

## **MANAGING RADIOACTIVE WASTE - THE DEPARTMENT OF ENERGY'S LAST BASTION OF SELF-REGULATORY AUTHORITY UNDER THE ATOMIC ENERGY ACT - WHERE ARE WE?**

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### **ABSTRACT**

The management of radioactive waste is one of the U.S. Department of Energy's last bastions of self-regulatory authority under the Atomic Energy Act of 1954. As early as 1990, the Department began analyzing, assessing, and reviewing the existing Order on Radioactive Waste Management, DOE 5820.2A, to revise it. This past year, DOE issued for comment a revised Order to reflect advances in radioactive waste management practices and changes within the Department since the existing Order was issued in 1988. The revised Order sets forth the requirements that DOE and its contractors must follow in managing radioactive waste to protect workers, the public, and the environment from radiological exposures in accordance with the Atomic Energy Act of 1954 and other authorities. This action also marked the first time the Department has asked for external review of a draft Order and was done at the request of state regulators, the public, and the National Governors Association. This paper focuses on DOE's efforts to revise the Order on Radioactive Waste Management, discusses the highlights of the revised Order's scope, and provides a status on where we are and next steps.

### **BACKGROUND**

As early as 1990, the U.S. Department of Energy began analyzing, assessing, and reviewing the implementation of the Order on Radioactive Waste Management, DOE 5820.2A. Most DOE Orders are scheduled for review every two years to determine whether they should be continued, revised, or canceled. The policy of the Department of Energy is to use a consistent and effective management system for the development, communication, implementation, and periodic review of its Orders. Objectives in revising a DOE Order include providing more effective program direction, accountability, and performance assurance. In 1991, the Department initiated efforts to revise DOE 5820.2A.

During this initial revision effort, the Defense Nuclear Facilities Safety Board (DNFSB) also began an examination of low-level waste management within the defense nuclear complex, including the Department's low-level waste management program and practices in terms of its past, present, and future operations. In September 1994, the Board issued Recommendation 94-2, *Conformance with Safety Standards at Department of Energy Low-Level Nuclear Waste and Disposal Sites*, which identified problems with the Department's radioactive waste management specific to low-level waste.

The DNFSB's findings, as reported to DOE in Recommendation 94-2, were that:

- DOE had not kept pace with the evolution of commercial practices for waste disposal;
- Six years after the issuance of DOE 5820.2A, the performance assessment process had not been completed for any of DOE's low-level waste disposal facilities;
- The performance assessments excluded waste buried prior to September 1988; and
- There was considerable uncertainty in the DOE projections of low-level waste volumes.

In May 1995, a revision to DOE 5820.2A (draft DOE 5820.2B) was issued for internal review by DOE and the DNFSB. The draft DOE 5820.2B was an extensive, detailed set of requirements. However, the relationship between the requirements in the draft Order and the technical basis for each was not clear. When distributed for review, the draft revision drew 1,500 comments from reviewers within DOE and from the DNFSB.

Based on the DNFSB's concerns and those raised by the numerous comments on the draft Order, a significant number of issues also were raised internally within DOE. As a result, the Office of Environmental Management (EM) abandoned the previous effort to revise the Order (as 5820.2B) and committed to a new approach. The Office also committed to issuing a draft of the revised Order by February 28, 1997 for review. This commitment was presented to the DNFSB on September 20, 1995 by Thomas P. Grumbly, then Assistant Secretary for Environmental Management (EM-1).

In addition to the DNFSB milestone, specific guidance was provided to DOE staff to integrate these efforts to revise DOE Order 5820.2A. The staff were directed to:

- Incorporate DOE commitments in response to other DNFSB Recommendations;
- Develop a clear and sound technical basis for the requirements and guidance;
- Incorporate considerations of risk, including the processes being developed under DOE's emerging Integrated Safety Management System;
- Develop less prescriptive and more performance-based requirements;
- Address stakeholder concerns; and
- Address other emerging considerations, such as the movement toward external regulation, legislation requiring the adoption of industry consensus standards, and DOE's ongoing efforts to delegate decision-making and managerial controls from Headquarters to the Field Office level.

The Department developed a new approach for revising the Order on Radioactive Waste Management, which incorporated direction from DNFSB and DOE. The approach involved:

- Undertaking a systematic review of DOE's radioactive waste management activities to identify and evaluate the functions and activities necessary to manage radioactive waste effectively;
- Assessing the hazards posed by performing the functions and activities;
- Identifying the regulatory requirements and guidance to mitigate identified hazards and manage waste effectively; and
- Establishing and documenting the technical basis for the requirements and guidance.

## **DOE INITIATES NEW APPROACH**

Initiated in October 1996, the Order revision process employed in revising DOE Order 5820.2A (to be renumbered as DOE O 435.1 under the new Departmental Directives System) involved a number of analyses which had to be performed in sequence. At each step in the analyses, staff from DOE and contractor organizations across the DOE complex were included, and the new effort had to be organized and coordinated.

The Order was revised using the process described below. Work products and documents completed under a number of related efforts (e.g., response to DNFSB Recommendation 94-2), were used to the extent that they supported the requirements and objectives of the Order revision task. The process included the following five steps:

- 1) Identification of radioactive waste management functions and activities based on standard systems engineering approaches.
- 2) Assessment of the hazards posed by performing the functions and activities.
- 3) Assessment of existing requirements (such as other DOE directives, Nuclear Regulatory Commission (NRC) regulations, Environmental Protection Agency (EPA) standards) for possible use and development of preferred language for the revised order.
- 4) Development of requirements to address significant hazards and the technical basis for each requirement.
- 5) Solicitation of wide review and comment (including public review), resolution of comments, and development of the final Order for issuance.

In revising the Order on Radioactive Waste Management, DOE drew on the technical expertise of its Headquarters and Field staff and contractors to assist in the analysis of radioactive waste management functions and development of requirements. Four subteams were formed, one to address each waste type (high-level, transuranic, and low-level waste), and one to address the Order's general requirements and responsibilities. The revision of the Order relied on a broad spectrum of relevant talent within and beyond DOE. Many of the team members who contributed to the response to the DNFSB recommendation on low-level waste were recruited for this effort because of their extensive experience in the operation and regulation of radioactive waste management activities. The expertise of the DOE National Program Managers for radioactive waste types was tapped. Also, representatives from each DOE site assisted through frequent participation via conference calls, meetings, and workshops.

Within DOE, development of the revised Order was coordinated among the Headquarters Program Secretarial Offices and the Field Organizations. This coordination was effected in two ways. First, personnel working on behalf of the various offices participated on the teams formed to conduct the analyses which served as the basis for the requirements included in the revised Order. Second, draft versions of the Order were made available for review, and comments received from the organizations were evaluated and resolved. Notably, DOE met the February 1997 commitment to the DNFSB. The Department also employed a panel of experts in radioactive waste management and regulation to review and provide independent technical advice and comment on the technical issues, analytical approaches, conclusions, and other

activities performed in revising the Order. Informal discussions were held with the Nuclear Regulatory Commission on specific topics and with DNFSB staff. The principal mechanism for external coordination was making a draft of the Order available to the public for review.

### **HIGHLIGHTS AND SCOPE OF THE REVISED ORDER, DOE O 435.1**

The revised Order, DOE O 435.1, *Radioactive Waste Management*, together with its accompanying Contractor Requirements Document and Manual, sets forth the requirements that DOE programs and contractors are to follow in managing DOE radioactive waste to provide radiological protection from DOE facilities, operations and activities in accordance with the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) and other authorities. An Implementation Guide, DOE G 435.1, also will be available when the Directive is issued, and will provide further guidance for implementing the Order and Manual requirements.

The Order and Manual requirements apply to the management of high-level waste, transuranic waste, low-level waste, and the radioactive component of mixed waste. The Order and Manual define high-level waste as it is defined in the *Nuclear Waste Policy Act of 1982*, as amended. The definition of transuranic waste is the same as in the *Waste Isolation Pilot Plant Land Withdrawal Act of 1992*, as amended. The low-level waste definition is essentially the same as in the *Nuclear Waste Policy Act of 1982*, as amended, with the addition of accelerator-produced wastes.

The Order and Manual do not apply to the management of byproduct material as that term is defined in section 11e.(2) of the *Atomic Energy Act of 1954*, as amended. Section 11e.(2) byproduct material includes uranium mill tailings which are regulated in accordance with the *Uranium Mill Tailings Radiation Control Act of 1978*, as amended. The Order and Manual, however, do allow small quantities of these types of materials to be disposed of as low-level waste if such disposal can meet the applicable performance measures.

DOE Order 435.1 differs from its precursor in several areas, the revised Order reflects:

- Technical advances in radioactive waste management that have occurred since Order 5820.2A was issued in 1988.
- A transition to an emphasis on proactive waste management, rather than the formerly reactive approach of addressing wastes once they are generated.
- An emphasis on performance-based requirements, including the concept of a “radioactive waste management basis.”
- Incorporation of “work smart” and integrated safety management systems.
- use of a graded approach to implement the requirements.
- A life-cycle management philosophy of incorporating “cradle-to-grave” considerations for radioactive waste management.
- More external involvement by providing for public review of draft documents.

The principal change reflected in the revised Order and Manual compared to the existing Order is that the new requirements are generally more performance-based rather than being prescriptive. The Order and Manual requirements were developed with an emphasis on performance-based requirements, supported by a small number of minimum technical criteria

where analysis demonstrated a specific need. The use of performance-based requirements includes the concept of site-and facility specific authorization for operations based on a review and approval of processes, procedures, and documentation implemented at the site or facility to meet the requirements. The use of performance-based requirements and the review and approval process leading to an authorization to operate is consistent with the regulatory methodology used by the NRC and EPA in carrying out their responsibilities in regulating radioactive waste management.

Consistent with the performance-based requirements, the Order and Manual promote the use of a graded approach based on consideration of risk when implementing the requirements. The Order and Manual institute the concept of a “radioactive waste management basis” for waste management facilities, operations, and activities. The radioactive waste management basis comprises the controls applied to provide near-term and long-term protection of the public, workers, and the environment. These include controls and analyses such as radioactive waste certification programs, waste acceptance requirements, radiological performance assessments, low-level waste disposal facility closure plans, and other processes, procedures, and analyses necessary to comply with the Order and Manual.

The revised Order also assigns more decision-making authority and managerial controls to the Field Elements. The Order and Manual assign the bulk of the responsibility for developing, documenting, approving, implementing, and maintaining the documents, processes, and activities necessary to comply with the requirements to the DOE Field Element Manager. This includes the responsibility for the elements of the radioactive waste management basis, and for establishing criteria and a process for approving the generation of waste for which there is not an identified path to disposal. Headquarters responsibilities include ensuring that the Order and Manual requirements are followed by the Field Element Managers, developing and documenting complex-wide programs for management of radioactive waste, and authorizing radioactive waste disposal for which DOE is the approval authority (e.g., low-level waste).

In addition, the Order and Manual include requirements associated with specific waste types.

For high-level waste, the Order and Manual:

- Adopt the definition of high-level waste contained in the Nuclear Waste Policy Act;
- Formalize the process for determining that a waste is incidental to reprocessing and can therefore be managed as another waste type;
- Focus all waste management steps on avoiding any activity that could result in the generation of a waste form unacceptable to the planned high-level waste repository;
- Require a structural integrity program to verify the confinement status of tanks and piping; and
- Provide requirements and a process for partial and final closure of high-level waste tanks.

With respect to the management of transuranic waste, the Order and Manual:

- Are consistent with recent legislated and programmatic changes affecting disposal;
- Focus on the entire life-cycle of transuranic waste management; and

- Limit requirements to management of waste in storage or to be generated and exclude past disposal to be addressed by cleanup activities.

The low-level waste requirements in the Order and Manual:

- Reflect changes from other DOE initiatives such as the *Complex-Wide Review of DOE Low-Level Waste ES&H Vulnerabilities*;
- Limit routine storage of waste “path forward waste” to one year;
- Impose a regulatory structure and process responsive to DNFSB concerns about the scope of disposal facility performance assessments; and
- Require disposal facilities constructed as part of a remedial action to meet performance objectives as set forth in the Order.

### SO WHERE ARE WE?

During these past two years, the DOE Order Revision Team received more than 3,000 internal comments on draft versions of the Order and Manual that were provided for internal DOE review. In addition, a Notice of Availability (NOA) of the Draft DOE Order and Manual was published in the *Federal Register* on August 6, 1998. Overall, approximately 250 comments were received from 16 different entities, including other Federal agencies (e.g. EPA), States and Indian Nations, public interest groups, DOE site-specific advisory boards, national laboratories, corporations and private individuals. Every effort was made by the Office of Environmental Management to respond to the multitude of comments received during the Order revision effort. All comments received, both internal and external, were considered and many resulted in changes to the draft Order, Manual, or the corresponding Implementation Guide.

On February 1, 1999, the Office of Environmental Management approved transmitting the draft Order, and accompanying Contractor Requirements Document, Manual, and Implementation Guide to Program Secretarial Officers and Operations and Field Office Managers for 30-day review and concurrence. At the time of publication of this paper, the review and concurrence period was scheduled to end March 3, 1999.

Once all concurrences are received, the directive package will be transmitted to DOE's Office of Management and Administration for issuance as a final Department of Energy Directive. DOE anticipates issuing the final directive by March 31, 1999, which will start the one-year period for implementation of the requirements. The directives will be posted to Explorer (DOE's directives Internet site) for distribution throughout the Department. Headquarters and Field organizations will begin implementing the directives, including factoring implementation costs into budget requests for future fiscal years.

The Department estimates the cost of implementing the requirements of the revised Order and Manual at \$168 million dollars over the next 30 years. About \$61 million dollars are initial costs associated with coming into compliance, with the balance (\$107 million) representing the cost of maintaining compliance. Approximately 75 percent of the implementing costs are associated with management of low-level waste. This result is consistent with DOE expectations since the DNFSB and the Department's own *Complex-Wide Review of DOE's Low-Level Waste Management ES&H Vulnerabilities* had identified deficiencies in low-level waste regulation.

For any requirements that cannot be implemented within one year of the issuance of the Order, Field Managers will be required obtain a waiver from the Cognizant Program Secretarial Office and prepare an Implementation Plan or Corrective Action Plan. Implementation of all requirements must be completed no later than October 1, 2001.

### **NEXT STEPS**

The revised Order must be implemented by all Department elements that are involved in the management of radioactive waste. There are thousands of workers involved in DOE's radioactive waste management operations, facilities and activities. This includes Federal employees at Headquarters, 11 Operations and Field Offices, and a number of smaller Area Offices. Additionally, there are contractor employees at the more than 100 sites involved in waste management and environmental restoration activities. DOE employees and contractors will need to be aware of the requirements of this Order in varying degrees, depending on their job responsibilities. This Order affects all levels: from the Program Secretarial Officials, Operations and Field Managers to workers responsible for day-to-day waste management operations.

These changes stipulated in the revised Order require that DOE inform and educate many of the thousands of DOE Headquarters and Field employees or contractors who are responsible for managing low-level, transuranic, or high-level waste. DOE Headquarters plans to partner with the National Environmental Training Office to prepare a comprehensive training course that will be provided across the complex to federal and contractor personnel once the Order is issued.

### **CONCLUSION**

The U.S. Department of Energy remains responsible for ensuring that management of radioactive waste is conducted in a manner that is protective of the public, workers, and the environment. This revised Order will continue DOE's efforts to provide this protection.