

March 2006

REPORT  
IN BRIEF

## IMPROVING THE REGULATION AND MANAGEMENT OF LOW-ACTIVITY RADIOACTIVE WASTES

**B**y far the largest volumes of radioactive wastes in the United States—millions of cubic meters—contain only low concentrations of radioactive material. This waste comes from nuclear energy and defense industries, medical facilities, mining sites, and other places where radioactive material is used or found naturally. These low-activity radioactive wastes (LAW) should be regulated and managed according to their intrinsic hazardous properties and therefore the degree of risk they pose for handling, storage, and disposal. However, the current regulatory structure is based primarily on



the wastes' origins (i.e., the enterprise that produced it) rather than on actual radiological risks. The result is an inconsistent system that often requires expensive measures for controlling wastes that pose little risk while imposing less control over other wastes that pose greater risks.

This report develops a vision of a risk-informed system for regulating and managing all types of low-activity waste in the United States. The framework for risk-informed decision making combines scientific risk assessment with public values and perceptions. The framework is implemented in a gradual or stepwise fashion—but always with regard to the hazardous properties of the waste in question and not to the enterprise that produced the waste.

The report's authoring committee recognizes that public perceptions of risk may differ from scientific assessments. Determining a level of acceptable risk is a matter of public policy informed by science. The committee also recognizes the substantial body of laws and regulations and the large financial investment in management infrastructure, including disposal facilities, that are now in place. While regulatory authorities are adequate to ensure safety, the current system is complex, is inconsistent, and does not address risks of the various low-activity radioactive wastes systematically. The system is inefficient and will grow increasingly so in the future as more and different wastes are generated (e.g., from nuclear facility decommissioning, site cleanups, and new nuclear applications).

There is no easy way to change the existing system. Efforts over the past 25 years to improve the system generally have not been successful. Radioactive waste issues are highly controversial among citizens, especially those whose communities might be affected by waste facility siting or transportation routes. For public policy makers, the political liabilities for engaging in these issues are high and benefits are small. Nevertheless, among decision makers at all levels who are responsible for continuing to ensure the safety of LAW management, there

is strong interest in improving current practices.

In addressing its charge, the committee sought to be practical. The report discusses and recommends a four-tiered system of change based on established principles for risk-informed decision making, current risk-informed initiatives by waste regulators in the United States and abroad, and solutions available under current regulatory authorities. If current authorities cannot provide adequate solutions, legislative changes could be pursued.

### Recommendation 1

Low-activity waste regulators should implement risk-informed regulation of LAW through integrated strategies developed by the regulatory agencies. Improving the system will require continued integration and coordination among regulatory agencies including the USNRC, EPA, DOE, DOD, and other federal and state agencies.

While current statutes and regulations for LAW provide adequate authority for protection of workers and the public, current practices are complex, inconsistent, and not based on a systematic consideration of risks. More efficient and uniformly protective management of the risks posed by these wastes will require moving away from the present origin-based regulatory system—a system that is firmly established through decades of practice and involves a number of federal and state agencies that have different authorities. The development and use of integrated strategies would strengthen waste regulators' ongoing efforts to improve LAW regulation and management practices by:

1. Focusing the attention of decision makers at all levels on the needs for and benefits of implementing risk-informed practices,
2. Providing a unified approach to developing risk-informed practices that is recognized by all stakeholders as cooperative and mutually supportive, and
3. Promoting harmonization (consistency on the basis of risk) in changes at each of the four tiers discussed in this report.

An important purpose of interagency strategies would be to help regulatory agencies balance their use of the four-tiered approach (see Recommendation 2), including instances where targeted legislation might be needed if the first three tiers are not sufficient for developing solutions.

Cooperative interagency efforts have made

significant progress in improving regulations in areas that are relevant to LAW management and disposal. Examples include development of the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and guidance from the Interagency Steering Committee on Radiation Standards (ISCORS), the latter of which includes eight federal agencies and has the goal of improving consistency in federal radiation protection programs. Development of the integrated strategies should build on the successes of MARSSIM, ISCORS, and similar interagency efforts and make even greater use of such efforts. Developing and instituting implementation strategies may require several years, as did the work on MARSSIM.

Two areas identified in this study exemplify where risk-informed regulations would improve the current system and could provide a focus for development of the strategies:

- Wastes containing uranium or thorium and their radioactive progeny generated by Atomic Energy Act (AEA)- and non-AEA-controlled industries pose similar hazards (according to the type and concentration of their radioactivity) but are controlled under very different regulatory regimes.
- There is no generalized provision for wastes that contain very low concentrations of radioactivity to exit the regulatory system, although there are examples of case-by-case exemption or clearance of some such wastes.

### Recommendation 2

Regulatory agencies should adopt a risk-informed LAW system in incremental steps, relying mainly on their existing authorities under cur-



Low-level radioactive wastes are disposed of in licensed sites such as this one near Barnwell, South Carolina.

rent statutes, and using a four-tiered approach: (1) changes to specific facility licenses or permits and individual licensee decisions; (2) regulatory guidance to advise on specific practices; (3) regulation changes; or if necessary, (4) legislative changes.

The report advocates a stepwise “simplest-is-best” approach to implementing risk-informed LAW regulation and management. Acting under their existing authorities, regulatory agencies and site operators can effect significant changes from the bottom up, beginning with changes to specific facility licenses, permits, or decisions. By changing licenses and permits, the burden of moving toward risk-informed practices is shared by generators, facility operators, and regulators. Good business practices can lead generators toward better waste prevention, minimization, and segregation if there is flexibility in selecting options for dispositioning their wastes.

### **Recommendation 3**

Government agencies should continue to explore ways to improve their efforts to gather knowledge and opinions from stakeholders, particularly the affected and interested publics, when making LAW risk management decisions. Public stakeholders play a central role in a risk-informed decision process.

When those affected by a decision are involved in the decision-making process, the outcome is generally more accepted and more easily implemented than it would be otherwise. Management and disposal of LAW and other potential environmental hazards have evolved beyond ex post facto announcements by facility operators and regulatory agencies into a deliberative process involving partnerships with the affected and interested publics.

Several countries have been generally more successful than the United States in gaining public stakeholder support for siting low-activity waste disposal facilities. Reasons that these stakeholders have been more supportive include greater transparency of decision making, public enfranchisement and participation in decision making, better involvement of elected local officials, and ultimately the ability of local communities to veto an initial site selection. Besides outreach, another way a few government organizations in Europe and the United States have helped public stakeholders become more central in risk decision-making processes is by helping them hire their own technical experts.

While agencies with responsibility for LAW in the United States have improved their efforts to involve the public in waste disposal decisions, many citizens continue to perceive those efforts as falling short of their intended goals. A continuing, concerted effort is needed to understand and address those shortcomings and, in particular, ensure that public stakeholders are a central part of a risk-informed decision process.

### **Recommendation 4**

Federal and state agencies should continue to harmonize their regulations for managing and disposing of AEA and non-AEA wastes so that those wastes will be controlled consistently according to their radiological hazards rather than their origins.

In the interim report’s overview of low-activity wastes, the committee developed five categories that it considered inclusive of the spectrum of LAW and that helped to point out gaps and inconsistencies in present regulation and management practices. The two major deficiencies listed in Recommendation 1 stood out. The committee is not alone in recognizing these deficiencies. Current initiatives by Congress, regulatory authorities, and other organizations are important initial steps in rectifying them. These initiatives should continue under current regulatory authorities.

### **Recommendation 5**

There should be continued collaboration among U.S. and international institutions that are responsible for controlling LAW. Greater consideration of international consensus standards as bases for U.S. regulations and practices is encouraged.

International organizations, especially the European Commission (EC) and the International Atomic Energy Agency (IAEA), are making significant progress in developing consistent, risk-based standards for managing LAW. Their approaches include a number of important elements of a risk-informed system. The IAEA waste classification system focuses on radiological properties of the waste rather than its origins. For example, at the very low activity end, EC regulations and IAEA standards provide guidelines for wastes to be cleared or exempted from control as radioactive material. At the high end, nuclear fuel reprocessing wastes and wastes with similar properties are classified as “high-level wastes.” In the U.S. system, only wastes from reprocessing meet the legal definition of high-

level waste, leaving other wastes that might pose similar risks to be defined as “greater-than-Class C low-level wastes,” a distinction that is confusing and has no basis in science or risk.

Public stakeholders are likely to be more receptive to waste management practices that are known to be accepted and implemented in other developed countries. If waste management technical experts and regulators develop broad agreement, publics might be more trusting of their ability to ensure safe management and disposal practices. Moving toward risk-informed practices in the United States could have the net effect of increasing stakeholder support in all countries.

## Conclusion

The committee concludes that, while challenging, it is possible to move in incremental steps to a more risk-informed system for controlling management and disposition of radioactive

materials. In contrast with the patchwork evolution of the past 60 years, stepwise implementation would move in a consistent direction: away from regulating LAW according to how or when it was generated and toward regulation based on the actual hazard and potential risk of the material. Risk-informed practices are good business practices. By working with regulators, public authorities, and local citizens to implement risk-informed practices, industry can increase the cost-effectiveness of its LAW disposals and increase its options for such disposals; and by moving away from the ad hoc nature of the current origin-based system, industry can increase the predictability of its disposal options. Through open and objective dialogue, risk as perceived by generators, regulators, concerned citizens, and elected officials can provide a common basis—a common currency—leading to better cooperation, agreement, and progress.

---

**Committee on Improving Practices for Regulating and Managing Low-Activity Radioactive Waste:** **David H. Leroy**, *Chair*, Leroy Law Offices, Boise, Idaho; **Michael T. Ryan**, *Vice Chair*, Charleston Southern University, South Carolina; **Edward L. Albenesius**, Westinghouse Savannah River Company (retired), Aiken, South Carolina; **Wm. Howard Arnold**, Westinghouse Electric (retired), Coronado, California; **François Besnus**, Institute de Radioprotection et de Sûreté Nucléaire, Cedex, France; **Perry H. Charley**, Dine College-Shiprock Campus, New Mexico; **Gail Charnley**, Health Risk Strategies, Washington, District of Columbia; **Sharon M. Friedman**, Lehigh University, Bethlehem, Pennsylvania; **Maurice C. Fuerstenau**, Mackay School of Mines, University of Nevada, Reno; **James Hamilton**, Duke University, Durham, North Carolina; **Ann Rappaport**, Tufts University, Medford, Massachusetts; **D. Kip Solomon**, University of Utah, Salt Lake City; **Kimberly W. Thomas**, Los Alamos National Laboratory, New Mexico; **Robert M. Bernero**, *NRSB Liaison*, U.S. Nuclear Regulatory Commission (retired), Gaithersburg, Maryland, **John R. Wiley**, *Study Director*, Nuclear and Radiation Studies Board (NRSB), National Research Council.

**This report brief was prepared by the National Research Council based on the committee’s report.** For more information, contact the Nuclear and Radiation Studies Board at (202) 334-3066. *Improving the Regulation and Management of Low-Activity Radioactive Wastes* is available from the National Academies Press, 500 Fifth Street, NW, Washington, D.C. 20001; (800) 624-6242; [www.nap.edu](http://www.nap.edu).

*Permission granted to reproduce this brief in its entirety with no additions or alterations.*

Copyright 2006 The National Academies