

**Decontamination and Decommissioning of
Radiologically Contaminated Facilities**

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**Prepared by
The Interstate Technology & Regulatory Council
Radionuclides Team**

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444 North Capitol Street, NW, Suite 445, Washington, DC 20001**

EXECUTIVE SUMMARY

The decontamination and decommissioning (D&D) of radiologically contaminated facilities present numerous challenges. Many tasks are involved, each of which requires adherence to a complex array of federal and state regulations and policies, attention to health and safety issues for workers and the public, monitoring and management of schedules and costs, and interaction with a potentially large number of stakeholders who have an interest in the present activities and future plans for sites undergoing D&D. Even the terms “decontamination” and “decommissioning” are subject to variations of definition. For the purposes of this document, “decontamination” refers to the removal or reduction of radioactive or other hazardous contamination from facilities, including both structural and nonstructural materials and equipment. The objective is to reduce radiation risk and/or exposure to be protective of public and worker health and safety and the environment. “Decommissioning” refers broadly to actions taken at the end of the life of a facility to retire it from service. The objective is to enable reuse or safe disposition of facilities and equipment. For radiologically contaminated facilities, the decommissioning process generally incorporates some or all of the following activities: the deactivation and safe management of radioactive and other wastes; plant decontamination dismantling, and demolition; and site remediation.

Presently, there are 104 operating nuclear power reactors in the United States, including both pressurized-water and boiling-water types. These plants produced 790 billion kilowatt-hours of electricity in 2004. Since 1960, more than 70 test, demonstration, and power reactors have been retired, most of them relatively small. The first commercial-scale nuclear plant decommissioned was Shippingport (Pennsylvania), in 1989. Since then, 14 nuclear plants, each greater than 100 megawatts, have been shut down and decommissioned. Currently, 16 power reactors and 14 test/research reactors are permanently shut down and undergoing decommissioning (IAEA 2006c). The U.S. Department of Energy (DOE) has also had some recent successes in closing sites. Cleanups at the Rocky Flats Site (Colorado), the Kansas City Plant (Missouri), and the Lawrence Livermore National Laboratory Main Site (California) were all completed in 2006. Cleanups were completed in 2006 at the Ashtabula, Columbus, and Fernald Projects (all in Ohio). Cleanups are scheduled for completion in 2007–2008 at the Miamisburg Environmental Management Projects (Ohio), the Lawrence Berkeley National Laboratory (California), the Inhalation Toxicology Laboratory (New Mexico), the Pantex Plant (Texas), and the Lawrence Livermore National Laboratory Site 300 (California).

The purpose of this document is to compile and make available some of the experience and knowledge acquired in recent years from facilities that have completed a D&D process. It provides guidance on D&D to regulators, the public, project managers, cleanup contractors, technology providers, and others with an interest or a need for information about this topic.

The document introduces D&D by describing the general D&D processes, examining the types of facilities undergoing D&D, and introducing regulatory authorities typically applicable to D&D activities. Subsequent sections further address major elements of the D&D undertaking—the regulatory framework (discussing the decommissioning requirements of the Nuclear Regulatory Commission, the Environmental Protection Agency, and DOE), costs, technologies, and health and safety. The document summarizes case studies of select closure sites, where some

of the potential problems and decisions involved in the D&D process are explored. In addition, stakeholder perspectives on the D&D process are included. The document concludes by providing a distillation of lessons learned and factors for success of D&D process that the ITRC Radionuclides Team compiled during the development of this document.

The examples used in this document are by no means comprehensive. Its introductions to technologies are not all-inclusive as new technologies continue to be developed in response to specific needs at facilities undergoing D&D. Further, the case studies it presents are intended to serve as a sampling of the large variety of facilities that may undergo D&D. The greater representation of DOE sites in the case studies presented is reflective of the perspective of the state regulator authors. Further, the majority of the collective experience and knowledge of D&D has come from DOE sites.

It should be noted that D&D is part of the larger process of site closure and should be understood as such. At any given site, any D&D project may present complex overlaps with other regulatory processes, stakeholder concerns, environmental issues, natural resources damage assessments, tribal concerns and treaty issues, monitoring and long-term stewardship, etc. However, the scope of this document is limited to considerations directly related to D&D.