared in accordance with the National Contingency Plan (40 CFR Part 300). In some cases, an analysis will be performed which includes an evaluation of all interactive sources near the proposed disposal facility, as suggested in *EPA's Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part A, Interim Final*. This analysis would essentially be equivalent to a composite analysis. If the CERCLA analysis does not include evaluation of all interactive sources at the proposed radioactive waste disposal facility, then a separate composite analysis is to be prepared. This separate analysis may be incorporated into the CERCLA process, including review by the regulatory agencies and stakeholders, or it may be handled as a document that is reviewed by the Low-Level Waste Disposal Facility Federal Review Group (LFRG) established under the authority of DOE M 435.1-1.

To fulfill DOE's responsibilities under the *Atomic Energy Act of 1954*, as amended, the Department must demonstrate compliance with the substantive requirements of DOE M 435.1-1 for low-level waste disposal facilities managed under CERCLA. A crosswalk between the CERCLA and the DOE M 435.1-1 requirements needs to be prepared and reviewed as described below when the cleanup action involves development and management of a radioactive waste disposal facility. It is not necessary to prepare a crosswalk to demonstrate compliance with DOE M 435.1-1 requirements for environmental restoration activities that do not involve development and management of a radioactive waste disposal facility.

The appropriate CERCLA documentation is to be submitted by the Field Element Manager to the Deputy Assistant Secretary for Environmental Restoration. For purposes of DOE O 435.1 and DOE M 435.1-1, the term "appropriate CERCLA documentation" means the written materials prepared to demonstrate compliance with the substantive requirements of DOE M 435.1-1 for low-level waste disposal facilities managed under CERCLA. Specifically included in such written materials are crosswalks between CERCLA requirements and DOE M 435.1-1 requirements

which are used as the basis for issuance of a disposal authorization by the Deputy Assistant Secretary for Environmental Restoration. Based on the appropriate CERCLA documentation, the Field Element Manager certifies that compliance with the substantive requirements of DOE M 435.1-1 has been achieved through application of the CERCLA process. Any other analyses that have not been incorporated into the CERCLA process require a separate review. The Deputy Assistant Secretary may assign the LFRG the task of reviewing the information submitted by the Field Element Manager. In this instance, the documents would be reviewed against the criteria set forth in the guidance entitled *Department of Energy LLW Disposal Facility Federal Review Group Performance Assessment and Composite Analysis Review Guidance Manual* (the *Review Guide*). Based on the content of the crosswalk, the LFRG will determine whether it needs to review the detailed analysis. The Low-Level Waste Disposal Facility Federal Review Group will report its conclusions from this review to the Deputy Assistant Secretary for Environmental Restoration. The Deputy Assistant Secretary for Environmental Restoration will use this information as the basis for deciding whether to issue a disposal authorization based on DOE's responsibilities under the *Atomic Energy Act of 1954*, as amended.

The disposal authorization statement does not impact the decision documented in the CERCLA Record of Decision on whether to build a facility because this decision is made through the CERCLA process. The disposal authorization statement specifies the limits and conditions on design, construction, operation, and closure of the radioactive waste disposal facility. The disposal authorization statement could be included as part of the Record of Decision. If this is the case, then the guidance on disposal authorization (Chapter IV) should be followed during the development of the ROD on CERCLA radioactive waste disposal facilities, to the extent practical. However, it should be understood that compliance with requirements of a law (e.g., CERCLA) does not release DOE of compliance with another law (e.g., *Atomic Energy Act of 1954*, as amended). DOE must determine that whatever actions are taken, *Atomic Energy Act* requirements are met.

> *Example: The remedial action on Operable Unit 34 at Site Q considers construction and operation of a facility for onsite low-level waste disposal. The CERCLA RI/FS contains analyses equivalent to the performance assessment and composite analysis required in DOE M 435.1-1. The site prepares a crosswalk between the CERCLA NCP and DOE M 435.1-1 requirements that demonstrates that the RI/FS documents contain the substantive requirements of DOE M 435.1-1. The Low-Level Waste Disposal Facility Federal Review Group evaluates the crosswalk and, if necessary, selected supporting documentation against the guidance and criteria in the Review Guide, and presents their conclusions to the Deputy Assistant Secretary for Environmental Restoration. Based on the evaluation and conclusions, the Deputy Assistant Secretary for Environmental Restoration decides whether to issue a Disposal Authorization.*

Demonstrating Compliance. Compliance with this requirement is demonstrated by:

- Establishment of qualified panels to conduct reviews of performance assessments, composite analyses, and, as requested, appropriate CERCLA documentation for environmental restoration activities involving the development and management of a radioactive waste disposal facility;

- Performance of the reviews by the panels and use of the results that leads to a decision on operations and long-term protectiveness of a low-level waste disposal facility, or compliance with 40 CFR Part 191 for a transuranic waste disposal facility; and

- Documentation of such decisions for low-level waste disposal facilities in a disposal authorization statement issued by the appropriate Deputy Assistant Secretary (for Waste Management or for Environmental Restoration) to the cognizant Field Element Manager. The disposal authorization statement contains conditions that the disposal facility must meet in order to operate under an approved radioactive waste management basis. For environmental restoration activities, if the CERCLA Record of Decision is to serve as the disposal authorization statement, it must include the same information as stated above, or the disposal authorization statement can be issued separately.

Supplemental References:

1. DOE, 1999. *Format and Content Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses* (in preparation), DOE G 435.1-1, U.S. Department of Energy, Washington, D.C., 1999.

2. DOE, 1999. *Review Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses* (in preparation), DOE G 435.1-2, U.S. Department of Energy, Washington, D.C., 1999.

3. DOE, 1999. *Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses.* (in preparation), DOE G 435.1-3, U.S. Department of Energy, Washington, D.C., 1999.

4. EPA, 1985. "Final Rule; Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," *Federal Register*, Vol. 50, No. 182, U.S. Environmental Protection Agency, Washington, D.C., September 19, 1985.

5. EPA, 1989. *Risk Assessment Guidance for Superfund, Vol. 1, Human Health Evaluation Manual (Part A)*, Interim Final, EPA/540/1-89/002, U.S. Environmental Protection Agency, Washington, D.C., December 1989.

6. EPA, 1993. "Final Rule; Environmental Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," *Federal Register*, Vol. 58, No. 242, U.S. Environmental Protection Agency, Washington, D.C., December 20, 1993.

7. DOE 1996. *Interim Format and Content Guide, and Standard Review Plan for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments,* U.S. Department of Energy, Washington, D.C., October 1996.

8. DOE 1996. *Interim Review Process and Criteria for Department of Energy Low-Level Waste Disposal Facilities Composite Analyses,* U.S. Department of Energy, Washington, D.C., November 1, 1996.

9. DOE, 1996. *Interim Guidance for a Composite Analysis of the Impact of Interacting Source Terms on the Radiological Protection of the Public from Department of Energy Low-Level Waste Disposal Facilities*, U.S. Department of Energy, Washington, D.C., October 1996.

10. DOE, 1998. *Department of Energy LLW Disposal Facility Federal Review Group, Performance Assessment and Composite Analysis Review Guidance Manual*, Revision 0, U.S. Department of Energy, Washington, D.C., September 1998.

I.2.E.(2) Site Closure Plans. Reviewing and approving closure plans and other closure documentation for deactivated high-level waste facilities/sites and issuing authorization for closure activities to proceed.

Objective:

The objective of this requirement is to ensure that closure activities for deactivated high-level waste facilities/sites do not proceed prior to the review/approval of the site closure plans .

Discussion:

The scope of the requirement, and this guidance, applies only to deactivated high-level waste closure plans, and other closure documents, e.g., CERCLA documentation, developed in accordance with the requirements of DOE M 435.1-1, Chapter II.U., Closure. The requirement

does not apply to the Decommissioning path documentation required by Section II.U. The documentation and review/approval requirements for this path are defined in DOE O 430.1A and DOE 5400.5 and are not repeated in this guidance.

This requirement is to be implemented by the Offices of the Deputy Assistant Secretary for Waste Management and the Deputy Assistant Secretary for Environmental Restoration, and their staff. However, since the requirement requires prior review and approval by the submitting Field Element Manager, guidance for Section I.2.F.(8), Closure Plans, should be consulted in implementing this requirement.

During the development of the requirements for DOE O 435.1 and DOE M 435.1-1, one high-level waste site was in the process of initiating closure activities for storage tanks. Additionally, DOE was in the process of responding to DNFSB Recommendation 94-2 related to the performance of low-level waste disposal facilities. These two activities required consistency in implementation, and influenced the final requirements. Closure is the final waste management function performed, yet the potential hazards from residual radioactive material within the facility or at the site must be assessed to determine their suitability for unrestricted use of the facility/site; or, if not suitable for unrestricted access, to determine the activities necessary to be incorporated into the site closure plan to protect members of the public, workers, and the environment. The development, review and approval, and implementation of high-level waste facility/site closure plans and other closure documentation are crucial functions in assuring that closure will be, and is being, conducted safely and effectively, and that the closed facilities/sites will remain safe.

Objectives of the DOE Headquarters Review and Approval. Closure of deactivated high-level waste facilities can be executed under three paths, as explained in the requirement and guidance for closure in DOE M 435.1-1, Section II.U. Closure conducted by the first path, Decommissioning, performed under the provisions of DOE O 430.1A and DOE 5400.5, is not discussed in this guidance. Refer to these Orders, and guidance, for details on documentation requirements and review/approval requirements. For the remaining two closure paths, CERCLA (Section II.U.(2)) and Closure Plans (Section II.U.(3)), the Deputy Assistant Secretary for Waste Management or the Deputy Assistant Secretary for Environmental Restoration, as appropriate, must review and approve the appropriate closure documentation and issue an authorization to proceed with closure activities. This authorization is required prior to the commencement of remedial actions or activities that cannot be reversed without expending significant resources. Such activities include, for example, remedial actions such as decontamination activities or the placing of immobilization materials in a deactivated high-level waste tank. Excluded are such activities as design and field survey work which are needed to support the development of a closure plan or other documentation.

As discussed in the guidance to Section II.U, closure plans are expected to be two-tier documents, i.e., their development and review/approval are expected to be conducted in two

phases. This multi-phase process is considered necessary because much of the data needed may not be available initially, but becomes available as engineering data and/or other documents/permits are developed. Headquarters review and approval is primarily focused on the first tier plans, from which subsequent plans are developed.

The first tier plan, which is to be approved by the Deputy Assistant Secretaries for Waste Management and/or Environmental Restoration (Section I.2.E.(2)), is intended to define and bound the parameters of a closure action(s). This level of closure plan should include, at a minimum the following:

- closure methodology;
- schedules and assumptions
- site or individual closure standards/performance objectives;
- allocation of closure standard/performance objective budgets to individual facilities/sites;
- assessment (preliminary) of the projected performance of each unit to be closed relative to the allocated performance objectives;
- assessment (preliminary) of the projected composite performance of all units to be closed at the site;
- alternatives (if any);
- waste characterization data;
- closure controls plans; and
- stakeholder concerns.

While the availability of some of the above information may be limited and therefore preliminary, it is necessary to ensure that a credible, bounding review can be conducted by DOE Headquarters. The Deputy Assistant Secretaries for Waste Management and/or Environmental Restoration are responsible for issuing an authorization to proceed with closure activities to the responsible Field Element Manager. This authorization to proceed with closure activities represents DOE Headquarters approval of the first tier site closure plan, or other closure documentation, as adequately representing and assessing the closure action planned. In addition, the authorization to proceed with closure activities contains any conditions on which the approval of the plan or documentation is based.

As discussed in the guidance to Section II.U., once approved it is expected that closure plans will be updated periodically, as determined by the Field Element Manager, to reflect revised analysis and the status of individual facility closure actions that are part of a site closure. However, once DOE Office of Environmental Management review/approval is gained on the first tier documentation and an authorization to proceed is issued, additional DOE Office of Environmental Management approvals are not required provided the bounding conditions defined in the DOE

Office of Environmental Management-approved first their plan(s) are not exceeded. (See the guidance for Section II.U for an example.)

The assessments of the projected performance of each unit to be closed and the assessment of the projected composite performance of all units to be closed are critical to deactivated high-level waste facility closure activities. Therefore, the DOE Headquarters technical review includes the determination of the adequacy of these analyses to establish the expected performance of the closed facility/site, the potential hazards, and the activities necessary to protect members of the public, workers and the environment. The review and approval of the assessment/analysis is extremely important to ensure that the assumptions regarding source term, leach rates, transport mechanisms, analytical transport models, hydrologic and other critical aspects of the site, effectiveness of any barriers to migration of radionuclides on which performance is based, and other key assumptions are supported by the available data. Furthermore, uncertainties associated with the key assumptions and are data addressed through identification of compensatory measures, through combinations of conservatism in the estimates, defense-in-depth, or other appropriate measures. The review specifically examines and documents the conclusions of the review with respect to the adequacy of each of these key assumptions.

The reviews of the assessment of performance or composite analysis documentation provide the basis for approving/disapproving the evaluations contained within them. The Deputy Assistant Secretary with authority over the facility/site is responsible for issuing an authorization to proceed with closure activities to the responsible Field Element Manager. The authorization to proceed with closure activities represents DOE Headquarters approval of the site closure plan, and other closure documents as adequately representing and assessing the closure action planned. This includes the acceptance of the assessment of performance and composite analysis, the identification of long-term hazards, and establishment of the necessary closure activities to ensure the protection of the public and the environment. In addition, the authorization to proceed with closure activities contains the conditions on which the approval of the plan or documentation is based.

> *Example: The authorization to proceed with closure activities for deactivated high-level waste Tank XYZ at Site A specifically lists the key assumptions on which the performance is based (e.g., source term for the specific tank and for other contributors, leach rates, transport mechanisms, transport models, hydrologic and other critical aspects of the site, assigned effectiveness of barriers to retard the migration of radionuclides, the uncertainties in the available data and the measures incorporated in the plan to account for uncertainties), and the controls (e.g.,the boundary for institutional controls to restrict access, and the time period for the restriction) necessary for the long term protection of the public, workers, and the environment both during and after closure.*

Process for Review and Approval of Site Closure Plans and Other Closure Documents. The Deputy Assistant Secretaries for Waste Management and Environmental Restoration should establish a cohesive and systematic process to evaluate the technical adequacy of the submitted closure plans and other closure documents including the assessments of performance or composite analysis, and to formulate recommendations to the Deputy Assistant Secretaries regarding approval/disapproval of the plan, and the potential issuance of authorization for the closure activities to proceed. This process should include the following elements:

1. Acceptance Review--Determine that the closure plan is acceptable detailed technical evaluation by determining that all the essential elements of the plan as outlined in the requirement in DOE M 435.1-1, Section II.U, and the associated guidance, are contained in the plan.

2. Review Team--A review team is established whose members include subject matter experts from Headquarters or the field who do not, by virtue of their current or past alignments, have a conflict of interest that would prevent an objective and effective review.

3. Review Team Responsibilities--The responsibilities of the team members are established as well as the administrative procedures, to include quality assurance, by which the review will be conducted and documented.

4. Site Visits--The process for conducting site visits is established, whenever it is determined by the team members to be prudent for such visits in order to acquaint the team members with the actual circumstances of the facility/site and thus prepare them to conduct the evaluation of the documentation.

5. Technical Reviews--A overall strategy for evaluating the assessment of performance and composite analysis and other closure technical documentation is established, and includes the specific criteria on which the team is to render its findings. A detailed plan to conduct the review is prepared and assignments made to team members based on their expertise and experience.

6. Reporting--An outline of the report is established which contains the findings of the review team with respect to each criterion, a recommendation on the adequacy of the closure plan and a recommendation relative to issuance of an authorization to proceed with closure activities. The report contains any other essential elements that the Deputy Assistant Secretaries may require on which to base their decision.

The *Low-Level Waste Disposal Facility Federal Review Group Manual* provides a systematic process that can be tailored to provide a documented process for review of site closure plans, and

other closure documents, for deactivated high-level waste facilities/sites and the issuance of an authorization to proceed with closure activities. The process should be interactive, involving the subject matter experts and the field site personnel to obtain clarifications and additional data as required to support the review and approval activities.

Analysis conducted during the performance assessment and composite analysis needs to be integrated into closure planning. Conversely, any information that becomes available during the closure operations, or any changes made to closure of the facility, that impact the analysis in the assessment of performance and composite analysis needs to be incorporated into these evaluations in a reasonable period of time to determine the extent of their impact. When major impacts are identified or when major changes are required to the closure plan that affect the conditions or the controls as contained in the authorization to proceed with closure activities, it is the Field Element Manager's responsibility to conduct a review and re-approve the revised analysis. In addition, it is the Field Element Manager's responsibility to inform the appropriate Deputy Assistant Secretary of the changes. Upon receipt of such notification, the Deputy Assistant Secretary reviews the changes and determines what action, if any, is required. At a minimum, the revised closure plan or analysis is distributed to organizations that have an interest in it.

Compliance with this requirement is demonstrated by:

- The authorization to proceed with closure activities at the facilities/sites contains the conditions for authorization, and the controls necessary to protect the public, workers, and the environment during and after closure;

- Physical closure activities for high-level waste deactivated facilities/sites do not proceed prior to the review and approval of closure plans by the appropriate Deputy Assistant Secretary (based on a formal documented review process) and the issuance of an authorization(s) to proceed with closure activities at the facilities/sites;

- Closure operations are actively monitored by the Field Element Manager to ascertain compliance with the conditions and controls as contained in the authorization, and to ensure that whenever any information that becomes available during the closure operations, or any changes made to closure of the facility that impact the analysis in the assessment of performance and composite analysis are incorporated into these evaluations to determine the extent of their impact; and

- The appropriate Deputy Assistant Secretary requires site closure plans and other closure documents to be re-submitted for review and approval when analysis indicates the bounding conditions within the first tier plans or documents may be exceeded.

Supplemental References:

1. DOE, 1998. *Low Level Waste Disposal Facility Federal Review Group Manual*, Revision 0, U.S. Department of Energy, Washington, D.C., September 1998.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(1) Site-Wide Radioactive Waste Management Programs. Developing, documenting, implementing, and maintaining a Site-Wide Radioactive Waste Management Program. The Program shall use a systematic approach for planning, executing, and evaluating the site-wide management of radioactive waste in a manner that supports the Complex-Wide Radioactive Waste Management Programs and ensures that the requirements of DOE O 435.1, *Radioactive Waste Management,* and this Manual are met.

Objective:

The objective of this requirement is to ensure that radioactive waste is managed in a safe, effective, and efficient manner; radioactive waste management activities are integrated, coordinated, and support site-wide and complex-wide goals and objectives; and progress towards goals and objectives are measured and evaluated, and feedback is provided for continued improvement of the management of radioactive waste. Additionally, the requirement is to ensure there are mechanisms in place for providing input to and receiving direction from the complex-wide programs.

Discussion:

Sites with radioactive waste shall develop and document a Site-Wide Radioactive Waste Management Program. To the extent practical, the site-wide program and documentation requirement may be met by existing site programs and documents. Multiple programs or documents can be used or existing programs or documents can be supplemented to meet this requirement. While the use of existing programs or documents to meet this requirement is encouraged, what constitutes the site-wide program and its associated documentation is to be clearly defined and maintained so that ambiguity is avoided. Implementing and maintaining the Site-Wide Radioactive Waste Management Program should be addressed in site-specific procedures. These procedures should require periodic review of the Site-Wide Radioactive Waste Management Program, and review whenever there is a change to complex-wide programs or plans, site-specific radioactive waste management activities, or DOE policy or directives regarding the management of radioactive waste. These reviews should evaluate the status of the Site-Wide Radioactive Waste Management Program and its associated documentation and the program's continued validity over time or under the changed circumstances.

The site-wide program addresses all of the site's radioactive waste, including any off-site radioactive wastes managed by the site. Additionally, all radioactive waste is to be categorized

and managed as high-level, transuranic, low-level, or mixed low-level waste to facilitate consistent, efficient, and effective management of radioactive waste among sites. Guidance on the categorization and management of radioactive waste can be found in Section I.1.C.

The site-wide program provides for the systematic planning, execution, and evaluation of site radioactive waste management activities in a manner that supports the Complex-Wide Radioactive Waste Management Programs. The site-wide program incorporates the direction of the complex-wide programs into site-level planning, execution, and evaluation activities as appropriate. The site-wide program reflects complex-wide direction and also includes site-specific activities necessary to accomplish site missions and result in the safe, effective, and efficient management of radioactive waste in a proactive manner. The site-wide program includes mechanisms for providing input into the complex-wide programs (such as radioactive waste inventories and projections and the identification of technical and programmatic issues and other constraints). The complex-wide and site-wide programs are to be integrated and provide input in both directions. The Complex-Wide Radioactive Waste Management Programs and program plans guidance can be found in Sections I.2.B and I.2.D.

The site-wide program provides personnel with an understanding of the site's radioactive waste management needs and the strategy for meeting those needs; identifies the organizational responsibilities and the facilities and methods that will be used by the site to meet those needs; and establishes evaluation and feedback programs to facilitate continuous improvement of the site-wide program. The program should implement the requirements of DOE M 435.1-1 and other directives and regulations such as those listed in DOE M 435.1-1, Section VI.1.D (e.g., radiation protection requirements of DOE 5400.5 and 10 CFR Part 835, quality assurance requirements of DOE O 414.1 and 10 CFR 830.120) for waste management activities.

The Field Element Manager is assigned the responsibility for the Site-Wide Radioactive Waste Management Program. This establishes a clear management responsibility for radioactive waste management activities at a site. It is the Field Element Manager's responsibility to decide how to meet this requirement. A site may have separate programs for each waste type at the site or one program that addresses all waste types at the site, however, it is not important that each site have one single program.

> *Example: At a site that manages mostly transuranic waste, but also small amounts of low-level and mixed low-level waste, the Field Element Manager has one program that addresses all three waste types. At another site where large amounts of high-level and low-level waste are managed by different organizations, the Field Element Manager has two separate programs. In this situation, the interface between the programs (with respect to the generation of low-level waste, including waste incidental to reprocessing, under the high-level waste program and its transfer to the low-level waste program) should be addressed.*

Additionally, each site may have a Site-Wide Radioactive Waste Management Program or several sites may be covered under one program.

> *Example: A Field Element Manager is responsible for the management of DOE radioactive waste at a DOE site and three off-site locations. Based on the types of waste being managed and the organizations involved, the Field Element Manager develops and supports two programs. One program covers the radioactive waste at the primary DOE site and a separate program covers the radioactive waste at the three off-site locations. The rationale for this approach is included in the documentation for each program.*

In addition to its role defining the radioactive waste program at a site, the documented Site-Wide Radioactive Waste Management Program may also serve as the site's end-state description for radioactive waste at that site, or as a primary reference document for such a plan. A well-documented Site-Wide Radioactive Waste Management Program could significantly facilitate development of radioactive waste end-state documents at individual sites.

Systematic Approach. Applying a systematic approach for planning, executing, and evaluating the site-wide management of radioactive waste facilitates the integration and coordination of radioactive waste management activities across both the site and the DOE complex. In addition, it provides a framework within which the site can identify and communicate a logical approach for effecting waste management activities (planning), manage waste in a manner that is protective of worker, the public, and the environment (executing), and provide measures of progress towards completing site and complex-wide goals, as well as generating feedback to support continuous improvement of the radioactive waste management program (evaluating).

The following sections describe components that are part of a systematic approach to waste management. Whereas there are various methods of implementing a systematic approach, each will generally include some common elements. The most basic element is defining the mission or what the program intends to accomplish. Another common element is the identification of the functions or what needs to be done to accomplish the mission. At the top level, these functions are the program planning, execution, and evaluation. Within the execution function are the functions necessary for management of the waste, generally identified as generation, storage, treatment, and disposal. Another key element is the identification and implementation of requirements and constraints. These include regulatory requirements, commitments or agreements with regulatory or oversight bodies, programmatic requirements, and technical or process requirements.

> Planning. Applying a systematic approach to planning results in a process which can be used to support decision-making related to radioactive waste management activities and should involve consideration of the following topics which are discussed below in more detail:

- Establishing goals, objectives, and milestones;
- Establishing priorities and prioritizing the goals, objectives, and milestones;
- Describing the radioactive waste management boundaries and interfaces;
- Waste projections;
- Identifying the constraints and assumptions;
- Establishing the integrated site strategy;
- Performing life-cycle radioactive waste management planning;
- Defining the schedule; and
- Identifying funding needs.

Goals, Objectives, and Milestones. Long-range goals, interim objectives, and specific milestones, meaningful to the program are to be established. The site-wide program goals should reflect complex-wide direction as well as site-specific goals. The site-wide program should also include site-specific activities necessary to accomplish site missions and result in the safe, effective, and efficient management of radioactive waste in a proactive manner and support the complex-wide established goals, objectives, and milestones as appropriate. Goals, which are long-range in nature, should include descriptions of end-state conditions for facilities, operations, activities, or waste categories, and should be challenging yet achievable. Interim objectives and specific milestones should be established to provide measurements of progress towards goals.

Example 1:
Complex-wide goal: close high-level waste storage tanks.

Supporting site-wide goal: complete closure of all high-level waste storage tanks at the site.

Objective: complete closure of all high-level waste storage tanks in Area 1 by December 2010.

Specific milestones:
- *Complete negotiations with State regulators on criteria for tank closures–August 1999.*
- *Gain acceptance by DOE Headquarters and technical assistance from NRC on guidelines for determining residual tank waste is incidental to reprocessing–February 2000.*
- *Complete partial closure of Tank 1A–September 2002.*
- *Complete partial closure of Tank 1B–June 2003.*
- *Complete partial closure of Tank 1C–October 2005.*

Example 2:
Complex-wide goal: dispose of all defense transuranic waste at the Waste Isolation Pilot Plant.

Supporting site-wide goal: ship all defense transuranic waste stored at the site to the Waste Isolation Pilot Plant.

Objective: begin shipping transuranic waste to the Waste Isolation Pilot Plant (WIPP) by May 2008.

Specific milestones:
- *Develop and get WIPP approval of waste certification program-June 1999.*
- *Initiate retrieval of waste from bermed storage-January 2001.*
- *Complete preparation and authorization of TRUPACT-II loading facility-March 2003.*
- *Complete retrieval of waste from bermed storage-September 2005.*
- *Ship 2000 cubic meters of waste to WIPP-May 2008.*

Example 3:
Complex-wide goal: dispose of all low-level waste placed in storage prior to 1998.

Site-wide goal: eliminate waste placed in storage at the site prior to 1998.

Objective: reduce volume of legacy waste in storage by 50 percent by December 2000.

Specific milestones:
- *Obtain authorization to ship low-level waste to Nevada Test Site-June 1998.*
- *Begin monthly shipments of 50 drums from Building 300-August 1998.*

Priorities and Prioritizing the Goals, Objectives, and Milestones. Site-wide priorities should be established and then be used to prioritize the site-wide goals, objectives, and milestones. The site-wide priorities should reflect complex-wide policy and integration efforts and should also include priorities which reflect site-specific conditions and needs that will result in the safe, effective, and efficient management of radioactive waste in a proactive manner. Establishing priorities should involve consideration of providing protection to workers, the public, and the environment; meeting regulatory requirements, legal commitments, or agreements; availability of technologies, facilities, and capacities; and available funding.

Example:

1) *Ensure continued safe storage of site radioactive waste inventories.*
2) *Reduce radiation exposures to workers.*
3) *Acquire necessary characterization technology, including assay capabilities.*
4) *Obtain approval of waste certification programs for all generating facilities at the site.*
5) *Reduce storage inventories of radioactive waste at the site.*

Boundaries and Interfaces. The site-wide radioactive waste management program is to be clearly defined and described, including: organization and responsibilities; facility, operation, and activity descriptions; existing and projected radioactive waste inventories; and storage, treatment, and disposal capacities.

The organizational and functional responsibilities of participants in the site-wide program and their interrelationships are to be identified and described. In addition to site organizations, interfaces with both Headquarters and other Field organizations are also identified and described, as appropriate, including a discussion of their respective roles and interactions in planning, executing, and evaluating site-wide radioactive waste management program activities.

Program documentation should include a brief description of the facilities, operations, and activities that constitute the site-wide radioactive waste management program and the interfaces between the site facilities, operations, and activities and other site facilities, operations, and activities, as well as other programs (e.g., Environmental Restoration or Defense Programs). A brief discussion of new facilities that have been identified as necessary to implement the radioactive waste management program, and the plans for funding, constructing, and obtaining authorization to operate these facilities is included at appropriate.

An accounting of the current radioactive waste inventories and treatment, storage, and disposal capacities by facility and expected waste generation and receipt projections should also be included. Site personnel should be made cognizant of the need for accurate inventory and projection data to support the planning, execution, and evaluation of site-wide radioactive waste management activities, as well as, the complex-wide programs. The purpose is to ensure that all radioactive wastes the site is expected to manage and site capacities are considered in planning, executing, and evaluating site-wide radioactive waste management activities.

Example: A site develops a document which is the compilation of the information provided to Headquarters for the "Accelerating Cleanup: Paths to Closure"

report. This site specific report represents a summary of the site baseline and includes disposition maps to aid in visualizing the system.

Waste Projections. A primary element in the Complex-Wide Radioactive Waste Management Program, waste projections should be implemented by the Site-Wide Programs, where data collection can be made most efficiently.

The methodology used for projecting waste data is to be documented. The major assumptions used in developing the estimates, the known activities and operations being undertaken at the facilities included in the projections, and the steps (treatment, storage, disposal) required for managing the radioactive waste should be included in the documentation. The estimation techniques used are to rely on documented information wherever possible, such as Remedial Investigation studies for cleanup projects and shipment manifests for operational radioactive waste. The information is to be consistent in detail and content with that being used to characterize ongoing waste generation.

The projections data developed through site-wide program should be collected, formatted, and reported so that they are easily integrated into the Data Management System that is established under the DOE M 435.1-1, Section I.2.D.(2), *Waste Management Data System*. The projections data should also be consistent and collected so that they can be easily integrated into life-cycle planning; complex-wide configuration of radioactive waste management facilities; and evaluations of treatment, storage, and disposal facilities capacities.

Example: As part of the update to the "Accelerating Cleanup: Paths to Closure" report, a site revises and updates its waste projection data. The data are input into a complex-wide standardized system and reports are generated.

Constraints and Assumptions. The site radioactive waste management program should document the significant constraints which affect planning, execution, and evaluation. These are generally those pre-existing conditions, commitments, or other factors that affect activities that can be performed or must be performed, or that otherwise limit the flexibility of the site-wide program. The constraints and assumptions should include basic tenets and policies adopted by DOE and the site, assumptions made by the site, interagency agreements, regulatory requirements or commitments (e.g, compliance orders), records of decision from *National Environmental Policy Act* evaluations, physical capacity constraints (space or through-put limits of facilities), and other resource constraints (e.g., capacity, resources, funding), and direction in the Complex-Wide Radioactive Waste Management Programs. Uncertainties should be identified along with the assumptions which provide a basis for proceeding.

Example 1: Complex-wide basic tenet: disposal of high-level radioactive waste shall be in accordance with 40 CFR Part 191.

Example 2: Complex-wide assumption: it is assumed that under current legislative constraints, non-defense transuranic waste will not be disposed of at WIPP.

Example 3: Site-wide constraint: funds for shipping stored waste to a disposal facility are limited and will result in only being able to ship 45 percent of the waste that is ready for shipment.

Example 4: Site-wide assumption: the Q Area disposal facility for non-mixed low-level waste will continue to operate for the indefinite future.

Integrated Site Strategy. The program is to document the strategy that will be used and the associated rationale to accomplish the site-wide program goals, objectives, and milestones. This strategy should address the allocation of funds and resources, consider the configuration of existing and the need for new physical assets, be based on current and projected inventories of radioactive waste (including current waste streams, stored waste with a path to disposal, and stored waste without a path to disposal), support the site goals, objectives, and priorities, consider land-use (present and future), and respond to stakeholder input. Incorporation of waste minimization and pollution prevention philosophies into site-wide radioactive waste management activities, and research and development needs and activities also are to be addressed in the strategy.

Example 1: A site needs to increase its current high-level waste evaporation capacity to meet the requirements of an agreement with the State regulator. One option is to enhance the current capacity by upgrading it, however, this may pose risks to operating personnel in terms of radiation exposure, as well as reduced evaporator availability and long-term reliability. Another option is to replace the existing evaporator(s) with a new one, however, this option will require time (e.g., Congressional support, State acceptance) to gain project line-item funding. The selection of the option to upgrade is documented to be consistent with the site-wide and complex-wide program goals, objectives, and milestones; stakeholder input; schedule commitments; and expected funding.

Example 2: A site needs transuranic waste assay capability. One option is to plan for and indicate the activities and schedule for using a portable assay facility. A second option is to build a new assay facility at the site. The selection of the option to build a new facility is documented to be consistent with site-wide program goals, objectives, and milestones; stakeholder input; and schedule

commitments. The plans for the funding, constructing, and obtaining authorization to operate the facilities are also documented. The strategy was also documented to be consistent with complex-wide goals, objectives, and milestones for making WIPP shipments from the site.

Life-cycle Radioactive Waste Management Planning. It is the intent of the requirement for life-cycle planning that disposition for all radioactive waste at a site is addressed. By evaluating all phases in the life-cycle of the waste, adequate capabilities can be provided and ensured for handling the radioactive waste and identifying any potential issues that need to be resolved. Life-cycle waste management planning is to address current waste streams (also see guidance on Waste Generation Planning in Sections II.K, III.H, and IV.H), stored waste with a path to disposal, and stored waste without a path to disposal.

The following are elements that are to be included in the life-cycle waste management planning process for a waste stream:

Waste identification - waste is identified in terms of its source (what facilities and what activities are the sources of the waste), and its characteristics. The waste characteristics should include radiological, chemical, and physical characteristics that need to be considered in determining the disposition of waste.

Waste management steps and locations - the steps necessary for managing the waste are described along with an identification of the specific means for accomplishing the steps. This should include:

- Characterization/certification;
- Storage;
- Treatment/pre-treatment/immobilization;
- Transportation; and
- Disposal.

Example 1: Site Z generates low-level waste streams which are collected once a month from three buildings by central waste management. Central Waste Management certifies it in accordance with an existing certification program and ships it to the Nevada Test Site for disposal on an arranged schedule. The life-cycle waste management planning documentation simply includes that the waste will be characterized in Laboratory L, collected weekly by the Waste Management Organization and staged in Storage Building S, certified in accordance with an existing program, and transferred for disposal at Nevada Test Site Area 5 when sufficient waste to justify a shipment is available (every 6-8 months).

Example 2: Scheduling waste shipments to the WIPP facility is highly complex, requiring the scheduling of TRUPACT-II shipping containers and their associated tractor-trailer units, and the opening and closing of transportation corridors from each DOE transuranic waste management site to the WIPP. A site managing transuranic waste would plan site waste management activities and transportation preparations so that waste is ready to ship on the schedules identified in the National Transuranic Waste Management Plan (CAO, 1996b).

Scheduling. A schedule of activities necessary to implement the site-wide program is to be developed. The schedule should address developing and maintaining the infrastructure for managing waste and the management of current waste streams, stored waste with a path to disposal, stored waste without a path to disposal, and projected wastes.

Funding. The site program documentation is to include cost estimates, as appropriate, for addressing the site-wide management of radioactive waste. These cost profiles should be consistent with the integrated site strategy and anticipated funding levels. Cost and budget information should be provided in sufficient detail, by fiscal year, to identify key programs, activities, and projects. Proposed privatization efforts, planned productivity improvements, and other efforts of interest should be identified separately.

Execution. The systematic execution of the site waste management program is the actions taken to manage the waste and develop the attendant documentation. The documentation is prepared consistent with the site's management of radioactive waste, operating procedures, radioactive waste generator requirements (waste characterization, waste certification, and waste transfer), radioactive waste acceptance requirements, closure plans, etc.

Example: Documentation of the execution of the waste management activities for a storage facility include:

- *personnel training records,*
- *safety documentation governing the facility,*
- *facility waste acceptance criteria and procedures,*
- *certification program description,*
- *receipt records,*
- *certification records,*
- *waste transfer records,*
- *monitoring program/procedures,*

- *monitoring records, and*
- *corrective action records.*

Evaluation. An important part of any program is evaluating progress in the program. Progress should be measured and compared with programmatic goals as well as environmental, health, and safety parameters. A systematic evaluation should include the following elements:

- Performance Measures - metrics to be used in evaluating performance against program, environment, health, and safety goals;

- Performance Data - collection of performance data to support the evaluations;

- Performance Evaluation and Reporting - reduction of data interpretation and evaluation; and

- Feedback - identifying and recommending potential changes in program policies, strategies, goals, priorities, or interfaces.

Example: A site has the goal of eliminating waste placed in storage at the site prior to the year 2000. The Site's objective is to reduce volume of waste in storage by 50 percent by December 2002. A milestone for this goal and objective is obtaining permission to ship waste in storage to the Nevada Test Site by June 2000, beginning monthly shipments of 50 drums from Building 300 by August 2000. Performance measures were identified which would evaluate performance against both the interim objective and specific milestones since both provide measurable progress towards meeting the goal. For the objective, the volume of waste in storage was determined and verified. The reduction in volume of this waste was used to measure progress towards meeting the objective. For the milestone to obtain permission to ship waste to the Nevada Test Site, the steps were identified and a schedule developed which ended with receiving permission in June 2000. This schedule was then used to measure progress towards meeting this milestone. The performance measures for the monthly shipments were identified assuming shipments were able to begin in August 2000 and continue through December 2002. The number of shipments per month and drums per shipment, and the total number of shipments and drums shipped to date were used as performance measures. The performance data were collected monthly and compared to the reference data and performance evaluated and reported. Evaluation indicated that progress towards meeting the specific milestone was on track to successful completion.

The process of planning, execution, and evaluation is an iterative process. The lessons learned from the activities undertaken during one fiscal year, or changes in the assumptions on which the program strategy was originally based will require revising the program planning.

Compliance with this requirement is demonstrated if a site-wide program plan(s) is developed for each of the waste types specified in DOE M 435.1-1. The site-wide plan(s) should support the complex-wide plans by incorporating the direction of the complex-wide plan into site-level planning, execution, and evaluation activities.

Supplemental References:

1. CAO, 1996a. *Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, Revision 5, DOE/WIPP-069, U.S. Department of Energy, Carlsbad Area Office, Carlsbad, NM, April, 1996.

2. CAO, 1997. *The National Transuranic Waste Management Program*, Revision 1, DOE/NTP-96-1204, U.S. Department of Energy, Carlsbad Area Office, Carlsbad, NM, December 18, 1997.

3. CAO, 1997. *Generator Site Certification Guide*, Revision 1, DOE/CAO-95-2119, U.S. Department of Energy, Carlsbad Area Office, Carlsbad, NM, August 1997. (users should refer to the current version).

4. DOE, 1996. *Low-Level Waste Projection Program Guid*e, U.S. Department of Energy, Office of Waste Management, December 18, 1996.

5. DOE, 1990. *Radiation Protection of the Public and the Environment*, DOE 5400.5, U.S. Department of Energy, Washington, D.C., February 8, 1990.

6. DOE, 1998. *Quality Assurance*, DOE O 414.1, U.S. Department of Energy, Washington, D.C., November 24, 1998.

7. DOE. *Occupational Radiation Protection*, 10 CFR Part 835, U.S. Department of Energy, Washington, D.C.

8. DOE. *Quality Assurance Requirements and Responsibilities*, 10 CFR Part 120, Washington, D.C.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(2) Radioactive Waste Management Basis. Ensuring a radioactive waste management basis is developed and maintained for each DOE radioactive waste management facility, operation, and activity; and ensuring review and approval of the basis before operations begin. The Radioactive Waste Management Basis shall:

(a) Reference or define the conditions under which the facility may operate based on the radioactive waste management documentation;

(b) Include the applicable elements identified in the specific waste-type chapters of this Manual; and

(c) Be developed using the graded approach process.

Objective:

The objective of this requirement is to ensure that the hazards associated with radioactive waste management facilities, operations, and activities have been identified, their potential impacts analyzed, and appropriate controls documented, implemented, and maintained for the protection of workers, the public, and the environment.

Discussion:

DOE M 435.1-1 states that it is the responsibility of the Field Element Manager to ensure development and approval of a radioactive waste management basis for a radioactive waste management facility. Guidance on the requirement is provided below under the headings entitled, Facilities with an Authorization Basis, Review and Approval of the Radioactive Waste Management Basis, Timing of the Radioactive Waste Management Basis, and Maintaining the Radioactive Waste Management Basis. Subrequirement (a) is discussed under the heading Documentation of the Radioactive Waste Management Basis. Subrequirement (b) is discussed under Elements in the Waste Type Chapters. Subrequirement (c) is discussed under the heading Graded Approach. Also, at the end of the guidance, Radioactive Waste Management Basis Statement Examples are presented for some of the hypothetical situations discussed throughout this guidance.

The requirements in DOE O 435.1 and DOE M 435.1-1 were developed following a systematic analysis of the hazards associated with management of radioactive waste and the conditions and

weaknesses that need to be controlled to prevent or minimize the risks due to these hazards. A principal concept in this analysis is that a significant amount of the waste will present hazards for a long time. Therefore, in addition to hazards that need to be controlled during operations and other near-term activities, there are many conditions and weaknesses inherent in managing radioactive waste that are required to be controlled leading up to disposal and after disposal to protect future generations from the continuing hazard of the waste.

> *Example: A liquid waste stream containing high concentrations of long-lived radionuclides requires stabilization to be disposed at the Site Y disposal facility in order to provide for site stability and to retard the migration of the long-lived radionuclides for a long period of time. An incorrectly processed batch of this waste form degrades prematurely and causes instability in the Site Y disposal facility and leads to significant migration of radioactivity. As a consequence, the site Y disposal facility must be remediated.*

The hazards analysis used to develop the requirements indicated that many weaknesses and conditions that could result in consequences in the near-term for workers, the public, and the environment from radioactive waste management are sufficiently addressed through requirements, processes, procedures, documentation, and evaluations required by existing regulations and requirements, particularly those for occupational and nuclear safety. DOE M 435.1-1 identifies many of these in Section I.1.E, Requirements of Other Regulations and DOE Directives. Key directives that address many of the significant risks from operations and other near-term management of radioactive waste are DOE 5480.21, *Unreviewed Safety Question*, and DOE 5480.23, *Nuclear Safety Analysis Reports*. As a result, the requirements in DOE M 435.1-1 principally address weaknesses and conditions that are not addressed in these other directives or address weaknesses associated with radioactive waste management activities. Requirements also address weaknesses associated with particularly vulnerable radioactive waste management steps, such as waste transfer, or address the weaknesses and conditions associated with the long times that management of radioactive waste is required.

The requirements in DOE M 435.1-1 are framed primarily as performance-oriented requirements, and are implemented through documented processes, programs, and procedures on a facility-, operation-, or activity-specific basis. The oversight of performance-oriented requirements such as these involves a decision by a DOE authority (e.g., the Field Element Manager) that there is a basis for a facility to operate. The basis is demonstrated through a review and analysis of the procedures that concludes that the necessary controls to meet the requirements and operate safely are in place. DOE 5480.21 contains some performance-oriented requirements, and its implementation involves development of an Authorization Basis for a facility to safely operate.

During the development of the DOE M 435.1-1 requirements, it was recognized that a basis was needed similar to the authorization basis that ensured that the potential hazards from management

of radioactive waste were being sufficiently evaluated and that adequate controls were in place to provide assurance that the public, workers, and the environment were being protected. As discussed above, for some aspects of radioactive waste management (e.g., preparation of waste for disposal), these assurances include consideration of potential future hazards.

Thus, the concept of a radioactive waste management basis was adopted to provide assurances that controls are developed, documented, in place, and properly implemented for management of radioactive waste. The term controls used here and elsewhere in the discussion of a radioactive waste management basis refers to processes, procedures, equipment, instruments, and other items that are intended to reduce the likelihood of, or the consequences from, a problem that could arise from managing radioactive waste. Controls include such things as placards, alarms, tools, shielding, training, checklists, duplication of critical steps, redundant monitoring, analysis, sampling and testing, etc.

The radioactive waste management basis will involve activities such as characterizing and certifying waste, establishing constraints on the acceptance of waste consistent with a facility or operation's characteristics, processing waste, containing waste with or without processing, and disposing of the waste, including its possible impacts following disposal. Controls will be implemented on a facility-, operation-, and activity-specific basis consistent with the earlier discussion about the implementation of performance-oriented requirements.

Facilities with an Authorization Basis. In the case of nuclear facilities with Authorization Basis documentation, it is likely that most of the controls required for a radioactive waste management basis are implemented by the Authorization Basis. DOE 5480.21, *Unreviewed Safety Question*, defines Authorization Basis as:

> "Those aspects of the facility design and operational requirements relied upon by DOE to authorize operation. These aspects 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, the Technical Safety Requirements, DOE-issued safety evaluation reports, and facility-specific commitments made in order to comply with DOE Orders or policies."

As prescribed in DOE 5480.23, *Nuclear Safety Analysis Reports*; DOE STD-3009-94, *Preparation Guide for US DOE Nonreactor Nuclear Safety Analysis Reports*; and DOE-EM-5502-94, *DOE Limited Standard, Hazard Baseline Documentation*, an Authorization Basis is required for all nuclear facilities that have a hazard categorization of Category 1, 2, and 3. While there are currently no radioactive waste management Category 1 facilities (reserved for nuclear reactors), some radioactive waste facilities are Category 2 or 3, as defined by the methodology outlined in DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*. Thus, these radioactive

waste management facilities have, or are required to have, an approved Authorization Basis. For these facilities, the radioactive waste management basis requirements are very likely already met by the implementation of the facility's Authorization Basis. This should be determined through a review of the Authorization Basis documentation that leads to a determination that adequate controls are in place to meet the DOE M 435.1-1 requirements (see additional discussion under Review and Approval).

Example: A review of the Authorization Basis documentation for the Liquid Radioactive Waste Handling Facilities at the Savannah River Site (includes F and H Area Tank Farms, the In-Tank Precipitation Process, the Replacement High-Level Waste Evaporator, and the Effluent Treatment Facility) found that the Authorization Basis includes the following documents and associated programs:

- *Safety Analysis Reports (SARs);*
- *Technical Justification for Continued Operation/Basis for Interim Operation/Design Basis Accident Analysis Report;*
- *Operational Safety Requirements/Technical Safety Requirements;*
- *Technical Standards;*
- *SAR Update Request Packages;*
- *Other Documents Identified by DOE-SR and WSRC as Authorization Basis Documents (Safety Evaluations, Exemptions, Unreviewed Safety Questions Evaluation);*
- *DOE Safety Evaluation Reports; and*
- *Listing of documents that are to be subject to configuration management but are not Authorization Basis Documents.*

Included within these documents are what DOE-SR considers to be the complete set of operational requirements relied upon by the site to ensure that the public, workers, and the environment are protected from the hazards associated with the management of the radioactive waste handled in the facilities (e.g., the establishment of limits of fissionable materials and chemical constituents that can be transferred to the waste tanks by the generators is included in the SARs. These limits are essentially equivalent to the limits required to be set by the waste acceptance requirements (II.J) of the high-level waste chapter of DOE M 435.1-1). The existing Authorization Basis documentation contains all the information demonstrating that DOE O 435.1 and DOE M 435.1-1 are met. This is documented in a memorandum from DOE-SR to the contractor organization operating the facilities.

Other radioactive waste management facilities are covered by similar documentation prepared to meet the requirements of the above Safety Orders and their implementation, such as an Auditable Safety Analysis, or a DOE- or contractor-established interim safety basis for facility operation

such as a Basis for Interim Operations (BIO). Facilities operating under one of these may also have the necessary programs and documentation in place to satisfy the requirements for a radioactive waste management basis. A review of the existing programs and documentation is to be conducted for their adequacy in providing the controls needed to meet the DOE M 435.1-1 requirements and determining whether any additional documentation or program is required to demonstrate that the requirements of DOE O 435.1 and DOE M 435.1-1 will be met.

Radioactive waste management operations and activities that take place in facilities which are radiological (non-nuclear) facilities are likely to not already have an Authorization Basis or similar safety-related documentation to consider in evaluating whether the radioactive waste management basis for the facility already exists. However, programs and controls already implemented at the facility may wholly or partially fulfill the requirements for a radioactive waste management basis. For these facilities, a thorough review should be conducted that identifies where additional programs or controls are needed, and includes the critical step of ensuring that a radioactive waste management basis exists when these programs and controls are appropriately implemented.

The radioactive waste management basis plays a key role in the self-correcting system employed by DOE Elements in accordance with DOE P 450.4, *Safety Management System Policy*. The radioactive waste management controls forming the basis are evaluated periodically to ensure they continue to address the hazards of managing the radioactive waste. Adherence to and compliance with the critical elements of the radioactive waste management basis should become items measured in accordance with DOE O 210.1, *Performance Indicators and Analysis of Operations Information*, and which is reported in accordance with DOE O 232.1A, *Occurrence Reporting and Processing of Operations Information* when incidents occur. As such, the critical elements of the radioactive waste management basis should be considered similar to the Technical Safety Requirements (TSRs) described in DOE 5480.21. The responsibility should be clear to all personnel involved in implementing radioactive waste management basis controls that violations and operations inconsistent with the radioactive waste management basis should be reported, and steps made to correct the situation consistent with the sections of the Manual entitled Corrective Actions.

Review and Approval of the Radioactive Waste Management Basis. The requirement states that the Field Element Manager's responsibility is to ensure review and approval of the radioactive waste management basis for each radioactive waste management facility under his/her authority. This review should be done by DOE staff. The DOE staff could be supported by staff of a contractor who has no conflict of interest. However, the Field Element Manager is responsible and accountable for the radioactive waste management basis approval.

The approval that is required means the facility, operation, or activity has been determined to have adequate controls to manage radioactive waste in accordance with the requirements of DOE O 435.1 and DOE M 435.1-1 and is authorized to manage radioactive waste. For new facilities or

major modifications to existing facilities, this approval should be provided prior to the beginning of the activities that will create waste. The Field Element Manager must determine how and when to approve radioactive waste management bases for existing and ongoing waste management facilities, operations, and activities (see additional discussion under Graded Approach).

In order to approve management of radioactive waste, the requirement calls for review of the basis. This statement implies review of documents, and in fact, some of the elements identified as crucial to the radioactive waste management basis for a facility are large documents (e.g., the composite analysis for a low-level waste disposal facility). While documentation should always be prepared for all critical activities affecting the management of radioactive waste, it is recognized that several methods may be employed for meeting requirements in DOE directives and in documenting compliance with requirements. Thus, the review could include reviewing documentation, preparation of documentation, the organization assigned the job of document preparation and its criteria or processes for preparing documentation, or audit results to conclude the facility, activity, or operation is satisfactorily meeting the DOE O 435.1 and DOE M 435.1-1 requirements. The review called out in this requirement is not supposed to imply the need for reviewing ALL documentation that is associated with the requirements or implementation of the requirements. The review should involve appropriate steps to ensure that DOE O 435.1 and DOE M 435.1-1 requirements are being met.

Example 1: A large DOE facility has several hundred generators, and a system is established for centralized certification of wastes for treatment and disposal. Generators submit waste profiles to the central waste management organization for each of their waste streams as part of certification. Therefore, there are thousands of waste profiles managed by the central unit. The review by the Field Element Manager at this facility to ensure the waste certification element of the radioactive waste management basis is being implemented appropriately includes a review of the procedure used by the central waste management organization for certification (which includes minimum information that must be on profiles and criteria for finding them complete), and an annual program review that assesses all aspects of the central organizations activities.

Example 2: A DOE facility consisting of many small operations and activities operates several storage areas. Its central waste management unit develops a generic waste acceptance requirements document that each storage area must follow, at a minimum, plus instructions for adding specific technical criteria to the set of generic requirements for any specific wastes they are handling. Central waste reviews and approves the specific criteria developed. The Field Element Manager's staff has reviewed the generic waste acceptance requirements with the instructions and finds this adequately addresses the DOE O 435.1 and DOE M 435.1-1 requirements for this element of the radioactive waste management basis. The Field staff does not investigate any of the specific waste acceptance criteria that have been developed and approved.

Documentation of the Radioactive Waste Management Basis. The radioactive waste management basis is to be documented for all radioactive waste management facilities, activities, and operations. The documentation of the radioactive waste management basis consists of results of reviews and analyses, where appropriate, and a description of radioactive waste management controls that are in place for protection of the public, workers, and the environment. The results of the reviews, analyses, and descriptions of the controls that must be in place for the safe and efficient management of radioactive waste are already prepared, documented, and implemented by DOE Elements for most radioactive waste management facilities, operations, and activities. The radioactive waste management basis includes the analysis, programs and their procedures, and documents that are identified in the waste-type chapters of DOE M 435.1-1, *Radioactive Waste Management Manual*.

> *Example 1: For the Liquid Radioactive Waste Handling Facilities at the Savannah River Site described in the above section Facilities with an Authorization Basis, of the list of documents cited in the example, all Safety Analysis Reports, the Safety Evaluation Report, and the Technical Justification for Continued Operation, plus several Technical Standards, Technical Safety Requirements, SAR Update Request Packages, several Exemptions and Unreviewed Safety Question Evaluations, plus many facility procedures, and several chapters from the Configuration Management list of documents constitute the radioactive waste management basis documentation.*
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> *Example 2: Storage Facility B200 operates under the following procedures and documents that constitute the radioactive waste management basis: Safety Analysis of Facility B200; Facility B200 Waste Acceptance Criteria; Procedure B200 - Acceptance of Waste for Storage, Quality Implementation Procedure (QIP) for Facility B200; Procedure C200B - Certification of Waste to Disposal, and; Training Module 200W.*
>
> *Example 3: At Storage Facility B200 in the example above, each of the documents and procedures listed above is assigned a number [RWMB-xxx], indicating it is a radioactive waste management basis document, which can easily be found by site personnel who perform a search for radioactive waste management basis documents in accordance with the record management system instructions.*

The documentation of a radioactive waste management basis includes a documented conclusion that there is adequate protection from the hazards of management of the radioactive waste as a result of the Field Element Manager, or his/her designee's review and approval. This documentation, called a radioactive waste management basis statement in this guidance, is to be prepared for every radioactive waste management facility, operation, or activity to demonstrate that a DOE authority has concluded that the hazards associated with management of radioactive waste have been addressed and that the performance-oriented requirements of DOE O 435.1 and DOE M 435.1-1 will be met by the implementation of the described controls. The radioactive

waste management basis statement should include, or reference, the documentation used to provide the conclusion, (e.g., list of facility procedures), or reference to other reports that contain the key conclusions (the facility's DOE Safety Evaluation Report). This key element of a complete radioactive waste management basis is not already prepared and documented by DOE Elements for many radioactive waste management facilities, operations, and activities.

For facilities with an Authorization Basis, or other safety-related documentation discussed under Facilities with an Authorization Basis, the radioactive waste management basis statement should document that the safety-related documents describe the controls required to ensure that DOE O 435.1 requirements will be met, describe the critical controls that provide compliance with DOE O 435.1 and DOE M 435.1-1, and provide information on the location of the controls. If appropriate, the radioactive waste management basis evaluations and conclusions could be incorporated into the Authorization Basis or other safety-related authorization if desired by the Field Element Manager.

> *Example: A radioactive waste management basis statement is prepared for the Savannah River Site example described under Facilities with an Authorization Basis. It contains a full list of facilities that are covered by the statement and it has two attachments. The first attachment is a complete list of the documents referred to in the previous example in which all radioactive waste management controls that must be in place to meet DOE M 435.1-1 are found (see Example 1 under Documentation of the Radioactive Waste Management Basis to see this list). The second attachment is a crosswalk of DOE M 435.1-1 requirements showing which documents and where in the documents analysis and descriptions of controls can be found to meet that requirement.* [An example of this radioactive waste management basis statement is provided as Example A at the end of this guidance.]

Elements in the Waste Type Chapters. Each of the waste-type specific chapters in DOE M 435.1-1 contains a list of specific programs, processes, and documents that must be included in the radioactive waste management basis for facilities that manage these waste types. These programs, processes, and documents represent implementation of critical radioactive waste management controls which are based primarily or exclusively on DOE M 435.1-1 requirements. These should not be considered as a complete list of all of the elements that may need to be included in a radioactive waste management basis.

Many weaknesses and conditions associated with radioactive waste management are controlled by processes, procedures, and documentation developed and implemented to meet other sets of requirements, both Federal and State regulations and DOE directives. Many of these are identified in Section I.1.E, Requirements of Other Regulations and DOE Directives. Controls based on these other directives and regulations should also be evaluated to ensure that the critical

aspects to radioactive waste management are adequate, and therefore, contribute to a radioactive waste management basis finding.

> *Example 1: A small DOE laboratory includes a storage operation for small amounts of low-level waste. Waste is accumulated over about a nine-month period of time, after which it is shipped to the Nevada Test Site for disposal. The radioactive waste management basis for this facility includes the waste acceptance requirements (DOE M 435.1-1), the waste certification program (DOE M 435.1-1), the radioactive waste management module of the laboratory training program (DOE O 360.1 and DOE 5480.20A), the facility's implementation procedure of the site quality assurance program plan (10 CFR 830.120), and the document control procedure used for maintaining records of waste that is in storage (DOE O 200.1 and 10 CFR 830.120).*

> *Example 2: Operation at the storage facility discussed in Example 1 above is modified to store a small amount of classified waste. The radioactive waste management basis includes the items above, plus Section 14 of the laboratory's security and safeguard implementation procedure (DOE O 470.1), which requires appropriate labeling of the containers of classified waste.*

Additional controls are sometimes needed to address situations and conditions that were not evaluated in the development of requirements and directives, or which are identified through facility-, process-, or activity-specific hazard analysis. These specific controls also must be evaluated to ensure the aspects of them that are critical to radioactive waste management are adequate and contribute to the radioactive waste management basis finding.

> *Example: The operating procedures for a storage facility containing transuranic waste includes the items identified in Chapter III; facility-specific procedures implementing two other DOE directives; and conditions specified in its RCRA storage permit. It also contains actions from a facility-specific audit conducted by the Carlsbad Area Office in its radioactive waste management basis to fully cover the hazards associated with the facility. The radioactive waste management basis statement includes the specific requirements from the audit report to document the commitments to meet these action items for safe management of radioactive waste.*

The radioactive waste management basis should be limited to only those processes or controls that are needed based on the hazards that may be present in the facility or operation, the complexity of activities to manage the waste, and the time that controls are warranted to provide protection. Controls critical to a radioactive waste management basis at one facility are not necessarily warranted to be included at all facilities within a site, for example. Thus, a standard listing of radioactive waste management basis documents cannot be developed.

Graded Approach. The scope of Departmental activities leads to a great deal of diversity in what constitutes the radioactive waste management basis for a given operation, and the documentation of the basis should reflect the hazards associated with these diverse activities. In general, generation and treatment of radioactive waste are more dynamic than storage and disposal, so it would be expected that the radioactive waste management bases for these types of facilities would be different, i.e., different topics need to be covered, and different levels of detail are necessary for proposed controls. Similarly, when identical activities (such as storage and certification to a disposal facility) are being conducted at many facilities on one site, it is expected that the same radioactive waste management bases may apply to all of these facilities.

For facilities where little hazard exists or where activities are not dynamic, the radioactive waste management basis statement may be abbreviated, such as a memorandum which references the appropriate documents. For facilities where many interrelated activities are occurring and/or where higher hazards are present, a radioactive waste management basis statement could be prepared that provides the operational conditions of a radioactive waste management facility , similar to a license for a facility regulated by the Nuclear Regulatory Commission.

> *Example 1: An operating low-level waste disposal facility has approved revisions of all of the following documents (listed in Chapter IV); the waste acceptance requirements, the performance assessment, the composite analysis, the disposal authorization statement, and the monitoring plan. The preliminary closure plan reviewed with the performance assessment has not been approved, pending an extensive update. Several disposal site procedures are also approved and implemented. The Field Element Manager determines that the facility may operate while it updates the closure plan. The Field Element Manager also identifies the Site Radiation Control Manual and the Site Health and Safety Plan and an additional document requested by the State mixed waste regulating authority to include as part of the basis to allow operations for management of radioactive waste. In this case, the radioactive waste management basis statement prepared incorporates the aforementioned documents by reference, and contains other conditions that the facility must adhere to for safe disposal of the low-level waste. One of these added conditions is that the updated closure plan must be submitted within 15 months of the issuance of the radioactive waste management basis to include consideration of the comments addressing deficiencies in the preliminary closure plan.* [An example of this radioactive waste management basis statement is provided as Example B at the end of this guidance.]
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> *Example 2: A laboratory facility stores transuranic and low-level waste in four temporary storage buildings. Following an approved time period, the waste is collected by a central waste management operation of the laboratory and consolidated in a permanent storage facility. The transuranic waste is stored there indefinitely, while the low-level waste is stored until a sufficient amount is accumulated for shipment to a low-*

level waste disposal facility. The low-level waste is certified to a specific disposal facility's waste acceptance criteria, while the transuranic waste is certifiable to WIPP requirements. The radioactive waste management basis statement for all of these facilities and activities is documented with one radioactive waste management basis statement. The statement consists of a memorandum that references five laboratory operating procedures on storage of waste and certification of waste, and the low-level waste disposal facility and WIPP waste acceptance requirements since the waste is certified to meet these two disposal facilities' requirements without any changes being made to the waste. [An example of this radioactive waste management basis statement is provided as Example C at the end of this guidance.]

Timing of the Radioactive Waste Management Basis. The requirement states that the radioactive waste management basis is to be reviewed and approved before operations begin. The requirement is written from the viewpoint of applying the provisions to a new facility, and thus emphasizes that the basis must be in place prior to the generating of any radioactive waste. For existing facilities, the Field Element Manager should establish a schedule for approvals of radioactive waste management bases to bring existing facilities into compliance with this requirement. It may be appropriate to consider the hazards associated with each facility and the radioactive waste managed at it when establishing the implementation schedule for approvals of radioactive waste management bases. Therefore, a facility with a great deal of hazard or complexity, such as a multi-waste stream treatment facility, may have a bases approved before facilities that engage in less complicated or hazardous activities. Implementation is to be consistent with the requirements of DOE M 435.1-1 as set forth in paragraph (i) 4.

Maintaining the Radioactive Waste Management Basis. The radioactive waste management basis should be reviewed periodically and whenever there is a change to the subject facility, operation, or activity, or the requirements of DOE O 435.1 or DOE M 435.1-1. Appropriate changes should be made to the documentation of the radioactive waste management basis, if warranted. These reviews should evaluate the status of the radioactive waste management basis and its continued validity over time. The review should evaluate whether the existing documentation still adequately identifies the hazards associated with a radioactive waste management facility, operation, or activity; the analysis of the potential impacts of those hazards is still valid; and the controls that are in place for protection of workers, the public, and the environment address the hazards. Existing processes, programs, or documentation that can satisfy this guidance should be used to the extent possible. Elements of the radioactive waste management basis in the self-correcting system employed at the site in accordance with the integrated Safety Management System employed in accordance with DOE P 450.4 should be included as an effective way to achieve adequate maintenance of the radioactive waste management basis.

The requirement for a radioactive waste management basis is successfully met if all radioactive waste management facilities, operations, and/or activities at each DOE site has a radioactive

waste management basis, which concludes that appropriate controls are documented and implemented for the protection of workers, the public, and the environment. The conclusion should be appropriately documented. The documentation should provide, at a minimum, a complete list of the controls that implement the requirements of DOE O 435.1 and DOE M 435.1-1 for all waste types being managed at the site, and provide evidence that the radioactive waste management controls are included in the site's implementation of the integrated Safety Management System.

Additional information on the radioactive waste management basis is contained in Chapter II, *High-Level Waste Requirements;* Chapter III, *Transuranic Waste Requirements*; and Chapter IV, *Low-Level Waste Requirements* of this guidance.

Supplemental References:

1. DOE, 1991. *Unreviewed Safety Question*, DOE 5480.21, U.S. Department of Energy, Washington, D.C., December 24, 1991.

2. DOE, 1992. *Nuclear Safety Analysis Reports*, DOE 5480.23, U.S. Department of Energy, Washington, D.C., April 10, 1992.

3. DOE, 1994. *Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Reports*, DOE STD-3009-94, U.S. Department of Energy, Washington, D.C., July 1994.

4. DOE, 1994. *DOE Limited Standard: Hazard Baseline Documentation*, DOE-EM-5502-94, U.S. Department of Energy, Washington, D.C., December 1994.

5. DOE, 1992. *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, DOE-STD-1027-92, U.S. Department of Energy, Washington, D.C., December 1992.

6. DOE, 1996. *Safety Management System Policy*, DOE P 450.4, U.S. Department of Energy, Washington, D.C., October 16, 1996.

7. DOE, 1995. *Performance Indicators and Analysis of Operations Information*, DOE O 210.1, U.S. Department of Energy, Washington, D.C., September 27, 1995.

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

9. DOE, 1999. *DOE Radiological Control Standard - Radiological Health and Safety Policy*, Draft, U.S. Department of Energy, Washington, D.C., April 1999.

Attachments: Example Radioactive Waste Management Basis Statements

Example A
Radioactive Waste Management Basis Statement
Savannah River Waste Handling Facilities
(See Example on Pg I-X, Example 1 on Pg I-X, Example on Pg I-X)

MEMORANDUM FOR: Joseph Smith, Field Element Manager, DOE/SR

THRU: Robert Jones, Director, Division of Waste Management, DOE/SR

FROM: Wilburt Littleguy, Operations Manager, SRS Contractor

SUBJECT: RADIOACTIVE WASTE MANAGEMENT BASIS FOR THE WASTE HANDLING FACILITIES

DATE: June 1, 1999

This memorandum documents the approval of a radioactive waste management basis for the following facilities, operations, and activities, which are collectively known as the Waste Handling Facilities at H Area of the Savannah River Plant: F Area Tank Farm, H Area Tank Farm, In-Tank Precipitation Process, Replacement High-Level Waste Evaporator, and the Effluent Treatment Facility.

The approval of the radioactive waste management basis for the Waste Handling Facilities is based on a review of the documents on the attached list granting an Authorization Basis to operate the Waste Handling Facilities under DOE 5480.21. The radioactive waste management basis review consisted of reviews of targeted chapters and sections of the Authorization Basis documentation to ensure that the requirements of the revised Order on Radioactive Waste Management, DOE O 435.1, were being met. The review of the Authorization Basis documents, and processes and procedures implemented as described, concluded that the requirements of DOE O 435.1 are being met. A crosswalk is also attached indicating the DOE M 435.1-1 requirements that are being met at the Waste Handling Facilities and the procedure or document which is the approved implementation of the requirement.

Unless additional review is required due to changes in the facilities or in the DOE 435.1 requirements, the radioactive waste management basis for the Waste Handling Facilities will remain valid until June 1, 2004.

Original signed by:
W.G. Littleguy
Operations Manager, Waste Handling Facilities
SRS Contractor

Attachments: As Listed

Attachment 1
Radioactive Waste Management Basis
Waste Handling Facilities / Savannah River Plant

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1. Safety Analysis Reports (SARs) [Report Nos. WHF-WSRC-003, WHF-WSRC-006, WHF-WSRC 015]

2. Technical Justification for Continued Operation/ Basis for Interim Operation/Design Basis Accident Analysis Report - [Memorandum dated April 1, 1996 with Attachments].

3. Operational Safety Requirements/Technical Safety Requirements [SRC-J-092, SRC-K-063, SRC-U-012]

4. Technical Standards - [WSRC-WMB-013 and OSHA-TYU-003]

5. SAR Update Request Packages - [Memoranda dated April 30, 1996, August 15, 1996, January 17, 1997]

6. Safety Evaluation Report - [Report No DOE-SRS-SER-003]

7. WSRC Operating Manual and Procedures:
   Waste Acceptance Requirements Implementation - [WSRC-OPSMAN-SC3-03]
   Waste Characterization Profiling - [WSRC-OPSMAN-SC4-02]
   Certification Process and Approval - [WSRC-OPSMAN-WA-W28]

8. USQ Package - [USQ-WHF-SER-98]

(Example of Attachment 2 not shown)

Example B
Radioactive Waste Management Basis Statement
Low-Level Waste Disposal Facility
(See Example 1 on Pg I-XX)

MEMORANDUM FOR: Robert Jones, Operations Manager, Site Y Low-Level Waste Disposal Facility

FROM: Joseph Smith, Deputy Field Element Manager, DOE/FO

SUBJECT: DOE M 435.1-1 RADIOACTIVE WASTE MANAGEMENT BASIS FOR SITE Y LOW-LEVEL WASTE DISPOSAL FACILITY.

This memorandum documents the radioactive waste management basis for the Site Y Low-Level Waste Disposal Facility. The basis is established as a result of reviews and approvals of the Site Y Performance Assessment (DOC-FO-PA-001) and the Site Y Composite Analysis (DOC-FO-CA-002), and the issuance of the EM-30 Disposal Authorization Statement (HQ-DAS-SITY-1), which is attached. The review and approval of the Performance Assessment and the Composite Analysis, and the issuance of the Disposal Authorization Statement included a review of several other documents, including a preliminary closure plan and a preliminary monitoring plan, which are listed in Appendix F in the April 1998 Low-Level Waste Review Group Team Report on the Site Y Performance Assessment and Composite Analysis Reviews.

The radioactive waste management basis is predicated on the continued adherence to the current revisions of the Site Y Radiation Control Manual, the Site Y Health and Safety Plan, and on meeting the commitments made in the April 27, 1997 letter from Smith, DOE/FO to Johnson, State/EPA for finalizing the monitoring well designs for the RCRA-regulated Site Y storage facilities plume.

The Disposal Authorization Statement contains twelve conditions that must be met in order for the operations at the Site Y Low-Level Waste Disposal Facility to continue. In addition to these twelve conditions, the following condition must also be met:

> *Condition 13: By August 1999, (15 months) the preliminary closure plan submitted with the performance assessment and composite analysis must be updated to reflect the designs of the monitoring system incorporated by reference above, letter Smith, DOE/FO to Jones, State/EPA, and the considerations documented in page 57 of the April 1998 Low-Level Waste Review Group Team Report on the Site Y Performance Assessment and Composite Analysis Reviews.*

Any questions about this memorandum or the radioactive waste management basis for the Site Y Low-Level Waste Disposal Facility should be directed to me at my office number.

Original Signed By:

Joseph Smith
Field Element Manager,
DOE/Field Office (FO)

Reference:
Site Y Low-Level Waste Disposal Facility Disposal Authorization Statement

Example C
Radioactive Waste Management Basis Statement
Several Waste Storage Facilities
(See Example 2 on Pg I-XX)

RADIOACTIVE WASTE MANAGEMENT BASIS STATEMENT
SITE Y CENTRAL WASTE STORAGE OPERATIONS.

This statement documents the radioactive waste management basis for the operations of the Site Y Central Waste Management Unit for storage of low-level and transuranic waste at all storage facilities (see list in Appendix A) at Site Y.

The radioactive waste management basis is founded based on the review and approval of the Site Y laboratory operating procedures on waste acceptance, certification, and storage which were found to meet the requirements of DOE O 435.1 and DOE M 435.1-1 (see list in Appendix B). The Site procedures on waste acceptance commit to meeting the requirements of the WIPP Waste Acceptance Criteria (WIPP-WAC-007), and the Nevada Test Site Waste Acceptance Criteria (NTSWAC) since all waste accepted at the storage facilities must be able to be certified for disposal at one of these two facilities. Therefore, these two documents, as approved by their respective Field Elements, are incorporated by reference into the radioactive waste management basis for storage activities at Site Y.

Appendix A - List of Site Y Storage Facilities
Appendix B - List of Site Y Radioactive Waste Management Basis Procedures

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(3) Waste Minimization and Pollution Prevention. Ensuring implementation of waste minimization and pollution prevention programs.

Objective:

The objective of this requirement is to ensure that emphasis is placed on the Field Element Manager's responsibility for minimizing the generation of radioactive waste and that waste minimization programs are implemented at radioactive waste management facilities.

Discussion:

The safety and hazards analysis indicated that an effective mitigating measure in management of radioactive waste was to avoid potential weaknesses and conditions through minimization of waste. The requirements analysis indicated that DOE's current programs implementing Executive Order 12856, *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements and Responsibilities*, and Executive Order 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition*, and DOE 5400.1, *General Environmental Protection Program*, were adequate in establishing effective waste minimization programs, especially for generators of waste. These directives are invoked in the General Requirement on other directives and regulations (DOE M 435.1-1, Section I.1.E.(20)). This General Requirement is added to emphasize the Field Element Manager's responsibilities in carrying out the requirements of the Executive Orders and DOE 5400.1 for radioactive waste management facilities, and ensuring that in the cases where radioactive waste is generated during the course of its management, for example, when ash is created from the incineration of radioactive waste, that this waste is also minimized. No additional guidance is needed beyond the documentation already prepared on the Field Element Manager's responsibilities for waste minimization and pollution prevention.

Compliance with this requirement is demonstrated if waste minimization and pollution prevention principles are incorporated into all radioactive waste management activities where appropriate.

Supplemental References:

1. DOE, 1992. *Waste Minimization Crosscut Plan Implementation*, SEN-37-92, U.S. Department of Energy, Washington, D.C., May 13, 1992.

2. O'Leary, 1994. H. O'Leary to Departmental Elements, memorandum, *Departmental Strategy for Compliance With Executive Order 12856*, "*Federal Compliance With Right-To-Know Laws and Pollution Prevention Requirements*," U.S. Department of Energy, Washington, D.C., December 27, 1994.

3. EPA, 1993. *Pollution Prevention and Right-to-Know in the Government, E.O. 12856,* EPA 100-K-93-001, U.S. Environmental Protection Agency, Washington, D.C., 1993.

4. EPA. *Federal Agency Environmental Management Program Planning Guidance*, EPA 300-B-95-001, U.S. Environmental Protection Agency, Washington, D.C.

5. EPA. *Federal Facility Pollution Prevention Project Analysis*, EPA 300-B-95-008, U.S. Environmental Protection Agency, Washington, D.C.

6. DOE, 1994. *Department of Energy Waste Minimization Reporting Requirements*, U.S. Department of Energy, Washington, D.C., November 1994.

7. DOE, 1996. *Pollution Prevention Program Plan,* DOE/S-0118, U.S. Department of Energy, Washington, D.C., 1996.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(4) Approval of Exemptions for Use of Non-DOE Facilities. DOE radioactive waste shall be treated, stored, and in the case of low-level waste, disposed of at the site where the waste is generated, if practical; or at another DOE facility. If DOE capabilities are not practical or cost effective, exemptions may be approved to allow use of non-DOE facilities for the storage, treatment, or disposal of DOE radioactive waste based on the following requirements:

(a) Such non-DOE facilities shall:

1. Comply with applicable Federal, State, and local requirements;

2. Have the necessary permit(s), license(s), and approval(s) for the specific waste(s); and

3. Be determined by the Field Element Manager to be acceptable based on a review conducted annually by DOE.

(b) Exemptions for the use of non-DOE facilities shall be documented to be cost effective and in the best interest of DOE, including consideration of alternatives for on-site disposal, an alternative DOE site, and available non-DOE facilities; consideration of life-cycle cost and potential liability; and protection of public health and the environment.

(c) DOE waste shall be sufficiently characterized and certified to meet the facility's waste acceptance criteria.

(d) Appropriate *National Environmental Policy Act* (NEPA) review must be completed. For actions taken under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), it is DOE's policy to incorporate NEPA values into the CERCLA documentation.

(e) Headquarters shall be notified of any exemption allowing use of a non-DOE facility and the Office of the Assistant Secretary for Environment, Safety and Health (EH-1) shall be consulted prior to the exemption being executed.

(f) Host States and State Compacts where non-DOE facilities are located shall be consulted prior to approval of an exemption to use such facilities and notified prior to shipments being made.

Objective:

The objective of this requirement is to indicate a clear preference for use of DOE facilities and to ensure that when it is determined to be necessary to use non-DOE facilities for the treatment, storage, and disposal of DOE radioactive waste only when such use is in the best interest of the Department and protective of the public, workers, and the environment.

Discussion:

It has been the Department's long-standing policy to dispose of low-level waste at the site where it is generated or at another DOE site if onsite capabilities are not practical. Exemptions to this policy have been allowed in cases where disposal at a DOE site is not practical and it can be shown that the action is in compliance with applicable requirements and is protective of the public, workers, and the environment and that there is a substantial benefit to the Department. However, use of non-DOE facilities has not been allowed without such justification because of the potential long-term liabilities and possible negative impacts on DOE-wide or commercial disposal programs associated with commercial disposal. Additionally, because of the economics associated with operating onsite disposal facilities, use of non-DOE facilities can result in higher overall costs for all DOE disposal.

The Department has previously addressed a number of issues related to the use of non-DOE facilities for the disposal of low-level waste. The Office of Environmental Management, in consultation with the Office of Environment, Health, and Safety, approved the use of non-DOE facilities for the disposal of waste originating from remedial activities the Department was performing at non-DOE sites and for the disposal of small quantities of mixed low-level waste. Subsequently, Headquarters delegated the authority to make decisions on the use of non-DOE facilities for disposal of low-level waste to the Heads of Field Elements under certain conditions. The current requirement and this guidance continue the practice of allowing the Field Element Managers to grant exemptions for using non-DOE waste management facilities. Exemptions granted prior to the issuance of DOE O 435.1 remain valid.

During the development of DOE M 435.1-1, it was also recognized that the evaluation performed to justify use of non-DOE facilities for low-level waste disposal, e.g., determining that the action is protective and in the best interest of the government, was a best management practice that should be employed for any use of non-DOE waste management facilities. Therefore, the requirement was broadened to also address storage and treatment.

This requirement allows the Field Element Manager to approve the use of non-DOE facilities where use of DOE facilities is not practical after meeting minimum requirements to ensure that the waste management decision is in the best interest of the government and will not pose an undue threat to public and worker health and safety, or to the environment.

This requirement does not extend to residues that result from the use of commercial laboratories to perform analyses on radioactive samples, whether they are waste samples or not. Laboratories that have the capability to accept radioactive samples for analysis generally have provisions for disposal of the waste resulting from their activities. This includes excess sample, i.e., sample that is not used in analyses, as well as sample residue, laboratory equipment, etc. When contracting for such laboratory services, it is not required that samples be returned to DOE for disposal if the laboratory has such provisions. The policy for use of non-DOE facilities does not require or prefer that waste from commercial analysis of samples be returned to the DOE site for waste management. It is acceptable for the laboratory to dispose of the waste in accordance with the provisions of their radioactive materials license. However, return of sample waste to the DOE site is acceptable if it is economically beneficial to DOE.

Use of DOE Capacity. As directed in the current requirement, there is a preference for treatment, storage, or disposal of DOE radioactive waste to occur at a DOE site. Nevertheless, DOE sites are explicitly encouraged to seek the most practical disposal option for low-level waste, especially if there is a lower cost alternative with adequate environment, safety, and health protection. Prior to using a non-DOE facility, a determination must first be made that the waste management activity being considered is not practical at the DOE site that generates the waste. Then a second determination must be made that management of the waste is not practical at another DOE site. The practicality of performing a waste management function at a particular site depends on the availability of facilities or capacity, and also the cost associated with performing the activity. As part of the planning process, a range of waste disposal alternatives must be considered and documented, including on-site disposal, an alternative DOE disposal site, and available non-DOE facilities. When evaluating the cost effectiveness of performing a waste management activity at a DOE versus a non-DOE site, managers should consider the complex-wide implications of this decision, e.g. if many sites choose non-DOE facilities over a particular DOE facility for a waste management activity, this facility, losing much of its incoming volume, may become prohibitively expensive per unit of waste it handles or may not be able to continue operating. This may have a great impact on waste for which with this facility is the only option. This is particularly true for low-level waste disposal because the Department must maintain the capability to dispose of low-level waste since the waste acceptance criteria at currently available commercial facilities do not accommodate significant amounts of the Department's waste. Therefore, one should not only consider the short term impact of a decision that DOE capacity is not practical, but also consider the implications across the complex and for the long term.

Acceptable Performance. In making a decision to use a non-DOE facility for managing DOE radioactive waste, the Field Element Manager must ensure that the decision is protective of the public and the environment. This responsibility is effected by ensuring that the non-DOE facility is properly licensed and/or permitted, that the facility complies with applicable regulations, and that the facility has an acceptable history of operational and regulatory performance. Based on the characteristics of the waste that is being considered for transfer to the non-DOE facility, a review should be conducted of the licenses and permits held by the facility to determine if they provide appropriate coverage for management of the waste. This should be accomplished through a reading of the licenses and permits and through discussions with the issuing authority (Federal, State, or local licensing/permitting authority). This review should confirm that the facility is authorized to receive the radionuclides in the waste to be transferred, and if the waste contains constituents subject to RCRA or TSCA, that the facility has the appropriate authorization to receive and manage those constituents. Discussions with regulatory authorities and reviews of inspection reports should also be used to determine whether the facility has a history of acceptable operational and regulatory performance. Occasional and minor violations should not be a basis for deciding not to use a non-DOE facility. Significant violations of regulations and controls which could lead to releases of material or exposure to workers should be cause for concern and may be a basis for deciding against use of a particular facility.

> *Example: A DOE site has a mixed low-level waste stream but lacks treatment capability for meeting the land disposal restriction treatment standards under RCRA. The site personnel determine that no other DOE site can treat the waste either. Therefore, the site personnel look for other options and discover there is a non-DOE facility which will contract with DOE to treat the waste for treatment standards under RCRA. The site personnel confirm that the non-DOE facility has the necessary radioactive materials license, hazardous waste permit, and air permit. The site DOE personnel recommend to the Field Element Manager that the waste be treated at the non-DOE facility. The Field Element Manager agrees and directs his employees to make arrangements for contracting with the treatment facility.*

Once a determination has been made by a DOE organization that a non-DOE facility has an acceptable operational and regulatory history, this determination can be used by other DOE organizations, e.g., a DOE organization can use the results of a review performed by another DOE organization or DOE contractor in making a decision on the acceptability of the non-DOE facility's performance. However, it is the responsibility of a DOE organization using a non-DOE facility to ensure, on an annual basis, that the facility is maintaining an acceptable performance record, either through their own review or that conducted by another DOE organization or contractor. Documentation of the results of the evaluation of regulatory compliance and acceptable operational history as discussed above is adequate for showing that the use of the non-DOE facility will be protective of public health and the environment.

Example: Site Z has previously contracted with a non-DOE low-level waste treatment facility for size reduction, sorting, and compaction services. As part of their effort to evaluate the regulatory and operational history of the facility, they conducted a thorough review of the radioactive materials permit of the facility, the waste acceptance criteria, and the regulatory authority's inspection reports. The Site Z personnel also contacted the regulatory authority and followed up on some of the items which had been identified as concerns in the inspection reports. Site Z personnel documented a description of their review and presented their conclusions in a report to the Field Element Manager. Six months later when Site A personnel were considering using the non-DOE treatment facility, they obtained a copy of the report from Site Z personnel. On the basis of the Site Z report, and after confirming that the waste acceptance criteria also encompass their waste, the Site A personnel make a determination that the regulatory and operational performance of the non-DOE facility is acceptable.

Cost Effectiveness. In addition to ensuring that use of a non-DOE facility is protective of the public health and the environment, use of such a facility is to be evaluated for cost-effectiveness. The evaluation of cost-effectiveness is to consider the cost of onsite management, if it is practical, the cost of management at another DOE site, and the cost of management at a non-DOE facility. Cost evaluations consider the cost of the specific management action being contemplated (usually treatment or disposal), and need to consider collateral management costs such as transportation and storage, and life-cycle costs. It is appropriate to consider the cost-related complex-wide implications of not using a DOE facility. The evaluation should include qualitative consideration of the costs associated with safety and liability of the different options considered. Generally when all costs are considered, the differential between using a DOE facility and using a commercial or non-DOE facility needs to be significant before a decision to use the non-DOE facility will be considered cost effective.

Example: A facility has low-level waste which cannot be disposed of on-site due to site characteristics which prevent safe disposal. The site contacts the other DOE facilities which could accept and dispose of this waste. The waste characteristics and packaging do not pose problems and it is determined that several DOE facilities could accept this waste. In discussing disposal charges with the DOE sites, the generator site determines that they have insufficient funds to dispose of all of the low-level waste at these DOE facilities. Discussions with the DOE facilities does not resolve this issue. It is determined that a non-DOE facility will accept this waste. The non-DOE facility has lower disposal costs for the specific waste stream, which will allow the generator site to dispose all of the radioactive waste. (The non-DOE facility has also been determined by a DOE organization to have an acceptable operational and regulatory history.) A justification statement supporting the decision to use the non-DOE facility is written and accompanies the approval request to the Field Element Manager or designee. The Field Element Manager reviews the request to authorize use of a non-DOE facility for disposal

of the waste. Following discussions with his staff and managers at another DOE site which could dispose the waste, the Field Element Managers decides to keep as much waste as current storage capacity allows and dispose of the rest at the non-DOE facility. The waste placed in storage is sent to another DOE site for disposal following receipt of the next fiscal year budget in order to keep the unit costs at the DOE site at a manageable level.

Evaluations of alternatives which lead to a decision that use of a non-DOE facility is cost effective are to be documented and should be included with the assessment of acceptable performance discussed above when the request for approval to use the facility is submitted to the Field Element Manager.

Meeting Waste Acceptance Criteria. Site personnel must characterize waste to meet the minimum requirements cited in DOE M 435.1-1, and in sufficient detail to evaluate conformance with the waste acceptance criteria of the non-DOE facility to which waste is being transferred. The site should ensure that certification and transfer requirements of DOE M 435.1-1 are implemented for waste to be sent to a non-DOE storage, treatment or disposal facility. Implementing the certification and transfer requirements provides a structured process for making sure that the waste acceptance criteria of the non-DOE facility are met, and that the information necessary for safe handling is transferred along with the waste.

National Environmental Policy Act. Implementing this requirement and using non-DOE facilities for reasonably small quantities of waste and special circumstances does not represent a change in DOE policy that requires a Department-wide review under the *National Environmental Policy Act* (NEPA). However, as part of approving the use of non-DOE facilities, the Field Element Manager must ensure that adequate evaluation under NEPA is performed and documented. For actions taken under the *Comprehensive Environmental Response, Compensation, and Liability Act*, NEPA values should be incorporated in the CERCLA documentation. Important considerations include (1) impacts of the facility receiving the waste, and (2) impacts of transporting the waste to the facility, and (3) an evaluation of alternative disposal facilities.

Consultation and Notifications. The requirements for granting and implementing an exemption for use of a non-DOE facility include consultation and notification both within and external to the Department. Prior to the Field Element Manager granting an exemption, site personnel must consult the State agency responsible for radioactive materials regulation. If the proposed exemption is for disposal of low-level or mixed low-level waste, and the state is in a low-level waste compact, the compact organization also must be consulted. This consultation with the compact organization is to occur even if the disposal is planned for a non-compact facility. The consultation is intended to provide information and enable DOE to consider any views that the state or compact might have regarding the use of the facility for management of DOE radioactive

waste. Since consultation with the state and compact are prerequisites to granting an exemption, sites are to include documentation of the consultation in the exemption request.

Once the Field Element Manager has signed the exemption request to use a non-DOE facility, prior to exercising the exemption, notification of Headquarters, specifically to include consultation with the Headquarters Office of Environment, Safety, and Health, is required. Information provided to Headquarters, including the Office of Environment, Safety, and Health, is to include:

- A description of the waste stream including characteristics and expected quantities;
- Alternatives evaluated for the management of the waste, including onsite management, management at another DOE site, and management at a non-DOE facility, including a description of why a DOE facility is not available or the use of one is impractical;
- Documentation of the conclusions made regarding the facility's regulatory and operational acceptability;
- Documentation of the cost analysis for alternative disposal sites evaluated;
- A description of the environmental review and documentation supporting the action;
- Documentation of consultation held with the host state and, if applicable, state compact; and
- Documentation showing the approval of the exemption request by the Field Element Manager.

The requirement to consult with the Office of Environment, Safety, and Health may be met without obtaining written confirmation. The process requires that 1) a copy of the complete exemption request be provided to the Office of Environmental Policy and Assistance (EH-41), and 2) exemption requests may not be considered approved until after completion of appropriate environmental review and documentation, adequate demonstration of need for the exemption and coordination with appropriate officials of the state and state compact where the non-DOE facility is located.

The Office of Environmental and Policy Assistance will review the exemption and coordinate with other EH offices as needed. If EH-41 believes that the exemption would raise environmental concerns, it will respond to the Field Element Manager within 15 working days. If a response is not received from EH 41 within the 15 working days, Field Element Managers can assume that

there are no environmental objections and further consultation with EH is not required. Therefore, Field Elements must send a copy of the exemption to EH-41 for its review and wait 15 working days before considering the exemption request approved. A copy of the exemption should also be transmitted to the responsible Program Office and the Office of Waste Management (EM-30).

In exercising the responsibility assigned under this requirement, Field Element Managers and their staffs should avoid pursuing the use of State Compact disposal facilities. The Department has a long-standing practice of avoiding actions which have the potential to affect State Compact disposal facilities. The Department would only consider the use of State Compact disposal facilities if petitioned by the State Compact for reasons such as economic viability.

Finally, the Field Element Manager must ensure that the state hosting the radioactive waste management facility is notified prior to actually shipping waste to the facility. Notification can be on a campaign or waste stream basis; it is not necessary under this requirement that notification be made for each shipment.

Compliance with this requirement is demonstrated by a site having a process for performing and documenting the actions necessary to get an exemption for use of non-DOE facilities, and by the site having records which show that the necessary evaluations, consultations, approvals and notifications have occurred.

Supplemental References:

1. Whitfield, 1991. R.P. Whitfield to L.P. Duffy, memorandum, *Commercial Disposal of Department of Energy Radioactive (By-Product and Low-Level) and Mixed Wastes*, U.S. Department of Energy, Washington, D.C., September 13, 1991.

2. Lytle and Whitfield, 1993. J.E. Lytle and R.P. Whitfield to L.P. Duffy, memorandum, *Commercial Disposal of Department of Energy Radioactive (By-Product and Low-Level) and Mixed Wastes*, U.S. Department of Energy, Washington, D.C., October. 12, 1993.

3. Alm, 1996. A.L. Alm to Department of Energy Operations Office Managers and Department of Energy Field Office Managers, memorandum, *Delegation of Authority to Grant Exemptions to Department of Energy Order 5820.2A to Allow for the Use of Commercial Facilities for Department of Energy Low-Level Waste*, U.S. Department of Energy, Washington, D.C., October. 24, 1996.

4. DOE, 1999. *Commercial Disposal Policy Analysis for Low-Level and Mixed Low-Level Wastes*, U.S. Department of Energy, Washington, D.C., March 9, 1999.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(5) Environmental Restoration, Decommissioning, and Other Cleanup Waste. Ensuring the management and disposal of radioactive waste resulting from environmental restoration activities, including decommissioning, meet the substantive requirements of DOE O 435.1, *Radioactive Waste Management,* and this Manual. Environmental restoration activities using the CERCLA process (in accordance with Executive Order 12580) may demonstrate compliance with the substantive requirements of DOE O 435.1, *Radioactive Waste Management,* and this Manual (including the Performance Assessment and performance objectives, as well as the Composite Analysis) through the CERCLA process. However, compliance with all substantive requirements of DOE O 435.1 not met through the CERCLA process must be demonstrated. Environmental restoration activities which will result in the off-site management and disposal of radioactive waste must meet the applicable requirements of DOE O 435.1, *Radioactive Waste Management,* and this Manual for the management and disposal of those off-site wastes. Field Elements performing environmental restoration activities involving development and management of radioactive waste disposal facilities under the CERCLA process shall:

(a) Submit certification to the Deputy Assistant Secretary for Environmental Restoration that compliance with the substantive requirements of DOE O 435.1 have been met through application of the CERCLA process; and

(b) Submit the decision document, such as the Record of Decision, or any other document that serves as the authorization to dispose, to the Deputy Assistant Secretary for Environmental Restoration for approval.

Objective:

The objective of this requirement is to ensure that radioactive waste generated as a result of environmental restoration, decommissioning, or other cleanup is managed in a manner that meets the requirements of DOE O 435.1, *Radioactive Waste Management*, and DOE M 435.1-1, *Radioactive Waste Management Manual*.

Discussion:

This requirement applies to sites undergoing environmental restoration (including decommissioning) pursuant to regulatory authorities including, but not necessarily limited to, the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), the *Resource Conservation and Recovery Act* (RCRA), the *Atomic Energy Act of 1954*, as amended, and applicable state requirements. This guidance clarifies how sites developing and managing facilities for management and disposal of radioactive waste resulting from environmental restoration activities are to comply with the requirements of DOE O 435.1, *Radioactive Waste Management*. The requirements of DOE M 435.1-1 do not apply to other cleanup requirements addressed by CERCLA or other authorities, such as determinations of protectiveness, cleanup levels, or cleanup methods associated with remediation of spills and releases. Additionally, these requirements do not apply to actions performed under environmental restoration which involve commercial facilities. The original guidance on this topic was articulated in: 1) Policy for Demonstrating Compliance with DOE 5820.2A for Onsite Management and Disposal of Environmental Restoration Low-Level Waste under the *Comprehensive Environmental Response, Compensation, and Liability Act*, May 31, 1996 (DOE, 1996); and 2) Guidance for Complying with DOE 5820.2A, Radioactive Waste Management, for Onsite Management and Disposal of Low-Level Waste (LLW) from Environmental Restoration Activities (Alm, 1997). These policies were prepared by the Department in response to Defense Nuclear Facilities Safety Board Recommendation 94-2. In its recommendation, the Board had indicated the need to demonstrate how disposal and waste management activities performed during environmental restoration activities ensured compliance with DOE's radioactive waste management requirements. The major concepts of these policies are:

- the CERCLA requirements and DOE M 435.1-1 requirements include significant overlap in their substantive requirements given both are designed to ensure safe management and disposal of waste;

- the CERCLA process is to be used to comply with the requirements of DOE M 435.1-1 for environmental restoration actions;

- the substantive requirements of DOE M 435.1-1 should be directly incorporated into the CERCLA process to the extent practical and consistent with site-specific technical and regulatory issues; and

- the Department must demonstrate compliance with the substantive requirements of DOE M 435.1-1 to fulfill its *Atomic Energy Act* responsibilities.

To fulfill DOE's *Atomic Energy Act* responsibilities, the Department must demonstrate compliance with the substantive requirements of DOE M 435.1-1 for low-level waste disposal

facilities managed under CERCLA. A crosswalk between the CERCLA and the DOE M 435.1-1 requirements needs to be prepared and reviewed as described below when the cleanup action involves development and management of a radioactive waste disposal facility. It is not necessary to prepare a crosswalk to demonstrate compliance with DOE M 435.1-1 requirements for environmental restoration activities that do not involve development and management of a radioactive waste disposal facility.

Regarding the distinction between substantive and administrative requirements, DOE follows the guidance provided in the rulemakings published for the National Contingency Plan (NCP) (59 FR 47384, September 15, 1994). The preambles to the NCP notices in the *Federal Register* (53 FR 51394, December 21, 1988; 55 FR 8666, March 8, 1990; and 59 FR 47384, September 15, 1994) state that substantive requirements are those that set environmental protection requirements, criteria, or limitations; all other requirements are considered administrative.

Management and Disposal of Environmental Restoration Wastes. The sites to which the crosswalk requirement applies are those using the CERCLA process to develop and manage facilities for disposal of radioactive waste resulting from environmental restoration activities. (An important exception is the disposal of 11e.(2) byproduct material wastes which are subject, instead, to the requirements of the *Uranium Mill Tailings Radiation Control Act*). These sites may be following CERCLA either because they are listed on the National Priorities List (NPL) or because the regulatory structure established in cleanup strategies (e.g., negotiated agreements) is based on CERCLA authority and procedures. Under Executive Order 12580, Superfund Implementation, DOE is the lead agency for responding to a release or threatened release of hazardous substances, including radionuclides, from any facility or vessel under the jurisdiction, custody, or control of DOE. As such, DOE has the authority to take appropriate response actions in accordance with CERCLA at sites not listed on the NPL. Response actions, consisting of removal actions (40 CFR 300.415) or remedial actions (40 CFR 300.430 and 300.435), may include onsite disposal, use of access/institutional controls, or other appropriate and feasible actions which ensure protection of human health and the environment.

A site which is not listed on the NPL may also perform corrective or remedial actions which result in onsite disposal of environmental restoration wastes. Such activities may be conducted pursuant to regulatory authorities other than CERCLA including, but not necessarily limited to, RCRA, applicable state requirements, and the *Atomic Energy Act of 1954*, as amended. When DOE is conducting cleanup work at a non-NPL site under its *Atomic Energy Act* authority or under any other non-CERCLA authority, the substantive and full procedural requirements of DOE M 435.1-1 apply. When using CERCLA authority to conduct a response action that involves onsite waste disposal at a non-NPL site, responsible DOE elements need to act consistent with the NCP as promulgated in 40 CFR Part 300 (including adherence to the requirements for regulatory agency involvement and public participation) if it is the intent of the Department for the CERCLA process to satisfy the requirements of DOE M 435.1-1.

The term onsite under CERCLA is defined as "the areal extent of contamination and all suitable areas in very close proximity to the contamination and necessary for implementation of the response action" [40 CFR 300.5]. Additionally, CERCLA Section 104 (d)(4) states "where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat, or potential threat to the public health or welfare or the environment, the President may, in his discretion, treat these related facilities as one." Therefore, the definition of onsite for any specific Department installation may include noncontiguous facilities within an installation as agreed by the parties involved (e.g., DOE, EPA, the State, and stakeholders) and documented in interagency agreements and/or records of decision.

In selecting Applicable or Relevant and Appropriate Requirements (ARARs) for radioactive waste disposal facilities in accordance with EPA's guidance CERCLA Compliance with Other Laws Manual, performance objectives and substantive requirements of DOE M 435.1-1 are included as information "to be considered" (TBC) rather than specific ARARs because DOE Orders are not promulgated under the *Administrative Procedures Act*. However, to meet its *Atomic Energy Act* responsibilities, the Department must still demonstrate compliance with the requirements of the DOE M 435.1-1. To do this, a CERCLA/DOE M 435.1-1 crosswalk may be prepared, showing how DOE M 435.1-1 was addressed through the CERCLA process. If any substantive Order requirement was not satisfied through the CERCLA process, it would need to be applied separately and complied with under the DOE M 435.1-1 process.

An example of a crosswalk between CERCLA requirements and DOE's waste management requirements is provided in Attachment 1. This example appeared as an attachment to both the 1996 and 1997 policies referenced above. Although this example was developed to illustrate compliance with the requirements of DOE 5820.2A and was referred to as a roadmap rather than a crosswalk, it is nonetheless a valid illustration of the content and level of detail expected in crosswalks linking the requirements of DOE M 435.1-1 with the requirements of CERCLA. The example is drawn from the actual comparison performed for the Fernald Environmental Management Project.

The crosswalk should state if the specific DOE M 435.1-1 performance objective/requirement was identified as an ARAR/TBC in the CERCLA process, or whether an equivalent requirement from a promulgated Federal or State law was determined to be an ARAR and was met. The CERCLA/DOE M 435.1-1 crosswalk should provide specific references to applicable sections of the site-developed regulatory documentation (e.g., RI/FS) which provide the details that support the statements made in the crosswalk. The tabular summary shown in Attachment 1 should be included for completeness. The crosswalk should also provide a brief one or two paragraph summary of the employed technical review process (e.g., identify reviewing organizations, regulators, stakeholders, and major comments which resulted in significant changes to the remedy selection and design).

In essence, when the CERCLA process is being used to plan for onsite disposal of CERCLA waste, compliance with the performance objectives of DOE M 435.1-1 is essential and must be documented. While the format in which compliance is demonstrated is not prescribed, Attachment 1 offers a suggested means to satisfy this need. As noted above, the crosswalk presented in Attachment 1 is a real example of a crosswalk prepared in accordance with the original 1996 CERCLA policy for compliance with the requirements of DOE 5820.2A, and illustrates the content and level of detail expected. If certain substantive requirements of DOE M 435.1-1 cannot be incorporated into the CERCLA documents, then those requirements must be met separately and approved using the DOE M 435.1-1 process.

> *Example: Site B is not on the NPL but consistent with DOE policy and Executive Order 12580, is following the CERCLA process in identifying and addressing risks posed by radioactive wastes previously disposed of at the site. One of the remedial alternatives at the site calls for building a new onsite disposal facility. The FS includes calculations for the new facility that are the same as those required for a performance assessment under DOE M 435.1-1, and reports the results under the detailed evaluation of alternatives against the CERCLA criteria. In addition, the risk evaluation prepared for the onsite disposal remedial alternative includes an assessment of all interactive sources and was submitted as an appendix to the FS. Therefore, the site met the substantive requirements of DOE M 435.1-1 through their RI/FS and associated process, and documented this compliance by developing a crosswalk. The CERCLA process is sufficient and there is no need to conduct any separate analyses.*

In some situations, analyses performed under CERCLA will not be identical to those conducted under DOE M 435.1-1 due to differing assumptions or methodologies (e.g., related to land use, institutional controls, etc.). In these cases, the brief statement in the crosswalk should identify the issue and provide an explanation of how the assumption or methodology used under CERCLA demonstrates compliance with requirements of DOE M 435.1-1.

> *Example: At Site C, one of DOE's largest NPL sites, an onsite disposal cell is being considered as part of an overall remedial strategy under CERCLA. A risk evaluation is prepared in accordance with <u>EPA's Risk Assessment Guidance for Superfund: Human Health Evaluation (Part A)</u>. For the remedial alternatives involving the proposed onsite disposal cell, an inadvertent intruder scenario is not evaluated based on the site's long term land use plan. In this case, the CERCLA/DOE M 435.1-1 crosswalk statement regarding compliance for this specific requirement, identifies the land use assumptions and explains how the site's regulatory process ensures compliance. The crosswalk explains that under CERCLA, the remedy would be evaluated no less than every five years to ensure it is functioning as intended and remains effective in reducing risks and complying with ARARs. This crosswalk statement and the accompanying table would then document compliance with this requirement of DOE M 435.1-1.*

CERCLA requires analysis of risks from all pathways/all sources [see 40 CFR 300.430(d) and 40 CFR 300.430(e)(2)(I)(A)]. However, there is no prescribed methodology for performing such an evaluation. The Department has established a consistent approach for assessing interactive sources; the document entitled *Guidance for a Composite Analysis of the Impact of Interacting Source Terms on the Radiological Protection of the Public from LLW Disposal Facilities* can be used to evaluate the impacts potentially resulting from radioactive waste disposal facilities. The completed composite analysis will be an effective management tool for understanding the site-wide implications of multiple source-terms.

> *Example: Fernald, an NPL site, is following CERCLA for cleanup activities and is disposing of some environmental restoration wastes in an onsite low-level waste disposal facility. To meet the requirements of DOE M 435.1-1 and CERCLA, the site prepared a Comprehensive Response Action Risk Evaluation as part of its RI/FS process. This Evaluation was a key component of the document prepared by the site to demonstrate compliance with CERCLA and DOE M 435.1-1.*

Field Element Managers are to submit the appropriate CERCLA documentation to the Deputy Assistant Secretary for Environmental Restoration. For purposes of DOE O 435.1 and DOE M 435.1-1, the term "appropriate CERCLA documentation" means the written materials prepared to demonstrate compliance with the substantive requirements of DOE M 435.1-1 for low-level waste disposal facilities managed under CERCLA. Specifically included in such written materials are crosswalks between CERCLA requirements and DOE M 435.1-1 requirements which are used as the basis for issuance of a disposal authorization by the Deputy Assistant Secretary for Environmental Restoration. Based on the appropriate CERCLA documentation, the Field Element Manager certifies that compliance with the substantive requirements of DOE M 435.1-1 has been achieved through application of the CERCLA process. Any other analyses that have not been incorporated into the CERCLA process require a separate review. The Deputy Assistant Secretary may assign the LFRG the task of reviewing the information submitted by the Field Element Manager. In this instance, the documents would be reviewed against the criteria set forth in the guidance entitled, *Department of Energy LLW Disposal Facility Federal Review Group Performance Assessment and Composite Analysis Review Guidance Manual* (the *Review Guide*). Based on the content of the crosswalk, the LFRG will determine whether it needs to review the detailed analysis. The LFRG will report its conclusions to the Deputy Assistant Secretary for Environmental Restoration. The Deputy Assistant Secretary for Environmental Restoration will use this information as the basis for deciding whether to issue a disposal authorization based on DOE's *Atomic Energy Act* responsibilities.

The disposal authorization statement does not impact the decision documented in the CERCLA Record of Decision on whether to build a facility because this decision is made through the CERCLA process. The disposal authorization statement specifies limits and conditions on design, construction, operations, and closure of the radioactive waste disposal facility. The disposal

authorization statement could be included as part of the Record of Decision. If this is the case, then the guidance on disposal authorization (Chapter IV) should be followed during the development of a ROD on CERCLA radioactive waste disposal facilities, to the extent practical. However, it should be understood that compliance with requirements of a law (e.g., CERCLA) does not release DOE of compliance with another law (e.g., *Atomic Energy Act of 1954*, as amended). DOE must determine that whatever actions are taken, *Atomic Energy Act* requirements are met.

> *Example: At Site F, DOE and the stakeholders evaluated the disposal of environmental restoration waste in an onsite disposal cell. The site is using the CERCLA process. The CERCLA RI/FS team followed the DOE "Guidance for a Composite Analysis of the Impact of Interacting Source Terms on the Radiological Protection of the Public from LLW Disposal Facilities" when assessing the sources potentially interacting with the proposed disposal facility. Therefore a separate composite analysis to comply with the requirements of DOE M 435.1-1 was not necessary. A crosswalk was developed showing the linkage between CERCLA requirements and DOE M 435.1-1 requirements. Based upon the crosswalk, the Field Element Manager certified that the facility would meet all of the DOE M 435.1-1 requirements and submitted the crosswalk to the Deputy Assistant Secretary for Environmental Restoration. The Deputy Assistant Secretary turned to the LFRG to review the crosswalk and the LFRG reported its conclusions to the Deputy Assistant Secretary. Based on the LFRG report, the Deputy Assistant Secretary issued a disposal authorization.*

Environmental restoration activities will generate radioactive waste requiring off-site disposal. Management of wastes that will be disposed of off-site must meet all the requirements of DOE M 435.1-1. There is no need to prepare a crosswalk documenting how the DOE M 435.1-1 requirements have been addressed in the CERCLA documents and process.

In addition, if DOE plans to use the services of a commercial facility for management of radioactive waste from environmental restoration activities, the requirements of Section I.2.F.(4) must be met. These requirements can be included in the appropriate CERCLA documentation or handled separately.

Demonstrating Compliance. To fulfill DOE's *Atomic Energy Act* responsibilities, the Department must demonstrate compliance with the substantive requirements of DOE M 435.1-1 for low-level waste disposal facilities managed under CERCLA. Appropriate CERCLA documentation (define above) may be used to demonstrate compliance with the substantive requirements of DOE M 435.1-1. This may include a crosswalk prepared to demonstrate that the CERCLA process addresses the requirements of DOE M 435.1-1. In addition, the Field Element Manager must submit certification to the Deputy Assistant Secretary for Environmental Restoration that the

substantive requirements have been met for the disposal facility. A disposal authorization must be issued by the Deputy Assistant Secretary for Environmental Restoration.

Supplemental References:

1. Alm, 1997. Alvin L. Alm (DOE) to John T. Conway (DNFSB), letter, *Guidance for Complying With DOE Order 5820.2A, Radioactive Waste Management for Onsite Management and Disposal of Low-Level Waste Resulting from Environmental Restoration Activities,* U.S. Department of Energy, Washington, D.C., January 9, 1997.

2. DOE, 1996. *Policy for Demonstrating Compliance with DOE Order 5820.2A for Onsite Management and Disposal of Low-Level Wastes Under the Comprehensive Environmental Response, Compensation, and Liability Act,* U.S. Department of Energy, Washington, D.C., May 31, 1996.

3. EPA. *National Oil and Hazardous Substances Pollution Contingency Plan,* 40 CFR Part 300, U.S. Environmental Protection Agency, Washington, D.C.

4. EPA, 1988. "Proposed Rule; National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300," *Federal Register*, Vol. 53, No. 245, U.S. Environmental Protection Agency, Washington, D.C., December 21, 1988.

5. EPA, 1990. "Final Rule, National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300," *Federal Register*, Vol. 55, No. 46, U.S. Environmental Protection Agency, Washington, D.C., March 8, 1990.

6. EPA, 1994. "Final Rule, National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Parts 9 and 300," *Federal Register*, Vol. 59, No. 178, U.S. Environmental Protection Agency, Washington, D.C., September 15, 1994.

7. EPA, 1988. *CERCLA Compliance with Other Laws Manual, Draft Guidance,* EPA/540/G-89/006, U.S. Environmental Protection Agency, Washington, D.C., August 8, 1988.

8. EPA, 1989. *CERCLA Compliance with Other Laws Manual, Part II - Clean Air Act and Other Environmental Statutes and State Requirements, Interim Final,* EPA/540/G-89-009, U.S. Environmental Protection Agency, Washington, D.C., August, 1989.

9. *Superfund Implementation,* Executive Order 12580, Washington, D.C., October 26, 1993.

10. EPA, 1989. *Risk Assessment Guidance for Superfund, Human Health Evaluation Manual (Part A),* Interim Final, EPA/540/1-89/002, U.S. Environmental Protection Agency, Washington, D.C., December 1989.

ATTACHMENT 1

SELECTED PORTIONS FROM A SAMPLE CERCLA/DOE ORDER 5820.2A [CROSSWALK]

INTRODUCTION

This example of a crosswalk between CERCLA requirements and DOE's waste management requirements appeared as an attachment to both the 1996 and 1997 CERCLA policies referenced above. Although this example was developed to illustrate compliance with the requirements of DOE 5820.2A and was referred to as a roadmap rather than a crosswalk, it is nonetheless a valid illustration of the content and level of detail expected in crosswalks linking the requirements of DOE M 435.1-1 with the requirements of CERCLA. The example is drawn from the actual comparison performed for the Fernald Environmental Management Project.

This [Crosswalk] provides specific examples of how the Fernald Environmental Management Project (FEMP) has substantively met the objectives/requirements of DOE 5820.2A. Each example specifically identifies how each performance objective or requirement was/will be satisfied at the FEMP via the CERCLA process.

DOE Order 5820.2A is applicable to the FEMP because selected remedies for three of the five operable units (OUs) include onsite disposal. The FEMP onsite disposal facility (OSDF) will contain LLW from the remedial activities to be conducted under CERCLA. This [Crosswalk] demonstrates that the FEMP CERCLA remedial activities of evaluation, design, construction, and waste placement in the onsite disposal facility has/will substantively satisfy the applicable requirements and intent of DOE Order 5820.2A, Chapter III, Management of LLW.

The CERCLA process satisfies the requirements and intent of DOE Order 5820.2A through compliance with ARARs, TBCs, and the information and planning that is derived during the implementation and completion of the CERCLA process, such as the completion of the CERCLA mandated remedial investigations, feasibility studies, remedial designs, and remedial planning documents. This [Crosswalk] will refer to the requirements that mandate these remedial investigations, feasibility studies, remedial designs, remedial planning documents, and the guidance used for implementation, as CERCLA Drivers. The ARARs, TBCs, and CERCLA Drivers serve as the basis for complying with the requirements of DOE 5820.2A and the [Crosswalk] document demonstrates that compliance has been attained. This [Crosswalk] is specific to the FEMP alone. The FEMP CERCLA process and associated ARARs, and TBCs that have been utilized will differ slightly from the ARARs, and TBCs that will be employed at other CERCLA sites within the DOE complex. Page A2-8 includes a table that summarizes the requirements of DOE 5820.2A that have been satisfied through the FEMP CERCLA process.

IDENTIFICATION OF COMPLIANCE WITH THE SUBSTANTIVE REQUIREMENTS OF DOE ORDER 5820.2A

DOE ORDER 5820.2A CHAPTER III (3) (a) PERFORMANCE OBJECTIVES

Purpose

This section of DOE 5820.2A identifies the performance based objectives that a LLW disposal facility must achieve. The objectives are: (1) protection of public health and safety; (2) releases to the environment from the LLW disposal facility shall be ALARA, and must not result in an effective dose equivalent (EDE) that exceeds 25 mrem/year to any member of the public; (3) prevent the possibility of a 100 mrem/year continuous exposure or 500 mrem acute exposure of an inadvertent intruder after institutional controls have terminated (100 years); and (4) protect ground-water resources consistent with Federal, State, and local requirements.

Statement of Compliance for 3(a)(1)

Compliance with this requirement was attained through applying the two CERCLA threshold criteria as identified in the NCP, which are protecting human health and the environment and identifying and complying with ARARs. Substantive compliance with this requirement was further accomplished through the design of the Onsite Disposal Facility (OSDF) and the establishment of waste acceptance criteria (WAC), which will result in the dose to the public being lower than the established exposure limits and by providing protection to ground-water resources.

Identification of ARARs, TBCs, and/or CERCLA Drivers for 3(a)(1)

ARARs: 40 CFR 300.430 (e)(9)(iii)(A), CERCLA Threshold Criteria

Statement of Compliance for 3(a)(2)

Compliance with this requirement was attained through the evaluation of all sources of risk to the public which was completed in the CERCLA Feasibility Study (FS) risk assessments and the Comprehensive Response Action Risk Evaluation (CRARE) performed for the FEMP. The designed containment system (multi-layer cap and liner) of the OSDF eliminates all exposure pathways except groundwater. Protecting the public through the groundwater pathway was addressed by meeting applicable *Safe Drinking Water Act* (SDWA) maximum contaminant level (MCL) groundwater standards. The established waste acceptance criteria (WAC) for the OSDF ensure that the MCLs are not exceeded in the groundwater for 1,000 years. By meeting the proposed SDWA uranium MCL of 20 parts per billion (ppb), the exposure dose from

groundwater will be below the 25 mrem per year EDE requirement for 1,000 years into the future.

Identification of ARARs, TBCs, and/or CERCLA Drivers for 3(a)(2)

ARARs: OAC 3745-27-08 (C), Landfill Construction
40 CFR 61.92-93, National Emissions Standards for Hazardous Air Pollutants (NESHAPS) for emissions of radionuclides other than radon from the Department facilities
40 CFR 61.192, NESHAPS for emissions of radon from Department facilities

TBCs: DOE 5400.5 Chapter II (1)(a), (b), (3)(a)(5), Chapter IV (4)(c), Radiation Protection of the Public and the Environment
DOE 5820.2A Chapter III (3)(a)(2), Protection of the General Population from Releases of Radioactivity

CERCLA Drivers: 40 CFR 300.430, Remedial Investigation/Feasibility Study (RI/FS) and selection of remedy
40 CFR 300.435, Remedial Design (RD)/Remedial action (RA), operation and maintenance
US EPA, 1988, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA
US EPA, 1988, Superfund Exposure Assessment Manual
US EPA, 1989, Risk Assessment Guidance for Superfund: Human Health Evaluation manual, Part A, Interim Final
US EPA, Guidance on Preparing Superfund Decision Documents: The Proposed Plan (PP), The Record of Decision (ROD), Explanation of Significant Differences, the ROD Amendment

Statement of Compliance for 3(a)(3)

Compliance with this requirement was satisfied through the implementation of permanent institutional controls, and the long-term permanence design of the OSDF. The Operable Unit 2 (OU2) and Operable Unit 5 (OU5) RODs specify that the final land use for the OSDF be restricted with perpetual federal ownership and maintenance of institutional controls (such as warning signs and fencing). The NCP and the OU2 and OU5 RODs also specify the design of a containment system with long-term permanence. The OSDF has a designed nine-foot multi-layer cap system which includes a three-foot rock barrier layer, and a five-foot multi-layer liner system. To ensure proper performance of the institutional controls and the containment system, their overall performance will be reviewed every five years as required by the NCP. The

implementation of perpetual institutional controls and the designed containment system precludes the inadvertent intrusion exposure scenario.

Identification of ARARs, TBCs, and/or CERCLA Drivers for 3(a)(3)

ARARs: OAC 3745-27-08 (C), Landfill Construction
OAC 3745-27-11 (H), Landfill Final Closure
OAC 3745-27-14 (A), Landfill Post-Closure Care

TBCs: DOE 5400.5 Chapter II (1)(a)(b), Radiation Protection of the Public and the Environment

CERCLA Drivers: 40 CFR 300.430, RI/FS and selection of remedy
US EPA, 1988, Guidance for Conducting RI/FS Under CERCLA
US EPA, 1988, Superfund Exposure Assessment Manual
US EPA, 1989, Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part A, Interim Final
US EPA, Guidance on Preparing Superfund Decision Documents: The PP, the ROD, Explanation of Significant Differences, and the ROD Amendment

Statement of Compliance for 3(a)(4)

Compliance with this requirement was met through the development of the WAC and design of the OSDF. These actions resulted in the protection of the groundwater resources in accordance with all applicable groundwater standards. The groundwater modeling for the OSDF WAC development demonstrated that the aquifer would be protected to the proposed uranium MCL for 1,000 years into the future. The DOE Fernald Area Office (DOE-FN), DOE Headquarters (DOE-HQ), the United States Environmental Protection Agency (USEPA), and Ohio Environmental Protection Agency (EPA) have approved the modeling in the OU2, and OU5 FSs.

Identification of ARARs, TBCs, and/or CERCLA Drivers for 3(a)(4)

CERCLA Drivers: 40 CFR 300.430, RI/FS and selection of remedy
40 CFR 300.435, RD/RA, operation and maintenance
US EPA, 1988, Guidance for Conducting RI/FS Under CERCLA
US EPA, 1988, Superfund Exposure Assessment Manual
US EPA, 1989, Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part A, Interim Final
US EPA, Guidance on Preparing Superfund Decision Documents: The PP, the ROD, Explanation of Significant Differences, the ROD Amendment

References for Requirement 3(a)

OU2 Risk Assessment (OU2 FS, Appendix C Risk Evaluation), OU5 Risk Assessment (OU5 FS, Appendix F Fate and Transport Modeling, Appendix G Short Term Risk Assessment, and Appendix H CRARE), and OU3 Risk Assessment (OU3 FS, Appendix H Short Term Risk Assessment, Appendix I CRARE), OU2 ROD, OU5 ROD, and OU3 ROD, Onsite Disposal Facility (OSDF) Design Criteria Package (OSDF Design Specifications Package, OSDF Design Calculations Package, OSDF Design Drawings Package), OSDF Support Plans (Appendix A Impacted Materials Placement Plan)

DOE ORDER 5820.2A CHAPTER III (3)(h) LONG-TERM STORAGE

Purpose

This section requires that the long-term storage of LLW be conducted in a manner in which the performance objectives of Chapter III (3)(a) are maintained.

Statement of Compliance for 3(h)(1), (2), (3), and (4)

The long-term storage requirements specified in DOE 5820.2A are not applicable to the remedial activities associated with the disposal of waste in the OSDF because there are no plans that include the long-term storage of waste prior to final disposal in the onsite disposal facility.

DOE ORDER 5820.2A CHAPTER III (3)(k) ENVIRONMENTAL MONITORING

Purpose

This section requires that the LLW disposal facility be monitored by an environmental monitoring program that can measure (through the monitoring of the applicable environmental media) operational effluent releases, migration of radionuclides, disposal facility subsidence, and changes in the disposal facility and site parameters that may effect the long-term performance of the disposal facility.

Statement of Compliance with 3(k)(1)

Compliance with this requirement will be satisfied by utilization of the Integrated Environmental Monitoring Plan (IEMP) developed for the FEMP and the OSDF Support Plans. These plans will include monitoring of OSDF associated ground water, surface water, air, leachate, leak detection system, and subsidence.

Identification of ARARs, TBCs, and/or CERCLA Drivers for 3(k)(1)

ARARs: OAC 3745-27-10, Ground-water Monitoring Program
OAC 3745-27-19(E)(26), Sanitary Landfill Operation; maintain integrity of landfill components
OAC 3745-27-19(J)(1), (4) - Sanitary Landfill Operations; surface water control structures

TBCs: DOE 5820.2(A) Chapter III(3)(k), Environmental Monitoring

CERCLA Drivers: 40 CFR 300.435, RD/RA, operation and maintenance

Statement of Compliance with 3(k)(2)

See discussion above stating compliance with 3(k)(1).

Identification of ARARs, TBCs, and/or CERCLA Drivers for 3(k)(2)

ARARs: OAC 3745-27-10, Ground-water Monitoring Program
OAC 3745-27-08(C)(1), (2), (3), (4), (5), (6), (7), (9), Leachate collection and storage; structures must be monitored
OAC 3745-27-19(E)(26), Sanitary Landfill Operation; maintain integrity of landfill components
OAC 3745-27-19(J)(1), (4) - Sanitary Landfill Operations; surface water control structures

TBCs: DOE 5820.2(A) Chapter III(3)(k), Environmental Monitoring

CERCLA Drivers: 40 CFR 300.435, RD/RA, operation and maintenance

Statement of Compliance with 3(k)(3)

See discussion above stating compliance with 3(k)(1).

Identification of ARARs, TBCs, and/or CERCLA Drivers for 3(k)(3)

ARARs: OAC 3745-27-10, Ground-water Monitoring Program
OAC 3745-27-19(K)(1), (2), (3) - Sanitary Landfill Operations; leachate detection

TBCs: DOE 5820.2(A) Chapter III(3)(k), Environmental Monitoring

CERCLA Drivers: 40 CFR 300.435, RD/RA, operation and maintenance

Statement of Compliance with 3(k)(4)

See discussion above stating compliance with 3(k)(1).

Identification of ARARs, TBCs, and/or CERCLA Drivers for 3(k)(4)

ARARs: OAC 3745-27-10, Ground-water Monitoring Program

TBCs: DOE 5820.2(A) Chapter III(3)(k), Environmental Monitoring

CERCLA Drivers: 40 CFR 300.435, RD/RA, operation and maintenance

References for Requirement 3(k)

IEMP, Onsite Disposal Facility Support Plans (Appendix C Surface-Water Management and Erosion Control, and Appendix F Air Monitoring Plan)

FEMP CERCLA REVIEW PROCESS

The CERCLA process at the FEMP involves many resources, organizations, and agencies, which provides for a thorough review and approval process. Several subject matter expert resources are utilized during the internal review process at the FEMP by the Department contractor. Additionally, resources from the major contractor teaming partners are utilized during the internal review.

The Fernald Area Office reviews and approves all CERCLA documents. The public stakeholders also have review and comment capabilities throughout the process. Direct involvement in information exchange meetings and technical review of CERCLA documents by US EPA and Ohio EPA in the FEMP CERCLA process is required, pursuant to the terms of the 1986 Federal Facility Compliance Agreement, and a 1990 Consent Agreement between the Department and US EPA, and a Consent Decree between the Department and Ohio EPA. The US EPA including the US EPA Radiation and Risk Assessment specialists, the US EPA environmental contractor, the Ohio EPA, and the Ohio EPA environmental contractor have review and approval authority on all CERCLA documents.

REQUIREMENTS IN DOE ORDER 5820.2A, RADIOACTIVE WASTE MANAGEMENT, CHAPTER III, SECTION 3, MANAGEMENT OF LLW, SATISFIED THROUGH THE CERCLA PROCESS

The following table identifies requirements a. through m. of DOE 5820.2A, Chapter III, Section 3 that have been satisfied at the FEMP via the CERCLA process. These requirements have been satisfied through the compliance with ARARs, TBCs, and other drivers of the CERCLA process. Since these requirements were incorporated as part of the CERCLA process, they do not need to be applied separately.

For completeness, the table also identifies those requirements that are not incorporated or satisfied through the CERCLA process. In the case of the FEMP, none were identified for this category. if any had been identified, they would need to be applied separately and complied with under the DOE 5820.2A process.

DOE 5820.2A, Radioactive Waste Management, Chapter III, LLW Waste Management, Section 3, Requirements	Requirements satisfied via the FEMP CERCLA process	Requirements not satisfied via the FEMP CERCLA process
a. Performance Objectives	a.1, a.2, a.3, a.4	
b. Performance Assessment	b.1, b.2, b.3	
c. Waste Generation	c.1, c.2, c.3, c.4	
d. Waste Characterization	d.1, d.2, d.3	
e. Waste Acceptance Criteria	e.1, e.2, e.3, e.4, e.5	
f. Waste Treatment	f.1, f.2, f.3, f.4	
g. Shipment	Not Applicable	
h. Long-Term Storage	Not Applicable	
i. Disposal	i.1, i.2, i.3, i.4, i.5, i.6, i.7, i.8	
j. Disposal Site Closure/Post Closure	j.1, j.2, j.3, j.4, j.5, j.6	
k. Environmental Monitoring	k.1, k.2, k.3, k.4	
l. Quality Assurance	all	
m. Records and Reports	m.1, m.2	

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(6) Radioactive Waste Acceptance Requirements. Ensuring development, review, approval, and implementation of the radioactive waste acceptance requirements for facilities that receive waste for storage, treatment, or disposal. Radioactive waste acceptance requirements shall establish the facility's requirements for the receipt, evaluation, and acceptance of waste.

Objective:

The objective of these requirements is to establish limits and technical criteria which waste and/or waste containers must meet, based on the hazards of the waste, to ensure that waste is manageable at receipt and can subsequently be safely stored, treated, or disposed, as applicable.

Discussion:

The discussions that follow provide guidance on the above requirement for radioactive waste acceptance requirements. Specific guidance for waste acceptance requirements for each of the waste types is contained in Chapter II, *High-Level Waste Requirements;* Chapter III, *Transuranic Waste Requirements*; and Chapter IV, *Low-Level Waste Requirements* of this guide.

The analysis of the hazards associated with management of radioactive waste in development of DOE O 435.1 and DOE M 435.1-1 indicated that a critical point where controls are needed to prevent or minimize the risks due to the hazards of radioactive waste is when waste is transferred from one major functional area to another. That is, when waste moves from storage, for example, to treatment or disposal. There is not only a physical transfer of the waste, but a change in the management activities that are to be carried out with the waste, possibly a change in potential risks or hazards, a transfer of the knowledge of the specific content and hazards of the waste, and also a transfer of the responsibility for management of the waste. This transfer of waste, knowledge, and responsibility can take place a large distance from where the waste was generated or treated, or previously stored, or in some cases, after many years in storage. Therefore, development of and implementation of waste acceptance requirements for storage, treatment, and disposal facilities is a critically important control that leads to safe and efficient management of radioactive waste.

Waste Acceptance Requirements.

The definition of "waste acceptance requirements" (DOE M 435.1-1, Attachment 2) is:

> Waste acceptance requirements are waste acceptance criteria, and all other requirements that a facility receiving waste for storage, treatment, or disposal must meet to receive waste (e.g., waste acceptance program requirements, receiving facility operations manual).

The waste acceptance requirements include both the program implemented by the facility receiving the waste, such as waste handling procedures and training, and any technical and administrative criteria to address the hazards associated with the waste that arise from handling and managing the waste, and technical and administrative criteria that are provided to waste generators who transfer waste to the receiving facility that waste must meet in order to be acceptable, known as "waste acceptance criteria."

The waste acceptance requirements should include all of the technical limitations and criteria for radioactive waste to be acceptable for storage, treatment, or disposal at the receiving facility. The safety analysis report, criticality analysis, and any other appropriate safety, authorization basis, or performance assessment documents should be used to establish the technical waste acceptance requirements for the receiving facility, including radioactivity (concentration and inventory) limits, waste classes or categories, waste form and/or packaging stability requirements, allowable chemical content, percent liquid, and any other necessary waste container or form requirements to ensure that the facilities' design bases, performance, and operating bases are protected.

The waste acceptance requirements should include establishment of a process by which the receiving facility evaluates incoming waste for acceptability and confirms that a waste meets the acceptance criteria of the facility. The process should include one of, or a combination of, physical evaluations of waste, such as sampling and testing, or reviews, audits, or observations of generating facilities' certification processes and procedures. The process should establish the procedures and mechanisms for dealing with incoming waste that does not meet the waste acceptance requirements of the receiving facility. The waste type chapters contain additional guidance on this element of waste acceptance requirements.

Waste Acceptance Criteria.

The definition of "waste acceptance criteria" (DOE M 435.1-1, Attachment 2) is:

> Waste acceptance criteria are the technical and administrative requirements that a waste must meet in order for it to be accepted at a storage, treatment, or disposal facility.

The waste acceptance criteria are those technical requirements, such as radionuclide concentration and package weight limitations, that a waste must meet, and administrative requirements, such as forms and certification statements, that a generator must prepare, for radioactive waste to be accepted at a storage, treatment, or disposal facility. Waste acceptance criteria must be documented, and in fact, for facilities that receive waste from many differing generators, are commonly known documents, such as the Waste Isolation Pilot Plant Waste Acceptance Criteria document, or the WIPP WAC.

The waste acceptance criteria should specify the documentation requirements regarding waste generation, characterization, transport, treatment, storage, disposal, and any other information that must be prepared by the generator, retained by the generator, sent to the receiving facility, and accompany the waste in order for waste to be acceptable at the receiving facility. The waste acceptance criteria should define the key elements to be included in a waste generator's certification program to confirm that radioactive waste has been properly prepared to meet the receiving facility's acceptance requirements.

Development of Waste Acceptance Requirements. The facility receiving waste for storage, treatment, or disposal must document its waste acceptance requirements. The documentation should be as thorough, clear, concise, and unambiguous as possible to minimize the potential for unacceptable waste being sent to the facility.

The waste acceptance requirements and documentation should be developed using a graded approach commensurate with the hazards associated with the management of the waste in the facility and the complexity of the activities to be conducted in the facility and on the waste. The complex activities that can involve many hazards that take place at a low-level waste disposal facility or a high-level waste storage tank would likely involve numerous and/or detailed waste acceptance requirements. By contrast, a facility which will only pass-through properly packaged waste directly to a disposal facility may have a minimum set of requirements that refer to the disposal facility waste acceptance requirements and are often more general in nature. A facility engaged only in staging of waste for shipment to another facility may not have separate waste acceptance requirements apart from the facility to which it will eventually be shipped.

> *Example: Facility 200 at Site W contains a high-level waste treatment process. The treated high-level waste is transferred to Facility 400 for transportation to another DOE site. Low-level waste and transuranic waste that result from the treatment process are solidified for disposal at Site W, and transferred to Storage Building A while it waits for disposal. The waste acceptance and processing documentation for Facility 200 contains detailed procedures and technical specifications for the acceptance of high-level waste streams for processing. The documentation contains details that make it clear that, as long as operations are maintained within appropriate parameters, the solidified low-level waste and transuranic waste are certifiable to the Site W disposal facility. No additional*

waste acceptance requirements are prepared for Storage Building A where the waste is stored prior to disposal.

A radioactive waste management facility may have individual, stand-alone requirements, if warranted by the hazards involved or the complexity of the activities conducted. Or a site may have general acceptance requirements applicable to all waste management facilities at the site, in which case separate facilities would add facility-specific acceptance requirements to the site acceptance requirements, as necessary. This may be the practice at a site with many facilities which manage small quantities of waste with multiple locations for staging, storage, and/or central management of waste. At such a facility, most of the process and procedural acceptance requirements could be in one document applicable to the whole site, which would be supplemented with specific technical requirements for acceptance at each of the management locations. If activities at various facilities are the same, they could share the same supplemental waste acceptance requirements documents. Likewise, if several activities are carried out at locations that are close to one another, or are managed by the same entity, then it may be advantageous for one supplemental technical document to be prepared to cover those activities.

Waste acceptance requirements for treatment and storage facilities should consider the waste acceptance criteria for facilities in subsequent steps of waste management in development of their waste acceptance criteria. Particular attention should be paid to the requirements for treatment facilities to prevent generation of waste streams, following treatment, that would have no path forward to disposal. Waste acceptance requirements should also clearly delineate different requirements for on-site generators as opposed to off-site generators, if differences exist. Similarly, if there are any specific requirements for, or accommodations made, at the receiving facility for small volume generators, these should be specified in the waste acceptance documentation. Waste acceptance requirements should also address any specific inspections for leakage, contamination, or presence of hazardous materials required by other DOE Orders or Department of Transportation regulations.

Example: Processes in the Site W Treatment Building include packaging of low-level and mixed low-level waste, compaction of low-level waste, incineration of mixed low-level waste, solidification of low-level waste, and storage and staging of waste prior to disposal. The Site W Treatment Building Waste Acceptance Requirements document contains provisions that address Department of Transportation requirements, RCRA Permit requirements, State Hazardous waste law permit requirements, waste acceptance criteria from the disposal facilities to which waste will be transferred, as well as DOE O 435.1 and DOE M 435.1-1 requirements.

Review and Approval of Waste Acceptance Requirements. The waste acceptance requirements for DOE facilities that receive waste for storage, treatment, or disposal are a key element of the radioactive waste management basis, and should be thoroughly reviewed for completeness,

adequacy, and consistency with the hazards that may be encountered at the facility. The Field Element Manager, or his/her designee, is responsible for conducting this review. At his/her discretion, review and approval of facility waste acceptance requirements can be delegated to a contractor. The waste acceptance requirements document should be finalized and approved prior to the issuance of a facility's radioactive waste management basis. The radioactive waste management basis for the receiving facility should reference the waste acceptance requirements document, or cite specific acceptance requirements, as critical elements of the radioactive waste management basis for the facility. Likewise, generating facilities, operations, or activities that send waste to the receiving facility should also cite or reference the waste acceptance requirements document for the receiving facility in the radioactive waste management basis statement applicable to the waste generation.

Implementation. The implementation of the waste acceptance requirements for radioactive waste management facilities should also follow the graded approach process that is consistent with the hazards associated with the management of the waste in the facility and the complexity of the activities to be conducted in the facility and on the waste. Some radioactive waste management facilities or operations that receive large amounts of waste for storage, treatment, or disposal from many different generator organizations, should establish a waste acceptance program that has separate responsibility for receipt, evaluation, and approval of receipt of waste. On the other hand, waste acceptance at a group of several small facilities at which similar management steps, like storage, are being undertaken, may require little in the way of an active program for receiving waste.

> *Example: The Site D Disposal Facility accepts waste from several generators in the DOE Complex. Site D establishes a Waste Acceptance Program which runs the receipt and acceptance of waste, including establishment of the waste acceptance criteria (WAC) documentation and waste receipt operations (including: container inspection upon arrival, unloading, transfer to disposal emplacement operators). The Site D Waste Acceptance Program performs waste certification audits of generators at all other DOE sites which send waste to the Site D Disposal Facility. By way of contrast, at Site E, where waste is generated, treated, and stored, and then transferred to Site D for disposal, the Waste Generator Program handles all waste generation documentation, waste certification, waste acceptance at Site E treatment and storage facilities, and all transfer responsibilities to Site D. Site E personnel participate in Site D waste generator certification audits, but do not conduct separate ones of their own.*

Compliance with the requirement for radioactive waste acceptance requirements is demonstrated if all radioactive waste management storage, treatment, and disposal facilities have approved, documented waste acceptance requirements that include all necessary technical requirements and limitations for waste to be acceptable upon receipt at the facility, documented waste acceptance criteria that a generator uses to transfer acceptable waste to the receiving facility, and all

necessary administrative requirements that include a process for evaluation and acceptance of incoming waste as meeting the acceptance requirements of the receiving facility.

Supplemental References:

1. DOE, 1997. *Nevada Test Site Waste Acceptance Criteria*, NTSWAC (Revision 1), U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV, August 1997.

2. DOE, 1996. *Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-069, Revision 5, U.S. Department of Energy, Carlsbad, NM, April 1996.

3. DOE, 1991. *Hanford Site Solid Waste Acceptance Criteria*, WHC-EP-0063-3, U.S. Department of Energy, Richland Operations Office, Richland, WA, September 1991.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(7) Radioactive Waste Generator Requirements. Ensuring development, review, approval, and implementation of a program for waste generation planning, characterization, certification, and transfer. This program shall address characterization of waste, preparation of waste for transfer, certification that the waste meets the receiving facility's radioactive waste acceptance requirements, and transfer of waste.

Objective:

The objective of radioactive waste generator requirements is to promote the development of effective programs for managing the front end of radioactive waste management cycles. Front end activities consist of those activities performed by waste generators in preparation for turning over waste for management in systems intended to lead to disposal. The Field Element Manager is assigned responsibility for ensuring that effective programs are developed and implemented for managing radioactive wastes in a manner that promotes their eventual disposal.

Discussion:

The requirement for a waste generator program provides for development and implementation of systematic, integrated capabilities for four key elements: (1) considering waste management needs prior to and during generation of waste streams (planning), (2) obtaining and maintaining knowledge about the waste that supports effective decision-making about the waste (characterization), (3) documenting that waste generated by one facility meets the receiving facility's waste acceptance requirements (certification), and (4) and ensuring that waste to be shipped satisfies certain documentation, authorization, and manifest requirements (transfer). Hazards associated with the physical aspects of radioactive waste transfer are addressed in transfer requirements for specific waste types.

The definition of generator (Chapter I, Attachment 2) is;

> "Organizations within DOE or managed by DOE whose act or process produces radioactive waste or, for the purposes of the generator requirements in this Order and Manual, transfer radioactive waste to a treatment, storage, or disposal facility."

Therefore, a waste generator program is to be implemented by all organizations who produce waste as a byproduct of a mission or process, and all organizations who transfer waste to a treatment, storage, or disposal facility, even if they don't produce waste. Some elements of the

waste generator program may not be applicable to organizations who only transfer waste, such as waste characterization or approval to generate waste with no path to disposal. Organizations that transfer waste are not required to implement any waste generator program elements that are not necessary to perform a compliant waste transfer. Each generator must determine the elements of the waste generator program that apply to the specific radioactive waste management facilities, operations, and activities, and ensure that they are included in the facility's approved generator program.

> *Example: At Site Q, 1400 Area, there are three facilities who generate low-level waste, and a storage building. The three generator facilities implement all four elements of the 1400 Area waste generator program; planning, characterization, certification, and transfer. Waste generated at 1400 Area is certified to the Site Q Disposal Facility waste acceptance criteria, and transferred to the storage building, where it is stored for 9 months prior to transfer for disposal. The storage building implements only two elements of the 1400 Area waste generator program; waste certification and waste transfer. The program is very minimal, as the storage building acts only to pass-through waste already certified to the Site Q Disposal Facility acceptance criteria. Certification involves only a signature by the storage facility manager on the waste certification statement that the waste continues to meet Site Q Disposal Facility criteria.*

Field Element Managers are required to ensure that their subordinate organizations and personnel establish and carry out these programs. Field Element Managers are also responsible for ensuring the adequacy of the programs for achieving the more detailed requirements identified for waste types and then approving the programs. Finally, Field Element Managers are to ensure that the programs are implemented as designed and approved.

Specific guidance on the four key elements of waste generator programs (i.e., planning, characterization, certification, and transfer) and on issues such as reliance on proposed facilities, conditions under which waste with no path forward can be generated, and demonstration of acceptable performance is provided in Chapter II, *High-Level Waste Requirements;* Chapter III, *Transuranic Waste Requirements*; and Chapter IV, *Low-Level Waste Requirements* of this guide.

Some of the conditions and weaknesses that need to be controlled to prevent or minimize the risks due to the hazards of radioactive waste management are a result of technical and administrative weaknesses and conditions in generator activities. In some cases, waste has been generated without due consideration of the benefits of the activity that generated the waste compared to the work required to manage and dispose of the waste generated. Waste generator requirements focus on systematic attention to the need for generating a waste and effective processes for turning over the waste to waste management facilities. The waste generator program is closely related to other requirements in this Manual, such as waste acceptance requirements, and the implementation of these related requirements should be integrated.

Development and Implementation of a Waste Generator Program. A facility that generates waste should have a program in place that provides for integration of four key elements -- planning, characterization, certification, and transfer. Facilities who transfer waste must also have a waste generator program that integrates whatever elements of the program are being implemented. Documentation of the program should be thorough, clear, concise, and unambiguous to promote integration of these elements and to clearly specify roles and responsibilities. The program does not need to be managed by a discrete organization with dedicated staff and offices. Rather the program is intended to describe the processes and procedures needed to integrate and document the four key elements and to establish roles and responsibilities for carrying out these elements, even across organizational boundaries.

A separate program need not be developed for each facility or each waste type. The establishment of a single waste generator program for an entire site may be the most effective and least expensive option, but depends on the complexity of the facilities and operations and other practical considerations at the site. Some of the waste generator requirements in DOE M 435.1-1 are identical across the waste types and others are very similar among the waste types. Ultimately, the structure and organization of the waste generator program are left to the discretion of Field Element Managers.

The waste generator program and its documentation should be developed using a graded approach commensurate with the hazards associated with the waste generated, the quantities of waste generated, and the complexity of the characterization, certification, and transfer activities to be conducted. Facilities that generate relatively benign radioactive waste with known management and disposal approaches should not have generator program requirements at the same level of detail as activities that produce very hazardous (high radiation) wastes whose management and disposal challenge existing capabilities. For some large, high-hazard facilities, it may be appropriate to establish a waste generator program that has separate responsibility for planning, characterization, certification, and transfer of waste. Facilities who are only pass-throughs (i.e., storage) from one management step (e.g., generation of waste certified to a treatment facility) to another will have minimal waste generator programs.

A radioactive waste generation facility may have individualized requirements if warranted by the hazards involved or the complexity of the activities conducted. Alternatively, a site may have site-wide generator requirements applicable to all waste generators at the site with separate generators supplementing the site requirements with facility-specific requirements as necessary. This would be a particularly good practice at a site with many facilities that generate small quantities of similar waste. At such facilities, most of the process and procedural generation requirements could be articulated in one document applicable to the entire site, which could be supplemented by specific technical requirements for waste generation at each of the management locations. If waste generation activities at some of the facilities are the same or very similar, then they could share the same supplemental waste generator documents. Likewise, if several wastes are

generated at locations that are close to one another, or are managed by the same entity, then it may be advantageous for one supplemental technical document to be prepared to cover those activities.

> *Example: Site X had dozens of operations that each generate approximately one package of radioactive waste each year and one large facility that generates truckloads of waste every week. The Field Element Manager decides to require the development of a site-wide waste generator program that applies to all of the small generators and to require the large volume generator to develop a separate program that applies only to its operation.*

Waste generator certification and characterization requirements are directly linked to the waste acceptance requirements for the facility to which a generator will transfer waste. The generator must certify that waste to be sent to the receiving facility meets its waste acceptance criteria, and waste characterization determines whether the waste acceptance criteria have been satisfied. The waste generator program should include a process for reviewing waste acceptance criteria of the receiving facilities and tailoring certification, characterization, and transfer elements to fully comply with the applicable waste acceptance criteria. The waste acceptance criteria for the receiving facility should be thoroughly reviewed to establish the conditions that the waste to be transferred must meet, as well as the corresponding characterization methods that will be used to ensure that the wastes meet the criteria. If it is determined that the waste acceptance requirements of a facility receiving waste for storage, treatment, or disposal have not been met, the generator bears the financial responsibility for corrective actions necessary to make the waste acceptable or for return of the waste.

Review and Approval of Waste Generator Requirements. The Field Element Manager is responsible for ensuring the proposed generator program(s) are reviewed and approved. As decided by the Field Element Manager, the review and approval may be done by DOE staff or by the contractor. Waste generator program documentation should confirm that the generators consider and plan for waste that will be generated; that a process is included for approving generation of waste that has no path forward to disposal; that waste will be certified to meet acceptance requirements for a receiving facility prior to transfer; that adequate characterization capability is in place; and that transfer requirements will be met. The program should document the roles and responsibilities for carrying out the component elements and should describe interfaces between the elements that will provide for appropriate integration. Documented evidence of the waste generation program approval, based on review of the written description of the program, will serve as the performance measure for this requirement.

> *Example: Upon completion of the draft written waste generator requirements program, the Field Element Manager directs his staff to review the process used by the contractor to review and approve the program against the requirements of DOE M 435.1-1 for*

waste generation planning, waste characterization, waste certification, and waste transfer. The contractor review is performed using procedures developed and documented for this purpose. Once any deficiencies in the programs are corrected, the contractor management provides written approval of the program for implementation. The DOE staff report to the Field Element Manager that they are satisfied with the process used by the contractor for reviewing and approving the program.

Planning Requirements. The goal of the waste generation planning element of this requirement is to provide ultimately for the disposal of all radioactive waste that is generated in the future. This requirement emphasizes analysis of the activities necessary to manage and dispose of waste prior to generating the waste. The objective of this requirement is to increase assurance that necessary waste management facilities are available. Planning is required for all new waste streams. All aspects of waste management up to and including disposal are included. The planning requirements for specific waste types in this Manual are structured to discourage sites from generating waste that does not have an identified path for storage, treatment, and disposal; and to promote the development of plans for resolving issues that prevent disposal of those radioactive wastes that must be generated, but do not have an identified path to disposal. The general requirement for waste with no identified path to disposal (see DOE M 435.1-1, Section I.2.F.(19)) requires approval for generation of such wastes.

Example: A batch of spent fuel stored at Site X is deteriorating, and reprocessing is necessary to reduce risk. The reprocessing will begin two years after the effective date of DOE O 435.1 in an existing reprocessing canyon. The spent fuel is different from that previously reprocessed in the canyon, and necessary process changes will produce a waste stream unlike those previously produced. The high-level waste produced will be subjected to pretreatment and treatment. Prior to disposal, the high-level waste will be solidified. At various stages in this series of operations, temporary or long-term storage will likely be required. Satisfactory performance of the waste generation planning requirements will include preparation of a high-level waste stream life cycle description consisting of identification and explanation of each of these steps and explanation of the interfaces between the steps. Prior to beginning reprocessing, the generator of the waste holds discussions with operators of facilities that may be able to manage the waste and incorporates relevant information on waste management needs and the availability of facilities to meet those needs in written plans.

Characterization Requirements. The waste characterization element of the waste generator process is a critical control used by other elements (e.g., waste acceptance requirements, certification, transfer) to ensure that sufficient knowledge of a waste's characteristics is available to support effective decision-making for its management. Waste characterization is a necessary control to mitigate potential vulnerabilities if a waste stream is not adequately described. The requirements contained in this section, and in the respective waste type chapters, address the

identified vulnerabilities by specifying the minimum characterization data, and requiring the use of a data quality objectives, or similar, process.

> *Example: A waste stream from an actinide processing building is sampled and analyzed and determined to consist of three primary nuclides: Pu-239, Am-241, and Pu-238. Multiple samples are found to contain the three radionuclides in essentially the same ratio, and the process does not vary significantly over time. Therefore, the contents of future waste packages are routinely characterized based on a gamma energy analysis which detects gamma radiation from the Am-241 and the Pu-238. The characterization program requires the collection and full analysis of samples once a month to confirm that the ratio of the three radionuclides falls within an acceptable range (based on application of the data quality objectives process).*

Certification Requirements. The waste certification element of the waste generator program is one part of the controls put in place as a result of the hazards analysis performed when developing DOE O 435.1 and DOE M 435.1-1. Certification requirements address confirmation that the waste acceptance criteria of a receiving facility have been met.

> *Example: The Building Five Storage Facility has low-level waste that it has received for storage over the last year. Facility personnel plan to continue to receive low-level waste and store it until it can be transferred to the Nevada Test Site disposal facility. The organization responsible for the storage facility will be considered a generator when the waste is shipped to the Nevada Test Site disposal facility. The storage facility must develop and implement a certification program that provides documented confirmation that the Nevada Test Site Waste Acceptance Criteria have been met.*

Transfer Requirements. The waste transfer requirement ensures that waste is transferred to a receiving facility only with the authorization of the receiving organization. It also ensures that the waste transfer is accompanied by transfer of relevant information and by appropriate transfer of responsibility for maintaining, as necessary, the integrity of the waste and its container. Waste should not arrive at a receiving facility until the sending facility has been authorized to send it by personnel responsible for the receiving facility. The transferred waste should be accompanied by relevant documentation about the waste and designation of the individuals in the receiving organization who will be responsible for maintaining the integrity of the waste and its container. This requirement is the responsibility of the individual or organization that is transferring (sending) the waste. While this approach ensures that the receiving organization is aware of and prepared for arrivals of waste, this requirement is also intended to promote communication between the sender and the receiver regarding waste acceptance criteria, available capacity of the receiving facility, and other important coordination information.

Example: In preparation for transfer of low-level waste to a disposal facility, characterization and packaging information is documented and, as required, accompanies the waste to the disposal facility. However, the generator had not received authorization to transfer the waste to the disposal facility and no disposal capacity was available when the waste arrived. The waste was shipped back to the generator.

Compliance with this requirement for a radioactive waste generator program can be demonstrated if all radioactive waste generator facilities have a documented waste generator program that includes, as appropriate, the four key elements -- planning, characterization, certification, and transfer -- and the Field Element Manager or his designee monitors those activities to verify that they are being implemented as described in the program.

Supplemental References:

1. EPA, 1994. *Guidance for the Data Quality Objectives Process*, EPA QA/G-4, U.S. Environmental Protection Agency, Washington, D.C., September 1994.

2. DOE, 1997. *Nevada Test Site Waste Acceptance Criteria* (NTSWAC), Revision 1, U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV, August 1997.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(8) Closure Plans. Ensuring development, review, approval, and implementation of closure plans for radioactive waste management facilities in accordance with the applicable requirements in the waste-type chapters of this Manual.

Objective:

The objective of this requirement is to ensure closure plans for radioactive waste facilities reflect the engineered and administrative controls established by the facility's radioactive waste management basis and that the closure plans and other documentation include sufficient technical specifications of the final closure of the facility to justify the bases for evaluating the protection of the public and the environment that are presented in the performance assessment and composite analysis of the facility, or similar prospective assessments.

Discussion:

The safety and hazard analysis for management of radioactive waste conducted to develop the essential requirements for DOE O 435.1 and DOE M 435.1-1 indicated that disposal is a critical activity requiring controls because disposal is the last function conducted on the waste, but yet, the potential hazards from radioactive waste will continue far into the future. Thus, there are specific requirements for the disposal of radioactive waste that are critical to protection of the public, workers, and environment. One of the most important of these controls is the closure plan for the facility, the elements of which represent the last line of defense against the possible interaction of buried radioactive materials with the public, workers, and the environment. The development, review and approval, and implementation of radioactive waste disposal facility closure plans are necessary to assure disposal is being conducted safely and effectively and that the disposal facilities will remain safe far into the future. The closure of deactivated high-level waste facilities and sites also poses potential hazards from radioactivity far into the future, similar to radioactive waste disposal activities. The development, review and approval, and implementation of closure plans and other closure documentation for deactivated high-level waste facilities and sites are also crucial in assuring that the public, workers, and the environment are protected far into the future.

The DOE M 435.1-1 requirement states that it is the responsibility of the Field Element Manager to develop, review and approve, and implement radioactive waste facility closure plans. The discussions that follow provide guidance on these aspects of the requirement for low-level waste disposal facilities and deactivated high-level waste sites and facilities. As indicated in the requirement, closure plans required by the Manual must meet the requirements for closure plans in

the waste type chapters of DOE M 435.1-1. Additional guidance on the following subjects, is found in the guidance on Chapter II, *High-Level Waste Requirements* and Chapter IV, *Low-Level Waste Requirements*.

Low-Level Waste Disposal Facility Preliminary Closure Plan. A preliminary closure plan must be submitted to Headquarters as part of the review documentation necessary for issuance of a disposal authorization statement for a low-level waste disposal facility. The preliminary closure plan documents the closure of the disposal facility that is assumed and evaluated in the performance assessment and composite analysis submitted for the disposal facility. Detailed guidance on the contents and submittal of this preliminary closure plan is discussed in guidance, on DOE M 435.1-1, Section IV.Q.(1).

Development of Low-Level Waste Disposal Facility Closure Plan. The development of a closure plan is necessary for a planned or operating disposal facility to ensure waste disposal operations are performed in a manner which is consistent with the assumptions made about closure in the performance assessment and composite analysis, and so that the actual closure of the facility is ultimately protective of the public and the environment. The closure plan provides the technical specifications to be addressed during waste disposal operations and closure of the facility. The closure plan is developed after consideration and evaluation of such factors as the activities that will occur at the facility during its use, the expected condition of the facility at the time of closure, the intended use of the facility following closure, land use plans for the facility, and institutional control of the disposal facility following closure. The closure plan establishes the conditions to be met to provide protection to workers, the public and the environment when active disposal operations have ceased. The specifications and conditions presented in the closure plan provide the bases for the long-term projection of the performance of the disposal facility and related facilities that are addressed in the performance assessment and composite analysis for the disposal facility. Detailed discussions on low-level waste disposal facility closure plans are included in the guidance on DOE M 435.1-1, Section IV.Q.

> *Example: The performance assessment and composite analysis for the Site X low-level waste disposal facility include assumptions regarding waste degradation, infiltration of water, and leaching of waste that correspond to descriptions of disposal unit closure in those documents. The closure plan describes the partial closure of the disposal units and provides technical specifications and conditions for the closure of units and the partial closure of the facility that are consistent with achieving an infiltration rate of water and degree of degradation of waste as assumed in the performance assessment and composite analysis. The closure plan also indicates preliminary plans for the installation of monitoring wells that will measure infiltration to confirm the assumptions used in the evaluations, and so appropriate adjustments can be made once closure activities begin.*

Review and Approval of Low-Level Waste Disposal Facility Closure Plan. The preliminary closure plan for a low-level waste disposal facility must be submitted along with the performance assessment and composite analysis for review prior to issuance of a disposal authorization statement. Therefore, review and approval of the closure plan for a low-level waste disposal facility is to be conducted by the Field Element Manager, and the approved closure plan then becomes part of the radioactive waste management basis for the disposal facility. The preliminary closure plan for a disposal facility comprises the documentation of the assumed closure configuration of the facility with some additional detail on how this closure can be achieved. The closure plan will be a living document that is constantly updated through the operational life of the facility with specific information about contents, partial closure (e.g., caps on trenches) of disposal units, and other information necessary (e.g., monitoring locations) to support the final closed state. It is imperative that the relationship between the closure plan and the analyses conducted in the performance assessment and composite analysis be considered as the facility is being operated. Any information that is incorporated into the closure plan or any changes made to closure of the facility that impact the analysis in the performance assessment or composite analysis need to be incorporated into these evaluations immediately, to determine their impact. This allows any changes to waste acceptance, or other aspects of operation, to be made effective as soon as possible. This relationship between the performance assessment and composite analysis and the closure plan is discussed in detail in the guidance on DOE M 435.1-1, Section IV.Q.(1). When major changes are required to the closure plan, based on operational changes or impacts as evaluated in the long-term assessments, re-approval by the Field Element Manager should be considered.

Development of Closure Plans and Other Closure Documentation for Deactivated High-Level Waste Facilities/Sites. The development of closure plans and other closure documentation for deactivated high-level waste facilities/sites is necessary to ensure that the process of closure results in a closed facility that is protective of the public and the environment. Closure of deactivated high-level waste facilities/sites can be accomplished by one of three paths. Documentation requirements and review/approval requirements for the first path, decommissioning, are defined in DOE O 430.1A and DOE 5400.5, and refer to these Orders for information on these topics. Documentation and review/approval requirements for the second and third paths, CERCLA process and closure, are defined in DOE M 435.1-1, Section II.U, Section I.2.F.(8), and Section I.2.E.(2). Section II.U defines the documentation requirements while the two General Requirements sections define the roles and responsibilities of the Field Element Manager and the Deputy Assistant Secretaries for Waste Management and Environmental Restoration, respectively.

As discussed in the guidance Section II.U, the development of closure plans and other closure documentation, e.g., CERCLA plans and analyses, are necessary for a planned closure action to ensure the closure activities are consistent with the assumptions made about the closure in the analysis, e.g., assessments of projected performance and projected composite performance, and so

that the actual closure is protective of the public and environment. Refer to Section II.U for the specific information that is required.

Review and Approval of Site Closure Plans and Other Closure Documentation for Deactivated High-Level Waste Facilities/Sites. The site closure plans and other closure documents required by Section II.U must be reviewed and approved by the Deputy Assistant Secretaries for Waste Management and/or Environmental Restoration, as appropriate, as required by DOE M 435.1-1, Section I.2.E.(2). Guidance on Section I.2.E.(2) discusses the review and approval process in detail. The responsible Field Element Manager needs to take the appropriate actions to ensure that the closure documentation for a facility or site meets the technical and administrative requirements of Section II.U and that the package of information submitted for the DOE Headquarters review and approval is adequate. To accomplish these tasks it is expected that the Field Element Manager will need to develop and implement a formal review and approval process that is completed prior to submission of the documentation to DOE Headquarters.

The authorization by the Deputy Assistant Secretaries to the Field Element Manager to proceed with closure activities should be viewed as analogous to a license that would be issued by the U.S. Nuclear Regulatory Commission or another regulatory agency. As explained in the guidance to Section I.2.E.(2) and II.U., an authorization to proceed with closure activities is issued by the Assistant Secretaries to the Field Element Manager responsible for closing the deactivated facility and contains the conditions of the authorization and controls deemed necessary for the long-term protection of the public and the environment. Thus the closure documentation is to contain information on the configuration of the closed facility or site as well as the details on how the closure will be achieved. It is envisioned that the closure plan, required by Section II.U(3), will be a living document that is updated as necessary to ensure the assumptions and analysis contained in the plan are consistent with the conditions at the site. It is imperative that the relationship between the closure plan and the analysis conducted in the assessment of performance and composite analysis be kept in mind as the facility or site is being closed. Any information that becomes available during the closure activity or any changes made to closure of the facility that impact the analysis in the assessment of performance or composite analysis needs to be incorporated into these evaluations immediately to determine needs to their impact. Any information that is incorporated into the closure documentation, or any changes to the closure activities, that impact the analysis in the performance assessment or composite analysis in the closure documentation should be incorporated into these evaluations immediately, to determine the extent of their impact. Once a closure action is authorized by the appropriate Deputy Assistant Secretary, as provided in Section I.2.E.(2), the Field Element Manager is responsible for ensuring that the closure plan or other closure documentation, with emphasis on the performance assessment and composite analyses, remain current with accurate and up-to-date information. This maintenance function is discussed in the guidance to Section II.U and ensures the data and analyses are accurate and reflective of current conditions at the closure site. When major changes or revisions are required to the closure plan or other closure documentation, it is the responsibility

of the Field Element Manager to perform a review and approval of the revised analysis to ensure the bounding conditions contained in the closure plan, and authorization to proceed with closure activities, is not exceeded. As explained in the guidance to Section I.2.E.(2), if these bounding conditions are exceeded, the closure plan needs to be revised and submitted to the appropriate Deputy Assistant Secretary within the Office of Waste Management for review and/or approval.

Closure Plan Implementation. The closure plan for a radioactive waste facility is a living document and needs to be implemented during facility operations and continue through final closure. The aspects of closure that are to be implemented during operations are generally limited but then increase as the time of final closure of the disposal facility nears. The Field Element Manager is responsible for ensuring the various aspects of the closure plan are properly implemented throughout the life cycle of the facility.

> *Example: The closure plan for a low-level waste disposal facility requires daily cover as wastes are disposed, and that the wastes and cover material are to be compacted to a specified density. A Field Element staff member makes periodic site visits to the disposal facility to ensure these disposal closure criteria are being met as part of facility operations. In the fifth year of operation, a performance monitoring well is installed at the north side of the disposal units filled to date. The staff member monitors the progress of the monitoring well installation, and ensures that the information concerning the well is incorporated into the closure plan.*

Compliance with this requirement is demonstrated if closure plans for radioactive waste facilities are developed, approved, maintained, and implemented throughout the life cycle of the facility.

Supplemental References:

1. DOE, 1998. *Life Cycle Asset Management,* DOE O 430.1A, U.S. Department of Energy, Washington, D.C., October 14, 1998.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(9) Defense-In-Depth. Ensuring that defense-in-depth principles are incorporated where potential uncertainties or vulnerabilities warrant their use when reviewing and approving radioactive waste management activities and documents. These principles advocate the use of multiple levels of engineered and administrative controls to provide protection to the public, workers, and the environment.

Objective:

The objective of this requirement is to ensure that defense-in-depth principles are appropriately evaluated and applied to the management of radioactive waste where uncertainties or vulnerabilities warrant multiple levels of controls to provide protection to the public, workers, and the environment.

Discussion:

Defense-in-depth is the use of multiple levels of protection to compensate for potential human and mechanical failures which could result in the release of radioactive material. Defense-in-depth as an approach to radioactive waste management safety has precedent in nuclear safety philosophy. The requirements analysis conducted to develop the requirements in DOE O 435.1 and DOE M 435.1-1 employed the defense-in-depth philosophy as a fundamental approach to hazard control for radioactive waste management facilities and operations even though they do not pose the catastrophic accident potential associated with nuclear power plants. In keeping with the performance-oriented approach to the development of DOE M 435.1-1, there is no requirement to demonstrate a minimum number of layers of defense-in-depth. However, evaluating and justifying that defense-in-depth is appropriate at a given facility is necessary for establishing a safety basis and/or a radioactive waste management basis. Operators of radioactive waste management facilities should use the rigorous application of defense-in-depth thinking in their designs and operations. Such an approach is representative of industrial operations with an effective commitment to public and worker safety and the minimization of environmental releases.

Implementing defense-in-depth can include use of both administrative and design controls. Administrative controls include plans (e.g., program management, emergency response, and characterization), training and qualification requirements, written procedures, safety reviews, quality assurance programs, evaluations, authorization bases, waste acceptance criteria, waste certification, and other actions. Design controls include secondary confinement, leak detection, environmental monitoring, backups to critical systems, and other engineered barriers or

redundancies. The degree to which defense-in-depth is implemented (i.e., graded approach) needs to be commensurate with the risk that the facility or operation poses to workers, the public, or environment.

Most radioactive waste management facilities, operations, and activities typically have defense-in-depth. The first layer of defense is a high level of design quality that ensures important systems, structures, and components will perform their required functions reliably. The next layer of defense is administrative controls such as training and written procedures. The final measure of protection is emergency response actions to minimize consequences of a given event for releases that might occur despite the other layers of defense.

> *Example: A low-level waste storage facility is authorized to store 100 55-gallon drums of solid waste. However, the low-level waste acceptance criteria allows up to 5 percent liquid by volume. Thus the liquid that could be released from a single drum is 2.75 gallons, or 275 gallons for the entire inventory of drums. Historical operational data indicate that failure of a drum can occur as often as five times per year for a 100 drum inventory. However, historical data support that the likelihood of failure of all 100 drums is near zero. Using the graded approach facility personnel determine that spill controls need to be implemented for a spill the size of less than 15 gallons and not the entire inventory of liquid of 275 gallons. Additional layers of defense-in-depth (other than the spill controls) include personnel training, container inspections, waste acceptance criteria, and an emergency response plan.*

DOE Standard DOE-STD-3009-94 provides further discussion on the use of safety-significant structures, systems, and components as contributors to defense-in-depth for DOE nonreactor nuclear facilities.

Compliance with this requirement is demonstrated by documentation in the radioactive waste management basis that describes and provides a rationale for the layers of controls (defense-in-depth) in place to provide the protection for the public, workers, and the environment.

Supplemental References:

1. DOE, 1994. *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*, DOE-STD-3009-94, U.S. Department of Energy, Washington, D.C., July 1994.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(10) Oversight. Ensuring oversight of radioactive waste management facilities, operations, and activities is conducted. Oversight shall ensure radioactive waste management program activities are conducted in accordance with a radioactive waste management basis and meet the requirements of DOE O 435.1, *Radioactive Waste Management,* and this Manual.

Objective:

The objective of this requirement is to ensure Field Element oversight of radioactive waste, management facilities, operations, and activities is carried out.

Discussion:

A key to successful compliance with any DOE Directive is oversight. This is particularly true of directives which, like DOE O 435.1 and DOE M 435.1-1, have performance-oriented requirements that call for review and approval of site- or facility-specific implementation of procedures and other controls to ensure the requirements are being met. Oversight is defined (DOE M 435.1-1, Attachment 2) as:

> The responsibility and authority assigned to line management to assess the adequacy of DOE and contractor performance. Independent Oversight refers to the responsibility and authority assigned to the Assistant Secretary for Environment, Safety, and Health to independently assess the adequacy of DOE and contractor performance.

The DOE Complex has initiated the integrated Safety Management System under Secretarial policies DOE P 450.4, *Safety Management System Policy*, DOE P 450.5, *Line Environment, Safety, and Health Oversight*, and DOE P 411.1, *Safety Management Functions, Responsibilities, and Authorities Policy*. These policies are invoked by DOE M 435.1-1, I.1.E.(17) for the purposes of emphasis and clarity. DOE P 450.4 provides the overall goals and objectives of the DOE integrated Safety Management System. Core function No. 5, "Provide Feedback and Continuous Improvement," calls for a system of evaluations and reporting in order to continuously improve in achieving the goals and requirements for safety and protection of the environment. DOE P 450.5 explains that line management has the responsibility for oversight of DOE facilities, operations, and activities, including those involving management of radioactive waste.

DOE G 450.4-1, *Integrated Safety Management System Guide, Revision 0*, contains guidance on Core Function No.5. Included with this guidance is Appendix D, which references other DOE publications and handbooks for conducting environmental audits and other types of assessments that can be conducted during self-assessments or which can be used by line management or parties with independent oversight responsibilities to conduct oversight assessments of contractor work performance. The guidance in DOE G 450.4-1, *Integrated Safety Management System Guide, Revision 0*, is sufficient guidance on oversight of radioactive waste management facilities, operations, and activities.

It is expected that the revised requirements of DOE O 435.1 and DOE M 435.1-1 will be incorporated into the contractor self-assessments established under the integrated Safety Management System, and incorporated into the Field Office oversight of the contractor programs, as appropriate. Similarly, under the Safety Management System policies, Headquarters line management has the responsibility to monitor the Field Office oversight and participate in Field Office oversight functions, as appropriate. Likewise, under the Safety Management Systems policies, the Assistant Secretary for Environment, Safety, and Health (EH-1) has the responsibility to assess the adequacy of Field Office and contractor performance, and it is expected that the revised DOE O 435.1 and DOE M 435.1-1 requirements will be assimilated into the Assistant Secretary's programs for independent oversight at his/her discretion.

Compliance with this requirement is demonstrated by appropriate incorporation of DOE O 435.1 and DOE M 435.1-1 requirements within the functions, responsibilities, authorities, and requirements explained in the set of Safety Management System directives. This should result in thorough and effective oversight of radioactive waste management facilities, operations, and activities, and assurance that the public, workers, and the environment are protected from the hazards associated with management of radioactive waste.

Supplemental References:

1. DOE, 1997. *Safety Management Functions, Responsibilities, and Authorities Policy*, DOE P 411.1, U.S. Department of Energy, Washington, D.C., January 28, 1997.

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

3. DOE, 1997. *Line Environment, Safety and Health Oversight*, DOE P 450.5, U.S. Department of Energy, Washington, D.C., June 26, 1997.

4. DOE, 1997. *Manual of Safety Management Functions, Responsibilities, and Authorities*, DOE M 411.1-1, U.S. Department of Energy, Washington, D.C., October 8, 1997.

5. DOE, 1992. *Environmental Audit Program Guidance*, DOE/EH-0232, U.S. Department of Energy, Washington, D.C., January 1992.

6. DOE. *Performance Objective and Criteria for Conducting DOE Environmental Audits*, DOE/EH-0229, U.S. Department of Energy, Washington, D.C.

7. DOE, 1999. *Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 98-1, Department of Energy Plan to Address and Resolve Safety Issues Identified by Internal Independent Oversight*. U.S. Department of Energy, Washington, D.C., March 10, 1999.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(11) Training and Qualification. Ensuring that a training and qualification program is implemented for designated radioactive waste management program personnel, and the training is commensurate with job duties and responsibilities. Only those personnel who have been trained and qualified shall design or operate safety (safety class and safety significant) structures, systems, and components.

Objective:

The objective of this requirement is to ensure that Field Element Managers establish the process and criteria for designating personnel that should be trained on the management of radioactive waste and establishing the appropriate level of training for those individuals.

Discussion:

It is the responsibility of the Field Element Manager to ensure a program is in place that includes a process for designating those field personnel for which a training and/or qualification program is required, and a process, for establishing the appropriate training and level of rigor for those personnel designated to be trained or qualified.

The selection, qualification, and training requirements for personnel involved in the operation, maintenance, and technical support of DOE-owned nonreactor nuclear facilities is contained in DOE 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*. The requirements for establishing, implementing, documenting, and evaluating training programs for Federal employees is contained in DOE O 360.1, *Training*. These two DOE Orders are invoked by DOE M 435.1-1, Section I.1.E.(19), and are emphasized here only as an indication of the importance of training to the successful implementation of the requirements in DOE O 435.1 and DOE M 435.1-1.

The Technical Qualification Program specified in DOE O 360.1 is required of DOE Federal technical employees whose position requires them to provide management direction or oversight that could impact the safe operation of a defense nuclear facility. The Technical Qualification Program is an example of the process used to determine that personnel possess the necessary knowledge, skills, and abilities to perform their specific duties and responsibilities. This program (or a similar program) may be specified by the Field Element Manager for a non-defense or nonnuclear related DOE waste management activity.

Use of the National Environmental Education and Training Center of Excellence (A. Alm memorandum, January 30, 1998) ensures DOE takes a corporate approach to optimizing and standardizing environmental training across the complex. The Center assesses training needs and develops and provides training courses on crosscutting environmental management topics. The Field Element Manager can use this resource in fulfilling the training needs of radioactive waste management personnel.

The second part of this requirement pertains to those personnel designing or operating safety (safety class and safety significant) structures, systems, and components. The hazards analysis conducted for preparation of DOE O 435.1 and DOE M 435.1-1 indicated a weakness in the design process that could lead to moderate or high hazard conditions if design personnel were not adequately trained and qualified. DOE 5480.20A does not have a requirement for personnel designing safety significant/safety class components to be qualified. Note that this requirement is targeted to design authority personnel and does not apply to design agency personnel.

Compliance with this requirement can be demonstrated by documentation that a Technical Qualification Program or similar personnel training process has been used to ensure that radioactive waste management personnel are sufficiently trained to perform these duties.

Supplemental References:

1. Alm, A., 1998. A. Alm to Distribution, memorandum, *Environmental Management Training Policy*, U.S. Department of Energy, Washington, D.C., January 30, 1998.

2. DOE, 1994. *Personnel Selection, Qualification and Training Requirements for DOE Nuclear Facilities*, U.S. Department of Energy, Washington, D.C., November 15, 1994.

3. DOE, 1995. *Training*, U.S. Department of Energy, Washington, D.C., May 31, 1995.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(12) As Low As Reasonably Achievable (ALARA). Ensuring ALARA principles for radiation protection are incorporated when reviewing and approving radioactive waste management activities.

Objective:

The objective of this requirement is to emphasize implementation of the ALARA process in the management of radioactive waste.

Discussion:

A hazards analysis was conducted as part of the process for developing DOE O 435.1 and DOE M 435.1-1. In that analysis, there were many functions and activities with the potential for personnel exposure to radioactivity and radioactive releases to the environment. Application of the ALARA process was found to be a mitigating factor for these circumstances. ALARA means "As Low As is Reasonably Achievable," which is the approach to radiation protection to manage and control exposures (both individual and collective) to the work force and to the general public to as low as is reasonable, taking into account social, technical, economic, practical, and public policy considerations. ALARA is not a dose limit but a process which has the objective of attaining doses as far below the applicable limits as is reasonably achievable.

An underlying principle of radiation control is that there should be no exposure to workers or the public, or releases to the environment of ionizing radiation without the expectation of an overall benefit from the activity causing the exposure or release. This principle advocates the use of administrative and design controls in work processes to minimize exposures to radiation. These controls are incorporated into the radioactive waste management system from initial design through operation. The fundamental outcome the ALARA process seeks to achieve is an absolute balance between detriment and benefit. Approved ALARA programs which provide the frame work for making ALARA determinations are probably in place for radioactive waste management facilities. The purpose of this requirement is to reinforce this concept. The ALARA process must be incorporated into all radioactive waste management activities. Line management involvement and accountability at the highest levels must be maintained. The governing directives on implementing an ALARA process, 10 CFR Part 835 *Occupational Radiation Protection* and DOE 5400.5 *Radiation Protection of the Public and the Environment,* have been previously noted in DOE M 435.1-1, Section I.1.E. under Applicability of Other Regulations and DOE Directives.

DOE waste management operations are to be conducted so that radiation exposures to workers and members of the public are maintained as far below regulatory limits as possible, and releases to the environment are minimized, commensurate with sound economics and operating principles. ALARA requires judgment with respect to what is reasonably achievable. Factors that relate to societal, technological, economic, and other public policy considerations are evaluated in making such judgments. Integration of this process into radioactive waste work plans with continuous feedback for improvement are essential to achieving the goal of ALARA and thus protecting the worker, public and the environment. Additional guidance may also be found in the *Implementation Guide for Use With Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection.*

> *Example: At a DOE site, an analysis of data on doses to maintenance workers at a radioactive waste treatment facility shows that doses rose rapidly after four hours in a radiation area. This was attributed to worker fatigue, since work in radiation areas requires extra caution and concentration, when compared with work in non-radiation areas. Additionally, this fatigue factor causes tasks performed after four hours to take disproportionately longer exposing the workers to the radiological environment longer and is compounded by their being less efficient than they are in the first four hours. The net result is more exposure with less productivity during the second four hours. Limiting work in radiation areas to four hours and alternating maintenance workers between radiation and nonradiation areas contributes to achieving ALARA where all other factors are equal.*

Compliance with this requirement is demonstrated by documented analyses showing the application of the site's approved ALARA process to the planning for the construction modification, operation, and closure of radioactive waste management facilities, operations, and activities.

Supplemental References:

1. DOE. *Occupational Radiation Protection,* 10 CFR Part 835, U.S. Department of Energy, Washington, D.C., November 1998.

2. DOE, 1994. *Implementation Guide for Use with Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection,* G-10 CFR Part 835/B1-Rev.1, U.S. Department of Energy, Washington, D.C., November 1994.

3. DOE, 1990. *Radiation Protection of the Public and the Environment,* DOE 5400.5, U.S. Department of Energy, Washington, D.C., February 8, 1990.

4. DOE, 1990. *Department of Energy (DOE) Radiological Control Manual*, DOE/EH 0256, U.S. Department of Energy, Washington, D.C., October 30, 1990.

5. DOE, 1997. ALARA Training for Technical Support Personnel, DOE-HDBK-1110-97, U.S. Department of Energy, Washington, D.C., 1997. (This document is available from the Radiation Safety Training home page, http://tis-nt.eh.doe.gov/wpphm/rst/rst.html.)

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(13) Storage. Ensuring all radioactive waste is stored in a manner that protects the public, workers, and the environment in accordance with a radioactive waste management basis, and that the integrity of waste storage is maintained for the expected time of storage and does not compromise meeting the disposal performance objectives for protection of the public and the environment when the waste is disposed.

Objective:

The objective of this requirement is to properly store radioactive waste by providing for containment of the waste during storage, protecting the ability of packages to maintain containment, and ensuring waste is handled in storage in a way that facilitates proper disposal and contributes to the long-term performance of the disposal facility.

Discussion:

During the development of DOE O 435.1 and DOE M 435.1-1, the storage of radioactive waste was identified as an activity that presented potential risk to the public, workers, and the environment. Numerous weaknesses and conditions were identified during the safety and hazards analysis conducted in support of the Manual documentation. In addition, previous reviews of radioactive waste storage conditions and management practices (e.g., *Complex-Wide Review of DOE's Low-Level Waste Management ES&H Vulnerabilities)* revealed inadequately or improperly stored waste, which presents the possibility of human exposure to radiation and the potential for adverse environmental effects.

The evaluations of storage that were conducted during development of the Order and Manual revealed a variety of current practices, desired end-states, and required lengths of storage among DOE's radioactive waste types. For instance, high-level waste has been in storage, and will remain in storage, for an indefinite period of time in many different forms (liquids in tanks, calcine in vessels, vitrified forms in canisters). Transuranic waste has been stored in many locations in dense-pack, until disposal capacity at WIPP was available. Low-level waste is planned for short term storage, unless unforeseen circumstances require otherwise. Besides these differences, in storage times, there are differences in the radiological and chemical hazards posed by storage of the waste types. Because of these differences, there are numerous waste-type specific storage requirements that must be met to maintain safe storage. The general requirement is performance based and states that storage must protect public, workers, and the environment. Waste packages must be maintained during the storage period, and DOE must ensure that nothing occurs to the

waste or waste packages that is detrimental to the final disposal of the waste or to meeting the disposal performance objectives of DOE M 435.1-1.

Integrity of Waste Packages. An essential element of proper storage of radioactive waste is the assurance that the waste is adequately contained in waste packaging and the package is protected from conditions that could cause it to degrade. Degradation could lead to failure and result in the spread of contaminated materials, leading to worker, public, or environmental exposure. It could also result in non-acceptance by a receiving facility.

Radioactive waste storage facilities should establish waste package design, inspection and corrective action programs to ensure that package integrity is maintained throughout the storage period. The inspection and corrective action program should evaluate storage conditions and eliminate conditions that could lead to package failure.

> *Example: Bulk contaminated soil and debris was packaged in untreated wooden boxes and stored outside. Inspection of the storage area revealed that the boxes degraded to the point that they no longer provide proper containment of the waste. The corrective action included repackaging the waste and storing the waste packages in a protected area.*

Periodic radiation and contamination surveys of storage areas and waste package should be performed to provide an indication of waste package integrity and ensure worker protection. It is not advisable to conduct inspections or surveys at a frequency or within a proximity that may lead to unnecessary exposure. As Low As Reasonably Achievable (ALARA) practices should always be considered during radioactive waste storage. Detailed guidance on monitoring of radioactive waste storage is discussed for high-level waste (Section II.T), transuranic waste (Section III.Q), and low-level waste (Section IV.R).

New radioactive waste storage facilities should be designed, constructed, and operated so that the minimum amount of residual radioactive material that requires cleanup prior to closure remains in the facility. Consideration should be given to facility design to meet other potential requirements. For example, mixed radioactive waste must be stored in facilities that meet RCRA storage requirements. Therefore, the facility should be designed to accommodate storage of RCRA wastes. For facilities storing liquid radioactive waste, the facility should be designed to allow liquid level, waste volume, and significant tank chemistry parameters, to be monitored.

Support Meeting Disposal Objectives. Storage of radioactive waste is usually done to facilitate future disposal of the waste. Disposal options may not be immediately available and long periods of storage may be required. Storage systems should be designed to last significantly longer than the anticipated need for capacity to allow for unexpected delays. The optimization of storage periods and storage conditions, with the waste and the waste packaging should be performed, as

part of the Site-Wide Radioactive Waste Management Program required in Section I.2.F. of this guidance.

> *Example: The need exists to store a certain radioactive waste stream that has no identified path to disposal. An analysis is performed by the Site-Wide Radioactive Waste Management Program to determine the probable storage period and all other requirements for a potential storage facility. An acceptable storage location is identified that meets all the storage facility requirements and is compatible with the waste package and the anticipated storage period for the waste.*

Particular consideration should be given to the design and operation of storage facilities to meet the eventual requirements of the disposal facility. Thus, maintaining the certified status of waste that is already certified for disposal, and protecting the waste from conditions, either man-made or natural, that would change the certification status and the acceptance of waste at the disposal facility is essential. (Further guidance on certification of waste and maintaining certification status of waste is in the guidance for each of the waste type chapters.) For waste that will be in storage for a short period, this may not require much additional effort. For waste that remains in storage for longer than anticipated, this could be quite challenging. Storage facilities should have the capability of differentiating between waste that is already certified to a disposal waste acceptance criteria and managing it appropriately.

Compliance with this requirement is demonstrated if the public, the workers, and the environment are protected from radioactive waste in storage while maintaining complete waste package integrity during the entire storage period plus that period of time necessary to facilitate proper disposal. As discussed above, each waste type chapter contains numerous specific storage requirements, and meeting those requirements is essential in achieving the desired safe storage that is the objective of this requirement. Additional information on the waste-type specific storage requirements is contained in the guidance on Chapter II, *High-Level Wastes;* Chapter III, *Transuranic Waste*; and Chapter IV, *Low-Level Waste*.

Supplemental References: None.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(14) Treatment. Ensuring all radioactive waste requiring treatment is treated in a manner that protects the public, workers, and the environment and in accordance with a radioactive waste management basis.

Objective:

The objective of this requirement is to ensure that when radioactive waste treatment technologies are utilized, they provide the necessary protection to the public, workers and the environment from treatment operations and from the resulting treated waste.

Discussion:

During the development of DOE O 435.1 and DOE M 435.1-1, the treatment of radioactive waste was identified as an activity that presented potential risk to the public, workers, and the environment. Numerous weaknesses and conditions were identified that required controls during the safety and hazards analysis conducted in support of the Manual documentation. As with the other major functions that were evaluated (i.e. generation, storage, and disposal), most of the weaknesses and conditions were found to be already covered by controls in numerous DOE Directives and external regulations, especially those concerning safety during operations. In addition, the analysis also confirmed that, although treatment is a separate management step taken with waste and was evaluated as a distinct function, disposal technologies and requirements are the primary driving force behind the need for treatment and the type of treatment. Except for some hazardous waste requirements based on RCRA, (e.g., certain constituents must be destroyed), the desire for an improved waste form behavior after disposal is usually the reason for treating waste. There may also be a need for reduced volumes to minimize the amount of disposal capacity utilized, but this is likewise, a disposal requirement driving the need for treatment. Additionally, the hazards and requirements analysis resulted in identifying characteristics of radioactive waste that are unsuitable for long-term storage. These wastes require treatment prior to their acceptance for storage.

Thus, the controls that must be implemented at a treatment facility in addition to those concerning operations address the waste forms resulting from the treatment process. Several objectives may be achieved through treatment such as enhancing the waste form, rendering waste suitable for storage, reducing disposal waste volumes, minimizing the number of transportation shipments, enhancing the monitorability of waste disposal facilities, or minimizing the long-term risks to the public and the environment from waste disposal. This requirement basically forms an umbrella performance-oriented requirement that requires that treatment technologies used must protect the

public, workers, and the environment. The treatment and waste form requirements in each of the specific waste-type chapters must also be complied with to treat radioactive waste successfully in accordance with DOE O 435.1 and DOE M 435.1-1.

Compliance with this requirement is demonstrated by the issuance of a radioactive waste management basis for a treatment facility that demonstrates that the public, workers, and the environment will be protected from the hazards inherent in the treatment facility. The radioactive waste management basis will ensure that waste form requirements for the resultant treated waste will be met in addition to the safety and environmental protection objectives of this requirement.

Specific requirements for treatment are in Chapter II, *High-Level Waste;* Chapter III, *Transuranic Waste*; and Chapter IV, *Low-Level Waste* of the Manual. Guidance on those requirements can be found in the sections of this document corresponding to the treatment requirements for each waste type.

Supplemental References: None.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(15) Disposal. Ensuring radioactive waste is disposed in a manner that protects the public, workers, and the environment and in accordance with a radioactive waste management basis. Reviewing specific transuranic or low-level waste documentation including the performance assessment and composite analysis, or appropriate CERCLA documentation, prior to forwarding them to Headquarters for approval, and obtaining and ensuring the facility is operated in accordance with the disposal authorization statement. Conducting performance assessment and composite analysis maintenance.

Objective:

The objectives of this requirement are to ensure that: (1) transuranic waste is disposed so there is a reasonable expectation that the disposal standards in 40 CFR Part 191 will be met; (2) and low-level waste is disposed so that there is a reasonable expectation that the performance objectives of Chapter IV of DOE M 435.1-1 will be met. The objectives are also to ensure that the performance assessment for a transuranic waste disposal facility and the performance assessment and composite analysis for a low-level waste disposal facility are technically adequate, logical, complete, and defensible for establishing the controls on disposal of waste for protection of the public, and the environment into the future. Lastly, the objectives are to ensure that data are collected and studies conducted to verify these analyses and that they are updated whenever necessary.

Discussion:

The safety and hazard analysis for management of radioactive waste that was conducted to develop the essential requirements for DOE O 435.1 and DOE M 435.1-1 indicated that disposal is a critical activity requiring controls because disposal is the last function in managing waste, yet the potential hazards from radioactive waste continue into the future. There are specific requirements for disposal of radioactive waste included in the DOE M 435.1-1 to ensure the protection of the public, workers, and environment. The analyses conducted in the performance assessment for a transuranic or a low-level waste disposal facility, and the composite analysis for a low-level waste disposal facility, are critical in determining the nature and extent of the controls that need to be put in place. The review and approval of these evaluations is important for the management of radioactive waste to ensure it is being conducted safely and effectively. This responsibility is placed with senior management in the Office of Environmental Management (see Section I.2.E.(1)).

Even more important is the implementation of the controls that are deemed necessary as a result of these evaluations. The radioactive waste management basis is intended to coordinate implementation of the necessary controls for disposal of radioactive waste, the performance assessment and composite analysis, and related documents that are based on the evaluations in them (e.g., waste acceptance). These analyses and the controls derived from them form the core of the radioactive waste management basis for a disposal facility. Additional guidance can be found in the guidance on the requirement for a Radioactive Waste Management Basis (Section I.2.F.(2)).

DOE M 435.1-1 gives the Field Element Manager responsibility for disposing of radioactive waste safely, reviewing the performance assessment (and composite analysis if applicable) for radioactive waste disposal facilities under his/her authority, submitting the evaluations to Headquarters for review and approval, and ensuring that the evaluations in the performance assessment and composite analysis are maintained. The discussions that follow provide guidance on the above requirement for review of the documents and submittal to Headquarters. DOE M 435.1-1, Section I.2.E.(1) contains the requirements of Headquarters for review and approval of the performance assessment and composite analysis. In order to achieve the safe disposal of waste, the Field Element Manager is responsible for implementing the controls in the radioactive waste management basis documentation, which includes the performance assessment, composite analysis, and disposal authorization statement.

Disposal of Transuranic Waste (not at WIPP). In cases where the Department disposes of transuranic waste in a facility other than WIPP (e.g., Greater Confinement Disposal at the Nevada Test Site), the Department is currently responsible for determining compliance with 40 CFR Part 191, and ensuring the transuranic waste is disposed of safely. The requirement includes the responsibility for ensuring safe disposal of transuranic waste disposed at a facility other than WIPP, and reviewing performance assessments for any transuranic waste disposal facility, including WIPP, before submittal to Headquarters. Since performance assessment is defined, and the requirements for compliance and what must be included in a performance assessment for a transuranic waste disposal facility are fully discussed in 40 CFR Part 191, the transuranic waste chapter only contains reference to the 40 CFR Part 191 standards, with no additional minimum requirements for disposal. Guidance on the transuranic waste disposal requirements at Section III.P should be consulted for additional discussions.

Safe and Environmentally Sound Disposal of Low-Level Waste. DOE M 435.1-1 contains requirements that must be met for the siting, design, operations, closure, and maintenance of DOE low-level waste disposal facilities. Achieving the goals of protecting the public, workers, and the environment from the potential hazards of disposal of low-level waste requires linking the functions of design, siting, operation, closure, and maintenance to the performance assessment objectives of DOE M 435.1-1, Section IV.P.(1), taking into consideration the waste and radionuclides to be disposed. It is the Field Element Manager's responsibility to link these critical

functions for control of low-level waste disposal facilities to the performance assessment and composite analysis evaluations, and to determine the level of controls within each of these functions that need to be imposed to continue to achieve the low-level waste disposal facility performance objectives. This responsibility is embodied in the concept of a radioactive waste management basis for a disposal facility. The linkage between the controls on these operational functions of the disposal facility and the evaluations in the performance assessment and composite analysis forms the critical components of the radioactive waste management basis for the facility. An important aspect of this linkage is the incorporation of changes in disposal facility operations, closure, monitoring, waste acceptance criteria, or other low-level waste management functions by the implementation of the conditions spelled out in the disposal authorization statement from Headquarters.

> *Example: The Field Element Manager for the Site R Low-Level Waste Disposal Facility approves the radioactive waste management basis for the disposal facility. He has thoroughly reviewed the performance assessment, disposal authorization statement, preliminary closure and monitoring plans, quality assurance plan, performance assessment maintenance procedure, and training manual. He also has a thorough understanding of the relationship of the controls described in the procedures and manuals, and of the results of the evaluation explained in the performance assessment and the conclusions of Headquarters documented in the disposal authorization statement.*

Section IV.P. contains the detailed requirements for disposal of low-level waste, and design, siting, maintenance, closure, and operations of a low-level waste disposal facility. More discussion on safe disposal of low-level waste, and the link between disposal operational functions and the performance assessment, composite analysis, and the disposal authorization statement, appears in the guidance on Chapter IV.

Reviewing and Submitting Low-Level Waste Performance Assessments and Composite Analyses. It is the responsibility of the Field Element Manager to submit the performance assessment and composite analysis to Headquarters for review. Chapter IV of the DOE M 435.1-1 contains the detailed requirements for performance assessments and composite analyses for a low-level waste disposal facility. More guidance appears on this subject in the guidance on Chapter IV. DOE G 435.1-1, *Format and Content Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses* (under preparation), will provide details on the format and content of performance assessments and composite analyses. Preparers need to follow that guidance document to ensure that complete information is included.

Prior to submitting these documents to Headquarters for review, the Field Element Manager reviews them to ensure they are complete and consistent with planned disposal facility operations and use. An independent organization or group may review these documents to assist the Field Element Manager in ensuring that all manual requirements identified have been properly

addressed. This review process will ensure that once the document is submitted to DOE Headquarters it will not be determined to be deficient in content. It also enables the responsible organization to obtain an independent opinion on the technical adequacy and defensibility of the information presented.

> *Example: Prior to submittal to Headquarters for review and approval, the performance assessment and composite analysis are reviewed against the Standard Format and Content Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses by two former members of the DOE Peer Review Panel, funded by the appropriate Field Element Manager. Consideration of their comments results in a more complete and technically defensible evaluation.*

The performance assessments and/or composite analyses are submitted to the Deputy Assistant Secretary for Waste Management, unless the facility being evaluated is an onsite low-level waste management unit being developed under CERCLA. In the case of a CERCLA onsite low-level waste management facility, documentation including a crosswalk from CERCLA to DOE O 435.1 (see Section I.2.E) and a separate composite analysis if one is prepared, are submitted to the Deputy Assistant Secretary for Environmental Restoration. For CERCLA onsite low-level waste management facilities, the *Standard Format and Content Guide,* DOE G 435.1-1, should be consulted and implemented in the development of the CERCLA documentation to ensure that adequate analysis is included to demonstrate compliance with the DOE O 435.1 and DOE M 435.1-1 (see guidance on DOE M 435.1-1, Section I.2.F.(5)).

Low-Level Waste Performance Assessment and Composite Analysis Maintenance. Once authorized to operate, a low-level waste disposal facility may be in operation for many years. Uncertainties may exist in certain aspects of the technical decisions when assumptions were made during the performance assessment and the composite analysis. Additionally, information about waste receipts and knowledge concerning the disposal facility environs could change. Therefore, DOE M 435.1-1 requirements include maintaining the performance assessment and composite analysis through regular collection of data and studies designed to reduce uncertainties, and a regular schedule of evaluations to update the analysis. It is the responsibility of the Field Element Manager to ensure these requirements are carried out. DOE M 435.1-1 Chapter IV contains the detailed requirements for maintenance of the performance assessment and composite analysis for a low-level waste disposal facility. Also, DOE G 435.1-3, *Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses* (under preparation), will provide guidance on performing the critical function of keeping these important analyses updated.

> *Example: The Field Element Manager with responsibility over a low-level waste disposal facility at Site A issues a procedure, in accordance with Site A Manual WM-100-5, mandating performance assessment and composite analysis maintenance that*

follows the guidance in DOE G 435.1-3, Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses.

Compliance with this requirement is demonstrated through the low-level waste disposal facility documentation, that shows the siting, design, operation, closure, and maintenance of the facility are linked to the evaluations in the performance assessment and composite analysis, and that these documents have been properly submitted to Headquarters for review in accordance with guidance in DOE G 435.1-1, *Format and Content Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses*. Additionally, the documentation demonstrates that a program/process has been put in place for conducting performance assessment and composite analysis maintenance in accordance with DOE 435.1-3, *Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses*.

Supplemental References:

1. DOE, 1999. *Format and Content Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses* (in preparation), DOE G 435.1-1, U.S. Department of Energy, Washington, D.C., 1999.

2. DOE, 1999. *Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses.* (in preparation), DOE G 435.1-3, U.S. Department of Energy, Washington, D.C., 1999.

3. EPA, 1985. "Final rule; 40 CFR Part 191, Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," *Federal Register*, Vol 50, No. 182, U.S. Environmental Protection Agency, Washington, D.C., September 19, 1985.

4. EPA, 1993. "Final rule; Environmental Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," *Federal Register*, Vol. 58, No. 242, U.S. Environmental Protection Agency, Washington, D.C., December 20, 1993.

5. DOE, 1996. *Interim Format and Content Guide, and Standard Review Plan for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments,* U.S. Department of Energy, Washington, D.C., October 1996.

6. DOE, 1996. *Maintenance of US Department of Energy Low-Level Waste Performance Assessments*, U.S. Department of Energy, Washington, D.C., September 1996.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(16) Monitoring. Ensuring monitoring is conducted for all radioactive waste management facilities as required. Ensuring that disposal facilities are monitored, as appropriate, for compliance with conditions of the disposal authorization statement.

Objective:

The objective of this requirement is to ensure that all monitoring is conducted as required, including monitoring of storage, treatment, and disposal facilities with respect to key parameters and conditions of their authorization statements.

Discussion:

The safety and hazard analysis identified that monitoring for releases of radiation and radioactive material to the environment was an especially important mitigating factor for potential weaknesses and conditions in radioactive waste management. The requirements analysis concluded that the environmental monitoring programs and plans, as required by DOE 5400.1, *General Environmental Protection Program;* and DOE 5400.5, *Radiation Protection of the Public and Environment*, implemented monitoring that would address the kinds of concerns evaluated in the analysis.

However, monitoring of disposed radioactive waste, because it must remain effective for a long time period following cessation of operations, presents a unique challenge. Additional monitoring of low-level waste disposal facilities is addressed in DOE M 435.1-1, Section IV.R. Implementation guidance for those requirements should be consulted for information on incorporating additional low-level waste disposal facility performance monitoring into the environmental monitoring program and plans already required to be in compliance with the subject DOE Orders on environmental monitoring.

Additionally, while the general environmental monitoring program and the environmental monitoring plans mandated by these DOE Orders are adequate for most circumstances, they were judged to not be sufficient in requiring identification of specific warning signs of impending conditions that would lead to releases, especially for storage of liquid low-level waste. DOE M 435.1-1, Sections IV.R.(1) and IV.R.(2) address these aspects of additional monitoring for low-level waste facilities. Also, the environmental monitoring requirements did not sufficiently address monitoring of the performance of a low-level waste disposal facility, for identification of specific signs that assumptions made in evaluations of the facility (i.e., performance assessment)

were incorrect or for warning signs of conditions that should be addressed in a timely fashion to prevent conditions that were not evaluated. DOE M 435.1-1, Section IV.R.(3) addresses additional monitoring needed for low-level waste disposal facilities.

Additionally, through the conduct of safety analyses, whether they are formal safety analysis reports or auditable safety analyses, facility personnel identify the quantity and form of radioactive and/or hazardous material to be handled at the facility and the operations for managing the waste. The safety analysis establishes a basis for defining the acceptable operations envelope for the facility, and provides the basis for technical safety requirements (TSRs). The technical safety requirements may include requirements for monitoring. Review of the safety analysis will determine if the analyses indicate other monitoring that would be prudent.

The DOE M 435.1-1 requirement states that it is the responsibility of the Field Element Manager to ensure that monitoring is conducted for all radioactive waste management facilities as required, including ensuring that disposal facilities are monitored, as appropriate, for compliance with conditions of the disposal authorization statement.

The requirements for monitoring low-level waste disposal facilities are additional requirements beyond the Chapter I requirements which are applicable to all facilities. Site-specific performance assessments and composite analyses are required for all low-level waste disposal facilities by DOE M 435.1-1, Sections IV.P. (2) and (3). These documents have the purpose of evaluating the long-term performance of the disposal facility and providing reasonable assurance that the performance objectives for low-level waste disposal are met. Assessments of the long-term performance of natural systems often have large uncertainties, and include many assumptions of the behavior of natural systems over extended periods of time. The performance assessment and composite analysis of a disposal system identifies these uncertainties and assumptions along with the results. An effective way to verify assumptions, reduce uncertainties, and build confidence in the results and conclusions of the performance assessment and composite analysis is to monitor the performance of the disposal facility.

Thus, the performance assessment and composite analysis are used as primary tools for establishing the monitoring plan to collect data to develop an understanding of the actual performance of the disposal facility. The performance assessment and composite analysis should provide sufficient information to identify the important migration pathways for the transport of radionuclides, primary mobile radiological and chemical constituents, logical monitoring locations, monitoring parameters, and sampling frequencies.

With respect to long-term performance of the low-level waste disposal facility to ensure the performance objectives are met, monitoring data are reviewed periodically against the action levels contained in the monitoring plan (see guidance on DOE M 435.1-1, Section IV.R.(3)(c)). This review is conducted routinely throughout the operational, closure and post-closure periods

of the facility to evaluate the performance of the facility as compared to the results contained in the performance assessment and composite analysis, detect trends in the performance of the facility sufficiently in advance to allow for necessary corrective actions, and to provide justification for changes in the monitoring plan for the facility. Additional guidance on this aspect of monitoring data evaluation is provided with the discussion of Section IV.R.(3)(c).

Compliance with this requirement is demonstrated if monitoring plans are developed, approved, maintained, and implemented throughout the life cycle of the facilities.

Supplemental References:

1. DOE, 1988. *General Environmental Protection Program,* DOE 5400.1, U.S. Department of Energy, Washington, D.C., November 9, 1988.

2. DOE, 1990. *Radiation Protection of the Public and the Environmental,* DOE 5400.5, U.S. Department of Energy, Washington, D.C., February 8, 1990.

3. NRC, 1989. *Environmental Monitoring of Low-Level Radioactive Waste Disposal Facility*, NUREG-1388, U.S. Nuclear Regulatory Commission, Washington, D.C., 1989.

4. NRC, 1983. *Subsurface Monitoring Programs at Sites for Disposal of Low-Level Radioactive Waste,* NUREG/CR-3164, U.S. Nuclear Regulatory Commission (by U.S. Army Corps of Engineers Waterways Experiment Station), Washington, D.C., 1983.

5. DOE, 1990. *Environmental Monitoring for Low-Level Waste Disposal Sites: Low-Level Management Handbook Series*, Revision 2, DOE/LLW-13Tg, U.S. Department of Energy, National Low-Level Waste Management Program, Idaho Falls, ID, 1990.

6. DOE, 1991. *Environmental Regulatory Guide for Radiological Monitoring and Environmental Surveillance*, DOE/EH-0173T, U.S. Department of Energy, 1991.

7. DOE, 1981. *A Guide for Environmental Radiological Surveillance at U.S. Department of Energy Installations*, DOE/EP-0023, U.S. Department of Energy, Washington, D.C., 1981.

8. NRC, 1979. *Quality Assurance for Radiological Monitoring Programs (Normal Operations)--Effluent Streams and the Environment*, Regulatory Guide 4.15, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1979.

9. DOE, 1986. *Experience and Improved Techniques in Radiological Environmental Monitoring at Major DOE Low-Level Waste Disposal Sites*, DOE/LLW-54T, U.S.

Department of Energy, National Low-Level Radioactive Waste Management Program, Idaho Falls, ID, 1986.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(17) Material and Waste Declassification for Waste Management. Ensuring, to the extent practical, radioactive material and waste generated under a program that is classified for national security reasons is declassified or rendered suitable for unclassified radioactive waste management.

Objective:

The objective of this requirement is to reduce unnecessary management costs and maintain national security by ensuring that radioactive material and waste is, as practical, declassified and managed as unclassified waste.

Discussion:

Some radioactive waste is the product of activities that are classified for national security reasons and therefore the waste may require special handling and protection. The waste may be any classified substance regardless of its form, e.g., fabricated or processed items, machinery, or equipment which inherently contains sensitive information. It may be classified for a variety of reasons such as dimensions, configuration, potential for reverse engineering to determine its function, or radionuclide content.

The management of classified radioactive waste could be more costly and difficult than unclassified waste. The Department has an ongoing effort to declassify or sanitize classified material including waste. Declassification of waste was a requirement in the management of transuranic waste in the previous order on Radioactive Waste Management. In reviewing requirements for inclusion in DOE M 435.1-1, it was realized that declassification/sanitization is a sound management practice that needs to be applied across all waste types. Declassification or sanitization of radioactive material that will become waste can enhance efficient and cost effective management of radioactive waste since it allows the Department to avoid the security costs associated with classified material.

Declassification means a determination by an appropriate authority that information, documents, or material no longer require protection against unauthorized disclosure for national security reasons. At one time, many alloys were considered classified, however, as a result of the Department's Openness Initiative, the Director of Security Affairs has determined that some of these alloys no longer require protection as classified information and has declassified them. The information remains the same, but it no longer requires security protection.

In contrast, sanitization means the irreversible modification or destruction of a component or part of a component of a nuclear weapon, device, trainer, or test assembly as necessary to prevent revealing classified or otherwise controlled information. Figure I.2.F.I provides a description of the declassification and sanitization process:

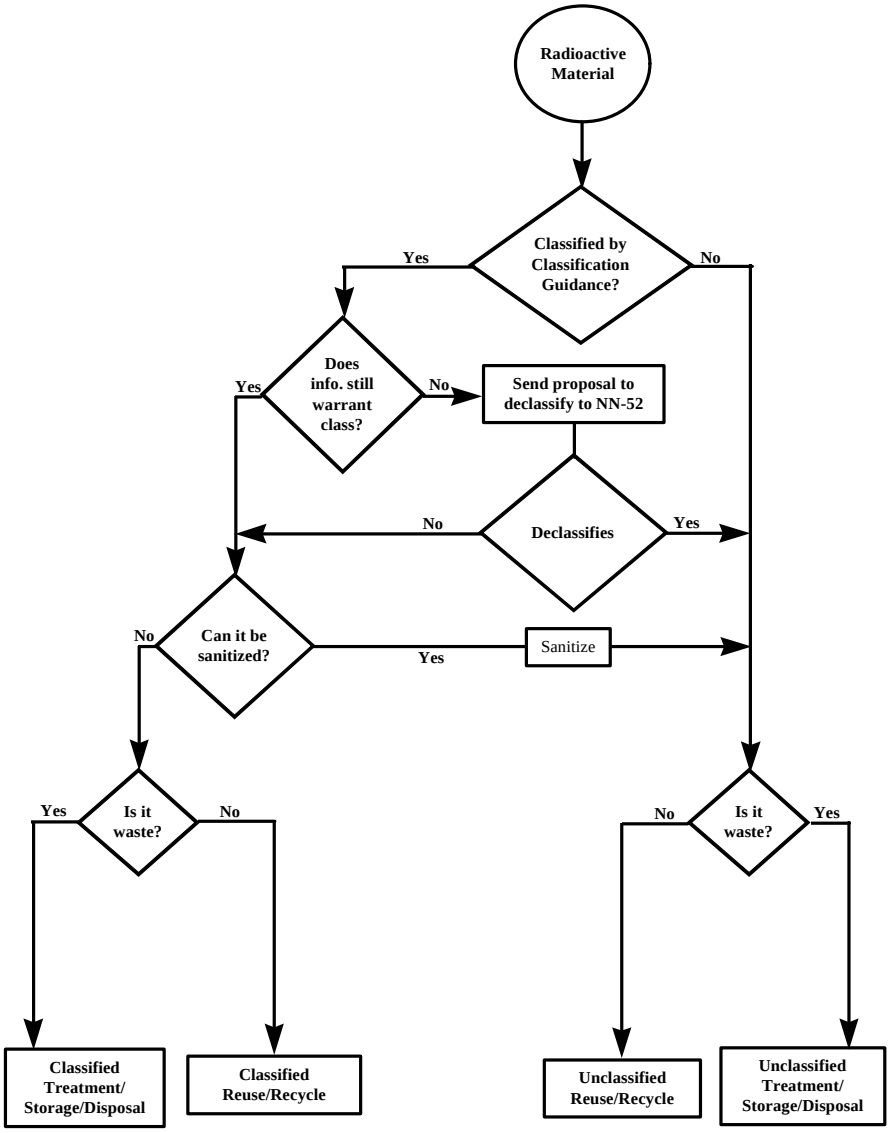

Figure I.2.F.1. Flow Diagram for Declassifying or Sanitizing Material for Waste Management

Example 1: As a result of weapons disassembly, components that are made of a classified alloy have become excess. Some of these components are contaminated by radioactivity. The custodian of the component believes that the alloy no longer warrants protection in the interest of national security. The custodian proposes to the Office of Declassification, that the alloy be declassified. The decision is made that the alloy no longer needs to be classified and it is declassified. The component is handled as unclassified excess material and an evaluation made to determine if it has any future programmatic value. The result of that analysis leads to the conclusion that the components are radioactive waste so they are treated, stored, and disposed without classified controls. Since the alloy has been declassified, future decisions concerning components made of it may be made by a Derivative Declassifier.

Example 2: As a result of weapons disassembly, a component whose shape is classified is being excessed. It can be sanitized by melting it into another shape or by pulverizing it, thus destroying the information that needs to be protected. The component can be handled as unclassified excess material, or if determined to be a radioactive waste, it can be treated, stored, or disposed without classified controls.

Material that is classified and can be declassified or sanitized should be handled in accordance with current classification guidance. However, certain classified material, once it is determined to be of no future programmatic use (i.e., waste), cannot be declassified or sanitized, and thus, is ultimately disposed of in a classified disposal site.

Example: A radioactive material has been determined to be of no future use due to advances in technology and is therefore determined to be a radioactive waste. The characteristics of the radioactive contamination i.e., the level of enrichment, requires protection to preclude revealing sensitive weapons information. As a waste classified which cannot be decontaminated, the waste must be afforded security protection and ultimately disposed of in a classified disposal site.

Classified waste is to be minimized whenever practical to reduce costs and increase efficiency in waste management programs. Decisions to continue to manage a waste as classified need to be based on careful consideration of requirements in the areas of environment, safety and health, safeguards and security, proliferation, and of total cost factors.

If waste can be declassified or economically sanitized, it can be disposed of in conventional facilities not requiring special protection and it avoids the cost of security during transport. Declassifying or sanitizing waste also preserves capacity in classified disposal facilities for that waste that cannot be declassified or sanitized.

Example: A facility has a classified waste. The facility's manager analyzes the options for managing the waste and discovers that it cannot be declassified, but can be sanitized. However, the treatment required in order to sanitize it would equal or exceed the cost of the necessary protections during transportation and disposal of the classified waste, with no increase in the protection of workers, the public, or the environment and no significant reduction in security or proliferation concerns. Therefore, the manager decides that the waste need not be sanitized and that use of a classified disposal facility is appropriate.

Compliance with this requirement is demonstrated by documented determinations that waste has been declassified or sanitized or by documented evaluations that support maintaining the classification for either national security or economic reasons.

Supplemental References:

1. DOE, 1998. *Identifying Classified Information* , DOE M 475.1-1, U.S. Department of Energy, Washington, D.C., May 8, 1998.

2. *Classified National Security Information*, Executive Order 12958, Washington, D.C., April 17, 1995.

I.2.F. Field Element Managers.

Field Element Managers are responsible for:

(18) Waste Incidental to Reprocessing. Ensuring that waste incidental to reprocessing determinations are made by either the "citation" or "evaluation" process as described in Chapter II of this Manual. Ensuring consultation and coordination with the Office of Environmental Management for waste determined to be incidental to reprocessing through the "evaluation" process.

Objective:

The objective of this requirement is to ensure that the processes and responsibilities for making waste incidental to reprocessing determinations are understood and implemented.

Discussion:

As discussed in Section II.B, Waste Incidental to Reprocessing, there are certain waste streams that may be generated during the management of high-level waste that may not have to be managed as high-level waste and therefore can be managed as another type (transuranic or low-level waste). To make such determinations, DOE M 435.1-1 establishes two processes, the citation process and the evaluation process. These are described in detail in Section II.B. In addition, Section II.A, Definition of High-Level Waste, provides assistance in determining whether a waste stream should be classified as high-level waste.

Determinations. To meet the first part of the requirement, the Field Element Manager, or designee, needs to establish a process or method that documents waste incidental to reprocessing decisions. Such a method is required by the evaluation process (see Section II.B.(2)) and is recommended for the citation process, although not required. While the level of formality of the process is left to the discretion of site management, the following elements are considered necessary:

1. Organization and Responsibilities: Identification of the site organizations that are responsible for formulating and approving the determinations.

2. Procedures: The process is formalized in procedures, including a requirement confirming the determination process has been followed correctly.

3. Quality Assurance: The determination process is subject to a quality assurance program that ensures the validity of the information used to make the determinations.

4. Document/Record Control: The principal documents that constitute the documentation of the determination process are controlled and retained.

5. Training: At a minimum, the process requires training of personnel that will implement the process (e.g., procedures, quality assurance program, document control).

The above elements have been recommended by the Nuclear Regulatory Commission (NRC) (Bernero, 1993), and adopted by DOE, as good practices for performing and documenting waste incidental to reprocessing determinations. Invoking existing programs (e.g., quality assurance program) and processes (e.g., document control) to implement the waste incidental to reprocessing determination process is appropriate. Additionally, site management may conclude that instead of making determinations for individual waste streams, it may be cost effective to establish categories of wastes that meet the citation and the evaluation process requirements and therefore avoid a determination for each candidate waste.

> *Example: At Site X, management of the high-level waste tank farm involves periodic sampling and analysis of tank contents. When taking these samples, operations personnel generate job wastes, including protective clothing, work tools, and personnel protective equipment. In implementing the Site's "Citation Determination Process," a determination is made that such job wastes are not high-level waste. The Site's procedures for making citation process (waste incidental to reprocessing) determinations requires that an initial documented determination is necessary for each waste stream. However, following this determination, and with the appropriate documentation and approvals, e.g., a basis for concluding the waste stream meets the citation criteria, similar wastes can be considered to be non-high level waste by inclusion within this determination. Thus, future generation of similar wastes from similar activities do not have to be subjected to the citation determination process if it can be shown that they fit within the existing determination.*

Citation Process. The Field Element Manager, using the process described in Section II.B.(1), is responsible for determining if a waste meets the citation process requirements. While not required, it is recommended that the process described for the evaluation process be implemented for the citation process as well. These elements are considered important to making defensible and consistent citation determinations and would be valuable if such determinations are questioned or challenged.

Guidance for Section II.B.(1), Citation, provides information and examples of the types of wastes and waste streams that have been considered to be non-high-level waste by use of the citation process. However, it is emphasized that these are examples only, and it is the Field Element

Manager's responsibility to make, and defend, citation process determinations. While challenges to these determinations are not expected, prudence suggests that a process similar to that required for the evaluation process (see below) be considered for the citation process by site management. In addition, consultation and coordination with the DOE Office of Environmental Management to support consistent interpretations of citation determinations is encouraged.

Evaluation Process. As noted in the guidance to Section II.B.(2), Evaluation, waste incidental to reprocessing determinations using the evaluation process require the involvement of two organizations: the program (site) management responsible for the management of the high-level waste (includes the Field Element Manager, or designee) and the DOE Office of Environmental Management (DOE EM). In using the evaluation process, the elements described under Determinations above need to be implemented to ensure that the requirements of Section II.B.(2) are met. These requirements are met by the use of good record-keeping practices, with an adequate quality assurance process, and documented to support the determination(s). The documentation is prepared in a manner that defends and supports the conclusions and provides adequate information to support outside organizations' review and approval. During the preparation of the determination package, the Field Element Manager is responsible for ensuring it is coordinated with the Office of Environmental Management, to ensure consistency of evaluation determinations between DOE sites. At the time of the preparation of this guidance the office within the Office of Environmental Management that is responsible for fulfilling this consultation role is the Office of Waste Management.

As discussed in the guidance to Section II.B, it is recommended that groups of waste streams or waste items that have similar characteristics, or will require similar processing/treatment, be grouped within one evaluation process analysis in lieu of preparing/submitting analysis for individual waste streams or waste items. Such grouping is expected to be possible and avoid duplication of preparation and review efforts by Site and the Office of Environmental Management personnel and expedite management of the wastes. In addition, grouping the waste streams promotes the best use of resources at both the DOE site level and the Office of Environmental Management and reduces the number of determinations that need to be processed.

NRC Role in Waste Incidental to Reprocessing Determinations. In September 1998 the DOE General Counsel (Letter, Mary Anne Sullivan to John T. Greeves, NRDC Petition, September 30, 1998) concluded, in response to a Natural Resources Defense Council Petition, that the NRC has no licensing authority over the 51 high-level waste tanks at the Savannah River Site. This conclusion was based on the following summary statement:

> "Section 202(4) of the ERA *(Energy Reorganization Act*) gives the NRC licensing authority over DOE facilities 'authorized for the express purpose of subsequent long-term storage of high level radioactive waste generated by [DOE and its predecessor agencies].' As explained in greater detail in the discussion below, this statutory language, the

> legislative history and governing case law establish that this licensing authority exists only with respect to facilities that are (i) authorized by Congress for the express purpose of long-term storage of HLW and (ii) developed and constructed after the passage of the ERA. None of the SRS tanks have been authorized for the express purpose of long-term storage of HLW and only 18 of the newer tanks were constructed after the passage of the ERA. As a result, NRC has no licensing authority over the SRS tanks."

From this determination DOE has taken the position in DOE O 435.1 and DOE M 435.1-1 that, unless determined otherwise, NRC does not have licensing authority over DOE's current high-level waste tanks and the waste contained in them. While it is acknowledged that similar determinations have not been made for the high-level waste tanks at Hanford, INEEL, and West Valley and that Departmental decisions in the future could change this position, it is believed that the approach defined in the Order and Manual is reasonable for all DOE-managed high-level waste. It should be noted, however, that the *West Valley Demonstration Project Act* specifies a review and consultation responsibility for the NRC which may include oversight of the high-level waste tanks. If this position changes, i.e., it is determined that the NRC has regulatory authority over some of the high-level waste tanks within the DOE complex, the requirements in Sections II.B. and I.2.F.(18) will be revised accordingly.

The Waste Incidental to Reprocessing requirement in Section II.B and the requirement in Section I.2.F.(18) support the position that formal involvement by NRC in making incidental waste determinations is <u>not</u> required. However, NRC involvement as a consultant to Field Offices and Programs on technical issues, is recommended, particularly for those waste streams that are expected to be controversial or contentious with other regulators or stakeholders. The NRC staff has conducted several reviews recently on compliance with criteria similar to the evaluation requirements in Section II.B.(2) and thus possess a level of expertise that is expected to complement the Field Office and DOE Office of Environmental Management reviews.

> *Example: Site X anticipates removing and disposing of many contaminated mixers/pumps and instrument trees from high-level waste tanks in the next few years. Characterization data and past experience in handling and disposing of this equipment indicate that the contamination levels, following decontamination activities, will likely allow these pieces of equipment to be managed and disposed as low-level waste, assuming they can meet the evaluation requirements under the DOE M 435.1-1, Waste Incidental to Reprocessing, Section II.B.(2). Plans over the next three years for removal and disposal of this equipment are reviewed and used to prepare the analysis required by Section II.B.(2). The decision is to use the most conservative (highest) contamination levels expected for this grouping of contaminated equipment for the three-year period to avoid continual preparation/review of separate evaluations. The analysis is prepared and concludes that the evaluation process requirements at Section II.B.(2)(a) 1., 2., and 3., can be met, and therefore, these waste items qualify for management as low-level waste. This analysis is*

prepared under Site X's quality assurance program, is coordinated with the Office of Waste Management, and is reviewed and approved by Site X waste management personnel in accordance with Site X procedures. During preparation of the analysis, the NRC is requested by Site X management to review and provide their position on the adequacy of the performance assessment prepared to meet the requirement in Section II.B.(2)(a)2. Following this review and the Site X's review and acceptance, the Site X High-Level Waste Program Manager approves the determination allowing these wastes, as defined in the determination, to be managed and disposed as low-level waste for the next three years without further review. The analysis and results of the determinations are incorporated into the facility's safety documentation and a copy is provided to the Office of Waste Management.

Compliance with this requirement is demonstrated by developing and implementing a process for documenting waste incidental to reprocessing determinations as specified in Section II.B. Specific to the evaluation process, the documentation includes analysis that supports the conclusions reached, as well as DOE Office of Environmental Management concurrence, that the waste meets the evaluation requirements in Section II.B of DOE M 435.1-1.

Supplemental References:

1. Bernero, 1993. R. Bernero, USNRC, to J. Lytle, DOE-EM, letter, *Hanford Waste Tank Management*, U.S. Nuclear Regulatory Commission, Washington, D.C., March 2, 1993.

2. Paperiello, 1997. C. Paperiello, USNRC, to J. Kinzer, DOE-RL, letter, *Classification of Hanford Low-Activity Tank Waste Fraction*, U.S. Nuclear Regulatory Commission, Washington, DC, June 9, 1997.

3. Sullivan, 1998. Mary Anne Sullivan, DOE General Counsel, to John T. Greeves, Director, Division of Waste Management, USNRC, letter, *Natural Resources Defense Council Petition to Exercise Licensing Authority over Savannah River Site High-Level Waste Tanks*, U.S. Department of Energy, Washington, DC, September 30, 1998.

4. *West Valley Demonstration Project Act*, as amended, October 1, 1980.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(19) Waste with No Identified Path to Disposal. Ensuring a process is developed and implemented for identifying the generation of radioactive waste with no identified path to disposal, and reviewing and approving conditions under which radioactive waste with no identified path to disposal may be generated. Headquarters shall be notified of the decisions to generate a waste with no path to disposal.

Objective:

The objective of this requirement is to bring issues associated with generating waste with no identified path to disposal to the attention of appropriate DOE managers before the waste is generated to resolve the problems that will prevent it from being disposed, to ensure that the waste has appropriate long-term safe storage until it can be disposed, and to minimize the generation of waste with no path to disposal.

Discussion:

The Complex-Wide Review of DOE Low-Level Waste ES&H Vulnerabilities conducted in response to Defense Nuclear Facilities Safety Board Recommendation 94-2 identified storage of low-level waste with no identified path forward to disposal as a major complex-wide vulnerability. DOE M 435.1-1 addresses this vulnerability in several ways. The Safety and Hazards Analysis conducted as part of the preparation of DOE O 435.1 also identified significant weaknesses and risks associated with wastes being generated with no path to disposal for all radioactive waste types, particularly weaknesses associated with long-term storage of waste, potential loss of characterization data from generators, and the problems associated with re-characterization.

This requirement is intended to cover newly generated waste streams. Waste streams generated in the past with no path to disposal which are now in storage should be addressed in the Site-Wide Radioactive Waste Management Program required by DOE M 435.1-1, Section I.2.F.(1). (See discussion entitled, Relationship to Site-Wide Radioactive Waste Management Program.)

Waste streams without a path to disposal that currently are being generated are also to be addressed by the Site-Wide Management Program. A periodic evaluation of whether no path to disposal waste should continue to be generated should be included in the management plans for this waste. This evaluation should consider the same conditions for approval for continuing to generate the waste stream that are described below under Conditions for Review and Approval. If a facility that currently generates no path forward waste is shutdown, or for any other reasons a

no path forward waste stream is temporarily not being generated, consideration should be given to including those wastes in the identification, approval, and notification process described in this section of the guidance.

Example 1: All transuranic and low-level waste streams to be generated from the New Mixed Waste Treatment Facility at Site X, scheduled to begin operations three years after issuance of DOE O 435.1, are all considered new waste streams. A full life-cycle planning process is applied to all waste from the facility to identify potential disposition issues and approve its generation.

Example 2: A filter system in Building 440 at Site Y is changed out four months after issuance of the Order. The resultant filter process waste is mixed low-level waste. Change out of the filter media has occurred repeatedly in the past, and the mixed low-level waste is in storage awaiting a disposal path. This is not considered a new waste stream and is not included in the Site's procedures for identification of potential no path forward waste, for approval, and for HQ notification. However, it is described in the Site's Waste Management Program documentation, along with the steps being taken to achieve disposal. The Site's program documentation also includes an evaluation of the need to continue to generate this no path forward waste.

Example 3: One year after issuance of the Order, Building 440 is shutdown for major upgrades, and does not resume operation for 18 months. When operations are resumed, all waste streams, including the existing filter media waste, will be included in the identification process and the waste stream generation will be in accordance with the approval process established by the Field Element Manager.

By requiring Field Element Managers to be involved with the decisions for generating wastes without a path to disposal prior to waste generation, and notifying Headquarters of the decisions to generate waste without a path to disposal prior to generation, senior management attention is directed to the long-term commitment made with the generation of such waste. The long-term commitment comes from the prolonged storage of the waste and from the work necessary to resolve issues which prohibit the disposal of the wastes.

The requirement calls for the Field Element Manager to ensure that three items are established in the programs implemented by waste generators (see DOE M 435.1-1, Section I.2.F.(7)): (1) a process for identifying the generation of no path forward waste prior to its generation, (2) approved conditions under which no path forward to disposal waste may be generated, and (3) a process for notifying appropriate Headquarters management of decisions to generate no path forward waste. Each of these three items is discussed in the following guidance.

No Path Forward Identification Process. The first part of the requirement is directly related to the general requirement calling for the Field Element Manager to ensure generation planning is occurring by all generators (DOE M 435.1-1, Section I.2.F.(7)), and to the subrequirement in each waste type chapter that requires generator planning to include life-cycle planning for all wastes prior to their generation (DOE M 435.1-1, Sections II.K.(1), III.H.(1), and IV.H.(1)). As discussed previously, "prior to their generation" applies to the stage before any of the waste is produced (e.g.,preceding the activity that will result in the waste). Therefore, this requirement is not intended to be applied to the generation of an individual waste drum, source, box, etc.

The situations which may lead to the generation of waste without a path to disposal are many. The life-cycle planning that is required under DOE M 435.1-1, Sections II.K.(1), III.H.(1), and IV.H.(1) needs to include the necessary elements and components to identify the possible generation of waste which will have no path to disposal prior to their generation and a process by which the Field Element Manager is informed of the potential to generate the waste. This element of the life-cycle planning required under DOE M 435.1-1 is considered very important. No path forward waste issues and problems may be complicated and should be dealt with early in the life cycle of the waste to prevent situations that could require expenditure of large amounts of resources to reverse erroneous steps taken in the managing of the waste.

> *Example 1: The life-cycle planning process at Facility 300 includes a semi-annual submittal by individual generators to the waste certification official of known or suspected new waste streams (i.e, waste streams not already approved for disposal at Site Q). The waste certification official's duties include an analysis of these waste streams to decide if they have a path to disposal. In one such exercise, a suspected waste stream is determined as not acceptable at disposal Site Q. The waste certification official submits this information as required in his procedures to the DOE Field Office, Assistant Manager for Waste Management.*
>
> *Example 2: Site R has signed a Record of Decision requiring remediation of a seepage basin by excavation and re-disposal of the contaminated soils. Contaminants include heavy metals, organics, and radionuclides. Because the waste that will be generated from this remedial action is a mixed low-level waste, there may be no path forward for disposal. Therefore, Site R will prepare an analysis for consideration by the Site Manager, regulators, and other stakeholders identifying the need to generate the waste (the relevant compliance agreement/Record of Decision), the characteristics of the waste to be generated (radioactive and hazardous constituents), the plans for storing the waste after generation (a RCRA-compliant mixed low-level waste storage facility), and the plans for identifying a disposal option for the waste.*

The identification process should occur early enough before the waste is generated so that alternatives to generating the no path forward waste can be examined as an option. Also,

notification of Headquarters (see guidance below on Notification to Headquarters) prior to waste generation appropriately involves Headquarters managers into the final decisions for generation and management of waste with no path to disposal. More detailed guidance for life-cycle planning for generation of new waste streams is included in guidance for life-cycle planning requirements in each of the waste type chapters (Sections II.K.(1), III.H.(1), and IV.H.(1)).

The determination of whether a waste stream has an identified path to disposal should be based on the availability of existing or planned facilities and operations and on the technical acceptability of the waste at the facility. A planned facility is considered to be available if it has been authorized (e.g., a line item in a Congressional appropriation or equivalent approval for design and construction). For purposes of planning for treatment and/or disposal of waste, a facility or capability that is part of a program or strategic plan, but has not been authorized, should not be considered available. A facility is also not considered available if it is not authorized to accept or manage a particular waste type or concentration. If an available planned facility used in life-cycle planning is canceled, the generator should revise the planning for the life-cycle of the waste and an alternate path to disposal should be identified and documented. If an alternate path to disposal is not available, then approval to continue to generate the waste should be obtained in accordance with this requirement, even though it had not needed approval when the waste was initially generated.

> *Example: Several no path forward waste streams generated throughout the Complex are approved because of a planned new High-Activity Borehole Disposal Facility which has received initial line item funding. In the FY2003 budget, Congress does not approve further funding of the facility. The approval to continue to generate these wastes is re-examined by several Field Offices in light of this development.*

Whether a path to disposal can be identified should also be based on the acceptability of the waste at the facilities at which it must be managed. For existing facilities, this involves no more than an evaluation of the waste stream properties against the waste acceptance requirements of the facility and determining there are no impediments for its management. For planned facilities, this determination is more involved. For some waste streams, the acceptability at a planned facility could be determined based on similar circumstances already known to exist in the Complex. This may be a common situation for wastes that do not have a full path to disposal because of issues that are not entirely technical (e.g., non-defense transuranic waste without a disposal option). For other waste streams, particular those with a technical impediment to disposal, the acceptability may need to be evaluated and a judgement made that a planned facility will be able to accept the waste provided some necessary treatment is performed (e.g., waste with explosive properties is made non-explosive), or some administrative step is successfully accomplished (e.g., a RCRA permit is obtained so that mixed waste can be accepted).

Example: A new project will generate 2 waste streams for which a path to disposal is unclear. One waste stream is a typical dry active transuranic waste stream, but it is non-defense transuranic waste, therefore, planned storage at Storage Facility B followed by disposal at the new borehole disposal facility under construction is evaluated. The waste stream is determined to be acceptable at both facilities through a comparison to the waste acceptance criteria for the two facilities. The second waste stream is a unique mixed low-level waste stream that can be stored at Facility B, but for which a disposal facility has not yet been determined. The acceptability of the waste is evaluated by comparing it to a similar waste stream in the Site Treatment Plan (STP), and determining that the treatment described in the STP will also work for the new waste stream.

Conditions for Review and Approval. The second part of the requirement calls for the Field Element Manager to be involved in the decision to generate waste without a path to disposal, prior to the generation of the waste. This requirement intends to ensure that wastes are generated with no identified path to disposal only under approved conditions and known circumstances and are considered to be acceptable by both the Field Managers and Headquarters. The waste type chapters contain requirements that these conditions for generating a no path to disposal waste stream must meet.

The review and approval of the generation of waste without a path to disposal is the responsibility of the Field Element Manager. The approval process and approved waste streams should be documented. In some cases, the Field Element Manager may approve the conditions under which an individual waste stream is generated, while in other cases, he/she may approve a process that confirms the conditions are being met, perhaps through the certification program. The latter circumstances may be appropriate for the routine generation of waste streams having no path forward to disposal.

Example 1: A large scale facility dismantlement is about to begin. Life-cycle planning evaluations indicate that several large components that will be removed from the facility cannot meet the current acceptance criteria for disposal at WIPP or at any other disposal facility. The Field Element Manager is directly involved in exploring alternatives to the generation of this waste, and if appropriate, approving the decision to proceed with the dismantlement and the plans for long-term storage for the components.

Example 2: A laboratory facility on Site B routinely generates small amounts of several mixed low-level waste streams. Prior approval to generate two of the waste streams was necessary in accordance with the guidelines discussed here. DOE Field staff has approved a process that includes conditions and decision criteria being implemented at the laboratory as part of its waste certification program. The process allows laboratory personnel to approve generation of additional mixed low-level waste streams.

The conditions for generating a waste without an identified path to disposal should include evaluations and considerations that involve both the waste generating and waste management organizations. Guidance on Sections II.K.(2), III.H.(2), and IV.H.(2) discusses the evaluations that must be included in the conditions for generating a no path forward waste.

For many newly generated waste streams identified as having no path to disposal, programmatic or technical problems and issues contributing to the lack of a disposal path may be the same as ones already experienced by other waste streams at the site, or within the Complex. All or part of the solution towards disposing of problem waste stream may therefore be actions being taken or planned as part of the Site-Wide Radioactive Waste Management Programs. Likewise, the issues or problems may have also been elevated and are being addressed in the Complex-Wide Waste Management Program for one of the waste types. The relationship of this General Requirement to the requirements for the Radioactive Waste Management Programs is discussed at the end of this guidance under Relationship to Site-Wide Radioactive Waste Management Programs.

> *Example: A new process at a DOE laboratory facility will result in the generation of some non-defense transuranic waste. This is a programmatic and complex-wide issue requiring resolution that is being addressed as a high priority item at Headquarters in accordance with the FY 2000 Transuranic Waste Management Program Plan. Information is prepared under the four topics (a) - (d) discussed above. The information on plans in place to take care of the no path forward waste identifies the complex-wide actions, and the actions being taken specifically at the site.*

Notification of Headquarters. The third part of the requirement calls for the Field Element Manager to inform DOE Headquarters of the decision to generate waste without a path to disposal. As previously mentioned, only newly generated waste streams are subject to this requirement. Notifications do not have to be made for wastes already generated at the time DOE O 435.1 is issued. Documentation of approvals should be provided to the cognizant Program Secretarial Officer (PSO) for the activity or program generating the waste, with an information copy to the Assistant Secretary for Environmental Management (EM-1). The notification should summarize the conditions for approval as described in the previous discussion, and should include an expiration date for the approval or other conditions that would require a new approval of the Field Manager. This notification should be accomplished in a timely fashion following the identification of the potential generation of no path forward waste so that Headquarters management is fully informed of the situation resulting in no path forward waste, and any Headquarters management concerns can be appropriately considered and included in the final Field Element Manager approval to generate the waste.

> *Example: A new waste generating process is developed that requires a waste treatment process not currently available for the waste to be acceptable for disposal. The needed waste treatment process has been approved, but the necessary hardware will not be*

available for five years. The waste generating process is approved by the Field Element Manager with the conditions that (a) the waste is stored in Storage Building 5, and (b) satisfactory progress is made toward the installation of the additional waste treatment process. The approval is documented, and sent to the PSO with an information copy to EM-1.

Relationship to Site-Wide Radioactive Waste Management Program. As previously discussed, waste streams generated in the past with no path to disposal which are now in storage, and waste streams without a path to disposal that are currently being generated are intended to be addressed in the Site-Wide Radioactive Waste Management Programs required by DOE M 435.1-1, Section I.2.F.(1) (and elevated to the waste type Complex-Wide Waste Management Program, if appropriate). Waste streams being generated when DOE O 435.1 is issued should also be evaluated for whether they should continue to be generated. This requirement for an identification process, approved conditions, and Headquarters notification is intended to cover newly generated waste streams only.

Since life-cycle planning should be a major element of the Site-Wide Radioactive Waste Management Program implemented at each site, information on waste streams generated at the subject site is expected to be documented as part of the program in accordance with the site's documentation protocol. It should be understood that the identification, approval, and notification process called for in this requirement for waste streams not being generated is a proactive part of the program, and as such, should be included in a site's operating processes or procedures.

However, once generation of a waste stream with no path forward is approved, then it should be included in the site's life-cycle planning program documentation so that complete waste stream information is maintained in one place. Revisions of the Site-Wide Management Program documents should contain appropriate actions to address new issues and problems of no path forward waste incorporated into them especially from any waste streams not covered in prior revisions of the documentation. Likewise, information already documented about past waste streams with no path forward should be updated because of developments concerning new no path forward wastes.

Example: Three new non-defense transuranic waste streams are approved and generated at Facility 200 in FY1998. In the FY1999 Site Radioactive Waste Life-Cycle Management Plan, these three waste streams are added to the list of previously generated non-defense transuranic wastes that have been managed at the site for years. The actions already documented in the current Life-Cycle Plan (FY1998) are evaluated and considered appropriate to pursue for the new as well as previous waste streams. This is documented, and progress on meeting the actions is updated in the FY1999 Plan.

Waste without a path to disposal which received approval in accordance with these requirements, and which have become part of the Site-Wide Program planning information, should continue to be observed with additional scrutiny. At a minimum, the approval to generate the wastes should be considered annually, with the primary focus being an evaluation of the progress toward identifying a path to disposal. Repeated or numerous one-time approvals for the generation of waste streams without a path to disposal should not be acceptable. The Site-Wide Program Documentation should be used as the vehicle for the evaluation and continued approval of no path forward waste streams on an annual basis. The evaluation of waste streams with no path to disposal should be consolidated with the annual evaluation discussed here.

Example: For the example above, the actions referred to in the Life-Cycle Plan are updated for the FY2000 Life-Cycle Plan for the site. Progress on meeting those actions is evaluated by a task force established by the Field Element Manager, and it is determined that progress is adequate. This decision is documented in the FY2000 Plan as a renewal of the approval of these three non-defense transuranic waste streams.

Major changes to the planned management of waste without a path forward (e.g., changes for developing the treatment facility or disposal facility to handle the waste) should also result in a re-evaluation and re-confirmation of the acceptability of continuing to generate no path forward waste. Headquarters should be notified of changes of this magnitude. On the other hand, if the assumptions for the planned management of approved no path forward waste are only slightly impacted (e.g., as a result of testing, design, changes in funding, or DOE policy), the information in the Site-Wide Program documentation should be updated. Slight changes to assumptions and to the planned management of the waste should not necessarily be a basis for re-evaluating the generation of the waste.

Example 1: For the three new non-defense transuranic wastes at Facility 200, the FY2000 Life-Cycle Plan, minor changes in the actions between the FY1999 and FY2000 Life-Cycle Plans are explained in the text of the plan. These minor items include a decision to add a peer review of one study, and a delay in the scheduled completion dates for three actions. The text states that the approvals for continuing generation of the non-defense transuranic wastes were not evaluated because these were deemed minor items.

Example 2: Continuing example 1 above, after the FY2000 Life-Cycle Plan is issued, the peer review convened on the study finds some of the conclusions in the study to be invalid. This finding has a significant impact on whether the technology selected for solidification of the non-defense transuranic waste can still be a cornerstone of the plan for the site's no path forward waste. This is considered a major item concerning the continuing generation of the non-defense transuranic wastes. The continuing approvals were re-evaluated because of this item, and only two are re-approved. The FY2001 Life-Cycle Plan incorporates these new facts into its updated text.

Compliance with this requirement is achieved if the life-cycle planning implemented at generator sites includes a documented process for identifying waste streams which may be generated that will not have an identified path to disposal; if a documented process is included for review and approval of the conditions for generation of the waste; if approved conditions are documented for any new no path forward waste streams being generated; if the approvals of generation of no path forward waste is appropriately considered in the Site-Wide Radioactive Waste Management Program documentation; and if Headquarters is being notified of the approval of and conditions under which new no path forward waste can be generated.

Supplemental References: None.

I. 2.F. Field Element Managers.

Field Element Managers are responsible for:

(20) Corrective Actions. Ensuring a process exists for proposing, reviewing, approving, and implementing corrective actions when necessary to ensure that the requirements of DOE O 435.1, *Radioactive Waste Management,* and this Manual are met, and to address conditions that are not protective of the public, workers, or the environment. The process shall allow workers, through the appropriate level of management, to stop or curtail work when they discover conditions that pose an imminent danger or other serious hazard to workers or the public, or are not protective of the environment.

Objective:

The objective of this requirement is to ensure that processes to identify, manage, and resolve radioactive waste management deficiencies in complying with DOE O 435.1 and address conditions that are not protective of the public, workers or the environment are established and implemented.

Discussion:

Corrective actions taken prior to events occurring that pose a threat to the workers, the public, or the environment can avert serious occurrences. Actions may include improvements to documentation (e.g., procedures, plans, authorization basis documents), training and qualification programs or procedures, or physical and process design changes. Corrective actions routinely occur as part of the implementation of DOE O 232.1A, *Occurrence Reporting and Processing of Operations Information* (ORPS). The requirement to implement a corrective actions process in managing radioactive waste includes those ORPS Corrective actions as well as corrective actions initiated by circumstances that do not rise to the threshold of reportable incidents.

Potential problems range from minor ones to those which pose an immediate threat to safety and health. Additional information on problem identification can be found in Section I.2.G.(1), Problem Identification. For situations where a problem could pose an immediate risk to a worker, member of the public, or damage to the environment, the immediate corrective action of shutting an operation down may be appropriate until the threat can be controlled. Guidance on shutting down or curtailing radioactive waste activities is provided in Section I.2.G.(2), Shutdown or Curtailment of Activities.

The corrective action process includes problem identification and tracking through resolution; proposal, review, and implementation of solutions, and a method for approval and assigning

accountability. Provisions need to be made for interfaces with the lessons learned program when others could benefit from an action taken. In the corrective actions process, review and approval by cognizant managers is necessary to assess the effectiveness of the corrective action in eliminating the problem and preventing recurrence, its practicality, cost effectiveness, and timeliness. Additional information on corrective action processes may be found in DOE O 232.1A, DOE-HDBK-1089-95 *Guidance for Identifying, Reporting and Tracking Nuclear Safety Noncompliances*, and DOE G 452.2A-1A *Implementation Guide for DOE Order 452.2A, Safety of Nuclear Explosive Operations*. These guides are specific to the topics for which they are written, but may have generic applications adaptable for use by radioactive waste management personnel.

> *Example: At the recommendation of the Defense Nuclear Facilities Safety Board, the department performed a Complex-Wide Review of DOE's Low-Level Waste Management ES&H Vulnerabilities. Site personnel performed a self evaluation followed by an assessment team visit. Based on the problems identified, Corrective Action Plans (CAPs) were prepared to address both complex-wide and site specific corrective actions. These CAPs identify and allow tracking of actions necessary to address the identified problems, including their time lines, milestones and relative resource impacts. The staff responsible to ensure that the corrective actions are completed are also identified. The CAPs were reviewed and approved by senior DOE managers.*

Compliance with this requirement is demonstrated by a site corrective actions program that addresses radioactive waste management-related occurrence reporting and processing of operations information reports citing corrective actions taken, and by records of changes to procedures or processes reflecting that changes were made to correct a problem.

Supplemental References:

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

2. DOE, 1995. *Guidance for Identifying, Reporting and Tracking Nuclear Safety Noncompliances*, DOE-HDBK-1089-95, U.S. Department of Energy, Washington, D.C., December 1995.

3. DOE, 1997. *Implementation Guide for DOE Order 452.2A, Safety of Nuclear Explosive Operations*, DOE G 452.2A-1A, U.S. Department of Energy, Washington, D.C., January 17, 1997.

I. 2.G. <u>All Personnel</u>.

All personnel are responsible for:

(1) Problem Identification. Identifying and reporting radioactive waste management facilities, operations, or activities that do not meet the requirements of DOE O 435.1, *Radioactive Waste Management*, and this Manual, or pose a threat to the safety of the public, workers, or the environment.

Objective:

The objective of this requirement is to clearly state the responsibility and right of each individual to identify and report unsafe conditions so that action can be taken to ensure protection of workers, the public, and the environment.

Discussion:

During the development of DOE M 435.1-1, it was recognized that achievement of safe working practices and conditions could be realized only if all personnel are involved and constantly critical of activities and operations. Comprehensive worker protection programs should already exist in compliance with DOE O 440.1A *Worker Protection Management For DOE Federal And Contractor Employees.* Detailed guidance is available in the multiple guides associated with that Order. This requirement is included in DOE M 435.1-1 to reinforce that accomplishing work safely is critical.

Safe and environmentally sound operations are not, and cannot be, solely the responsibility of management or safety professionals. Coordinated and integrated efforts and constant vigilance are required. Every individual must act in the role of a safety observer. Managers are typically accountable for the overall worker protection program, including planning and allocating resources. Supervisors are accountable for ensuring that worker protection plans, programs, and procedures, including hazard identification and abatement activities, are implemented on a day-to-day basis at the front line. Employee/worker accountability involves following procedures, using safe work practices, and reporting hazards. Formal roles may vary, but everyone has the role of identifying and reporting threats to safety.

Example 1: A subcontractor at a DOE site is performing roofing repairs in an explosives processing area which is a non-smoking area. The subcontractor, however, has permission to have an open flame on the roof because the work involves tar and a hazards analysis indicated that there was no threat from the flame at that location. The subcontractor and crew receive the standard safety briefing upon being awarded the

contract, including an explanation of the rules regulating smoking in the restricted area, i.e. smoking is authorized only in designated areas. As a DOE employee is walking in the area, the roofer's crew is leaving to go to lunch. The employee observes that a laborer is smoking a cigarette in the bed of the truck. He immediately calls the security post to have the truck stopped and security personnel inform safety and contract management personnel to take appropriate action.

Example 2: The approved radioactive waste management basis for a storage facility requires low level waste to be stored on concrete pads with suitable leak detection and spill control. The facility manager has allowed two slightly corroded drums of low level waste to be stored temporarily in a grassy area beside the pad due to a lack of storage space on the pad. A DOE employee familiar with the radioactive waste management basis notices the drums on the grass, and notifies his supervisor, who contacts the facility manager about the situation. The facility manager immediately rectifies the situation by transferring the waste to an acceptable storage pas at another facility.

Compliance with this requirement is demonstrated by records showing what corrective actions were taken to remedy situations in the radioactive waste management system.

Supplemental References:

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

2. DOE, 1997. *Worker Protection Management for DOE Federal and Contractor Employees Guide for Use with DOE Order 440.1A,* DOE G 440.1-1, U.S. Department of Energy, Washington, D.C., July 10, 1997. (This guide has applicable standards and guidance documents listed at the end of each chapter.)

I.2.G(2) Shutdown or Curtailment of Activities. Stopping or curtailing work, through the appropriate level of management, to prohibit continuation of conditions or activities which pose an imminent danger or other serious hazard to workers or the public, or are not protective of the environment.

Objective:

The objective of this requirement is to ensure that the operation of radioactive waste management facilities or the performance of radioactive waste management activities is discontinued or controls put in place if it poses an imminent danger or serious hazard to the public, workers, or the environment.

Discussion:

The shutdown and curtailment of activities requirement complements DOE M 435.1-1, Section I.2.G.(1), Problem Identification, and requires that the Field Element Manager has a system in place to ensure that corrective actions are initiated when necessary. The need for corrective actions has long been recognized in the management of radioactive waste. However, the responsibility for individual actions was not clearly assigned. Stop work procedures, which are not specific to radioactive waste management, are anticipated to be already in place and workers need to be trained to those procedures. DOE O 440.1A requires that DOE elements and contractors implement procedures to allow workers, through their supervisors, to stop work when they discover employee exposures to imminent danger or other serious hazards. A worker has the right to decline to perform an assigned task because of a reasonable belief that, under the circumstances, the task poses an imminent risk of death or serious bodily harm to that individual, coupled with a reasonable belief that there is insufficient time to seek effective redress through the normal hazard reporting and abatement procedures.

Accomplishing work safely is an important DOE goal. When a situation with an imminent danger is discovered, immediate action must be taken either to correct the dangerous condition or practice, or to remove all employees from exposure to the dangerous condition until the condition or practice has been removed. Imminent danger means a situation that could reasonably be expected to cause death or serious physical harm unless immediate actions are taken. This requirement to shut down or curtail activities is included in DOE M 435.1-1 to complement DOE O 440.1A by broadening its application to include threats to the public and environment, and to emphasize that it applies in radioactive waste management.

Any stop work authority must be exercised in a justifiable and responsible manner. All workers, supervisors, managers, and safety professionals are responsible for being cognizant of the conditions in their workplaces and for being prepared to stop work if conditions pose a serious threat to health or safety, or a detriment to the environment. Hazards analyses and hazard prevention/abatement processes result in routine hazards being controlled. This requirement is intended to address extraordinary or unanticipated circumstances and situations where there is a breakdown in controls. When a reasonable person views the circumstances as having the potential to cause injury, serious impairment, harmful health effects, or serious damage to the environment, a stop work order is to be issued. However, the full implications of what will occur

must be recognized. Any work stoppage must alleviate the hazard without creating unintended consequences that are worse than the hazard. Whenever workers see a need to stop work, they are to advise their supervisors. Before a stop work order is issued, the person issuing it needs to ensure the work stoppage itself will not negatively impact workers or public health and safety or the environment.

> *Example: At a site, radioactive waste is stored in an approved storage facility in drums. These drums are in groups of four on wooden pallets and are strapped together for stability. In order to remove them for transfer to a treatment facility, the pallets are lifted by forklifts and placed in trucks. In the course of moving a pallet from the third tier, an adjacent pallet load becomes unstable. Any further movement would cause it to fall on support workers who are inventorying and processing the drums for the transfer. The supervisor recognizes that the pallet load is an imminent threat to those support workers with the potential to cause serious physical harm. The supervisor immediately suspends work in the immediate area, clearing all personnel until a second forklift can be made available to stabilize the threatening pallet load. In accordance with site procedures, appropriate occurrence reporting and processing system (ORPS) reports are made.*

Compliance with this requirement is demonstrated by having the necessary procedures, mechanisms, and training in place to effect shutdown or curtailment of activities which pose an imminent danger or other serious hazard to workers or the public, or are not protective of the environment.

Supplemental References:

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

2. DOE, 1997. *Worker Protection Management for DOE Federal and Contractor Employees Guide for Use with DOE Order 440.1A,* DOE G 440.1-1, U.S. Department of Energy, Washington, D.C., July 10, 1997. (This guide has additional topic specific standards and guidance documents listed at the end of each chapter.)

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