Cleaning Up the Nuclear Weapons Complex: A Herculean Challenge

by Katherine N. Probst and Michael H. McGovern

For nearly five decades, the U.S. Department of Energy (DOE) and its predecessors engaged in a highly secretive, complex, and massive endeavor to fabricate nuclear weapons for national security purposes. Large-scale production of nuclear weapons was an unprecedented undertaking requiring thousands of facilities, dozens of large tracts of land, huge volumes of dangerous materials, and great quantities of water. With the Cold War's end and the emergence of new types of national security concerns, weapons production operations have, for the most part, ceased, and much of the secrecy under which they were shrouded has lifted.

The subsequent revelations have been shocking. In the rush to produce the materials, components, and devices necessary to produce thousands of nuclear weapons, DOE paid scant attention to the environmental consequences of its actions. At many sites, tremendous volumes of soil and groundwater are contaminated with both radioactive and hazardous materials. Wastes stored for years pose substantial dangers, and many aging facilities that harbor highly radioactive and sensitive materials are deteriorating.

In 1989, DOE established the Office of Environmental Management (EM) to address these problems and to clean up the nuclear weapons sites. DOE has spent almost $35 billion on the EM program over the past seven years, and expects to spend another $6.5 billion on environmental management activities in fiscal year 1997. Some 70 percent of these expenditures address problems at six major sites: Hanford, Washington; Savannah River, Georgia; Rocky Flats, Colorado; Oak Ridge, Tennessee; Fernald, Ohio; and the Idaho National Engineering Lab. The Hanford cleanup alone has consumed $8 billion since 1989.

More to "Cleanup" than Cleaning Up

Much more than cleanup goes on at the six major sites. In addition to addressing soil, groundwater, and surface water contamination, EM staff and contractors are responsible for safely managing millions of cubic meters of stored wastes, several metric tons of excess plutonium and highly enriched uranium, and thousands of aging and contaminated buildings. EM must also properly treat and dispose of newly generated wastes resulting from several remaining weapons production operations and from ongoing nuclear energy research.

The diverse challenges of environmental protection and nuclear safety can readily be illustrated at Hanford. Sixty million gallons of high-level waste are contained in 177 huge underground storage tanks at the site. Some of these tanks have been leaking waste into the soil for years, and some are in danger of exploding from the buildup within of hydrogen gas. In addition to safely managing the tanks, DOE must eventually extract all waste from them to treat and prepare for disposal in an off-site geologic repository. These operations are complicated because high-level waste is composed of both hazardous and highly radioactive constituents.

A Fragmented Regulatory Regime

For most of its existence, DOE followed the practice of its predecessors—regulating all of its own activities to ensure the safety of its facilities, the protection of the environment, and the health and safety of workers. Total self-regulation of weapons production activities was deemed necessary because of the urgency and nature of the mission at hand.

In the 1980s, however, DOE found itself increasingly hard-pressed to justify complete self-regulation, with environmental groups attacking that stance in court and in the media. As a result of several court rulings—notably *Leaf v. Hodel* in 1984—the U.S. Environmental Protection Agency (EPA) was granted authority to regulate DOE activities to ensure compliance with environmental laws. Many states now have similar authority as well.

Meanwhile, DOE still self-regulates to ensure nuclear safety under the authority of the Atomic Energy Act. This self-regulation is accomplished through the use of internal directives that govern the management of radioactive materials and the safety of nuclear facilities.

Thus DOE's environmental management activities are often subject to regulatory requirements under the purview of several different agencies. Moreover, cleanup activities are not uniformly regulated by either internal or external entities. This fragmented regulatory regime results in gaps and overlaps in regulatory requirements that make it extremely difficult to address diverse hazards in a holistic manner.

The RFF Project

RFF's Center for Risk Management (CRM) is exploring new approaches to cleaning up the nation's nuclear weapons complex under a cooperative agreement with the Department of Energy's Office of Environmental Management. In July, the CRM research team issued a discussion paper that considers whether a new "integrated" law is warranted to replace the often overlapping and conflicting requirements of the legal framework now governing environmental management activities within the weapons complex.

The Research Team

The RFF research team conducting research on DOE's EM program includes Senior Fellow Katherine Probst, CRM Director Terry Davies, Fellow Karen Dunn, Research Associate Michael McGovern, and Research Assistant Kieran McCarthy.

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Constructing storage tanks at the Hanford site tank farm. When completed, each tank can store one million gallons of high-level, liquid radioactive waste seven to ten feet underground.

New Regulatory Regimes

In recent years, pressure has been mounting both within and without DOE to eliminate most remaining self-regulation. Responding in part to those demands, Secretary of Energy Hazel O'Leary established in January 1995 the Advisory Committee on External Regulation of Department of Energy Nuclear Safety.

That committee concluded in December 1995 that self-regulation of DOE activities should cease almost entirely and recommended that regulation of nuclear safety come under the authority of either the Nuclear Regulatory Commission (NRC) or Defense Nuclear Facilities Safety Board (DNFSB), an independent oversight agency established by Congress in 1988. Adoption of the committee's recommendations—which are quite controversial—would require action by Congress.

The committee's recommendations to end self-regulation do not address the problems of multiple regulators and divided regulatory domains. An even more radical approach—"integrated legislation"—would address the full range of DOE's environmental management activities and the panoply of concerns that drive them. Specifically, a regulatory regime established by a single "integrated statute" could concurrently address nuclear safety and environmental protection, replacing the extant fragmented approach. Such a law could be administered by either one of the existing regulatory agencies (EPA, NRC, a reconstituted DNFSB, state environmental agencies) or by a new agency.

An integrated law would provide an opportunity not only to eliminate gaps and overlaps in regulatory requirements, but also to ensure that resources would be focused on the worst risks first.

Over the next few months, the CRM team will continue its research to develop the outlines of what an "integrated statute" for DOE's EM program might look like.

To obtain a copy of the team's discussion paper, entitled "Cleaning up the Nuclear Weapons Complex: Exploring New Approaches," (96-25), see page 22.