The Radionuclides Team of the Interstate Technology Regulatory Council was formed in 1999 to investigate innovative methods and approaches for characterization, treatment, and management of radioactively contaminated materials. To investigate the long-term stewardship (LTS) challenge facing state regulators, the Team conducted a targeted survey of state regulators in states with major Department of Energy (DOE) facilities during the fall of 2002. The goal of the survey was to identify the areas of LTS, which present challenges that would benefit from development and application of additional science and technology. A total of 31 regulators from seven states responded to the survey (~80% response rate). The responses were requested and evaluated as individual regulator views not State views.

To put the results of the survey into context with other LTS efforts, three documents were reviewed and compared with the findings of the survey: DOE’s Long-Term Stewardship Science and Technology Roadmap (Draft) (1); Environmental Cleanup at Navy Facilities: Adaptive Site Management, developed by National Research Council (2); and DOE’s Draft Implementation Guide for Use with DOE O.1B, Real Property Asset Management: Guidance for Transition of Long-Term Surveillance and Maintenance Function (3). A broad collection of activities was identified as important to closing sites and conducting LTS. State regulators recognize the need for new technologies to support better and more cost-effective cleanup and LTS efforts. This paper is a synopsis of the information presented in the ITRC report, Issues of Long Term Stewardship: State Regulators’ Perspectives (4).

Introduction

DOE is the fourth largest federal landowner, conducting its mission at 50 major sites on 2.4 million acres across the United States (5). With DOE’s mission coming to a close at many sites and with the potential to return land to the public, DOE and several states are debating how to best manage sites too contaminated for free release. Developing successful monitoring, institutional controls, engineering controls, and maintenance activities to last for the hundreds,
even thousands of years required at most DOE sites is a challenge faced by all. No processes, policies, or technologies have been evaluated against such long-term standards.

To investigate the LTS challenges facing state regulators, the Interstate Technology & Regulatory Council’s (ITRC) Radionuclides Team conducted a targeted survey of state regulators from seven states with major DOE facilities. The goal of the survey was to identify the areas of LTS that present challenges that would benefit from development and application of additional science (social, biological, chemical, engineering, etc.) and technology.

To put the results of the survey into context with other LTS efforts, three additional documents were reviewed and compared with the findings of the survey. These documents were selected because they represented other federal initiatives responsible for moving the sites from cleanup to long-term management and meeting implementation challenges of LTS. The DOE-sponsored *Long-Term Stewardship Science and Technology Roadmap (Draft)* (1) was developed to aid DOE in identifying and cost-effectively implementing knowledge and tools at DOE LTS sites. The *Environmental Cleanup at Navy Facilities: Adaptive Site Management* document was developed by the National Research Council to improve the U.S. Department of Navy’s ability to close its difficult-to-remediate hazardous waste sites (2). DOE’s *Draft Implementation Guide for Use with DOE O.1B, Real Property Asset Management: Guidance for Transition of Long-Term Surveillance and Maintenance Function* (3) provides a checklist of documentation and processes needed by sites transitioning from cleanup to LTS. The survey and the three reviewed documents all employed different techniques for collecting information and focused on different groups of people as the primary contributors. However, the technical needs identified by the three activities are similar.

This publication is a synopsis of the ITRC report *Issues of Long Term Stewardship: State Regulators’ Perspectives* (4). The ITRC report provides additional details and discussion including the original survey and all response data. A copy of the ITRC report can be requested at www.itrcweb.org.

**Methods**

Standard survey development methodology was used to develop the survey questionnaire, which included multiple-choice graded-response, multiple selection, and short-answer questions. A focused subgroup of the team proposed and revised questions. The survey was then formatted for presentation on an internet site so respondents could access it electronically.

The survey was developed with the intention of assessing opinions of individual state regulators involved in work with DOE sites, targeting those familiar with LTS issues. Potential respondents were contacted through members of the Radionuclide Team based on their familiarity with and involvement in DOE oversight and LTS issues. The participation of 39
regulators from eight states (Colorado, Idaho, Missouri, New Mexico, Ohio, South Carolina, Tennessee, and Washington) with large DOE facilities was solicited via e-mail. Thirty-one regulators from seven states (all but Idaho) completed the survey. See Figure 1.

The survey was divided into seven sections—general, treatment, monitoring, information access and use, institutional controls, decision making, and path forward. The survey included 166 questions, 45 of which were short answer. The survey was estimated to take approximately one hour to complete. Each section included multiple-choice and short-answer questions, as well as an optional question allowing the responder to provide unaddressed information.

**Results**

The 31 regulators from seven states with major DOE sites who responded to this survey represent approximately 80% of those contacted. The survey provided insight into the perspectives of state regulators currently involved with cleanup and LTS activities at DOE sites. A large percentage of respondents (84%) were familiar with LTS issues. They responded as being familiar (32%) or very familiar (52%) with LTS issues. This finding reinforces the intent of the survey to contact regulators that were familiar with LTS issues. The results of all questions are evaluated and the actual data are presented in the ITRC report *Issues of Long Term Stewardship: State Regulators’ Perspectives (4)*. Select data sets are presented below.

Ninety percent or more of regulators indicated that technology is critical in addressing treatment and monitoring challenges of LTS. The majority of regulators (67%) agreed (27% strongly, 40% moderately) that technology limitations are affecting the ability of sites to successfully implement LTS. About 77% of respondents agreed (29% strongly, 48% moderately) that investments in technology development should be a high priority in addressing LTS issues.

Respondents noted monitoring during LTS as being of major importance for disposal facilities, containment facilities and groundwater. More than 70% of regulators indicated that real-time data, remote sensing and data transmission, and redundancy in monitoring are considered of importance for successful LTS monitoring.

**Discussion**

The importance of LTS is broadly recognized in the regulatory, public, technical, and federal communities. The survey and the three documents reviewed were each developed by different groups of people (state regulators, National Research Council, contractor personnel at DOE complex, and DOE personnel) for different reasons. Consequently, there are both common and differing perspectives presented within the documents. All of the documents view LTS as a collection of integrated activities including communication, information management, institutional controls, and monitoring. The differences among the perspectives lies in the timing and amount of involvement of the public, the expectation for change over time, the level of confidence in intergenerational information transfer, the degree of confidence in current monitoring strategies, and the relative level of current technical and institutional readiness for LTS. This LTS survey report provides a useful basis for continuing dialog, education, and development efforts to bring the perspectives closer, facilitating the transition of sites into LTS, improving the tools available for conducting LTS, and improving the effectiveness and efficiency of LTS operations.
Conclusions

The purpose of ITRC report *Issues of Long Term Stewardship: State Regulators' Perspectives* (4) was to guide the future activities of the ITRC Radionuclides Team in LTS, to help the Radionuclides Team make a more informed review of the LTS documents being developed by DOE, and to assist decision makers and technology developers addressing LTS issues. The Radionuclides Team is confident that this threefold purpose was reached. The following specific conclusions were developed from the analysis in the document:

1. The scope of LTS includes the management of radioactive waste disposal facilities, groundwater treatment, monitoring, information storage, and access controls. Designing and managing facilities that must safely dispose and manage wastes for hundreds, even thousands of years requires regulators and DOE to consider new technologies and strategies to address the common goal of protection. Support for development of new technologies to improve the effectiveness and efficiency of LTS is an important consideration however, there are technology limitations in the above-mentioned areas that limit the ability of sites to successfully implement and conduct LTS.

2. LTS can be done more effectively and efficiently by integrating best-available technologies, robust administrative policies, active communication, and adaptive management principles to ensure that solutions are comprehensive, resilient, and consistent with land use requirements and scientific knowledge.

3. Awareness is key to the effectiveness of land use and institutional controls. The following approaches could aid in improving the long-term awareness and effectiveness of land use and institutional controls: computer/database links for deed restrictions, on-site museum/educational facility, continued government use of the site, and community education classes.

4. Citizens Advisory Boards have proven to be effective communication methods for getting local community, tribal, and state values factored into cleanup decisions. It is important to have some structured local citizens group, possibly an evolution from the CABs, continue to play a strong role in the planning, implementation, and conduct of LTS at sites across the DOE complex.

5. Developing additional capabilities in monitoring sensors and systems will strengthen the ability of site stewards to detect changing conditions and potential problems early, minimize sample generated waste, and complement human surveillance activities.

6. Strengthening information systems will improve management (including collection, organization, preservation of technical and physical integrity, and timely access) of records and information/data for current and future generations. A combination of media will likely be required to accomplish this multigenerational task. Technologies from paper to digital should be employed.

7. The effectiveness of LTS can be strengthened through open communication among all affected parties including site owners, federal, state, local, and tribal governments and local and regional community members. Communication systems should be strengthened and designed to function throughout the period of LTS. A variety of media (e.g., paper, museum, digital) as well as both unidirectional (e.g., newsletter, reading room) and multidirectional (e.g., CAB or town meeting) communication modes should be used as necessary. An active
and continued public outreach is an essential and integral component of this communication effort.

8. Human surveillance of sites during LTS is important. The frequency of this human involvement will depend upon the site condition at closure. Issues affecting surveillance include monitoring complexities, land use changes, and ongoing treatment requirements.

9. While many state regulators have experience and knowledge of LTS issues and technologies, they identified several areas (information management, monitoring, decision making, etc.) where they would like to improve their skills and knowledge to be better prepared to face the significant challenges LTS will present.

10. Although criteria are being set by DOE and other federal agencies for moving sites from active cleanup to LTS, additional guidance is needed from the states’ perspective that not only determines conditions for accepting a site into LTS but also ensures that the challenges identified in various aspects of technology, LTS implementation, and long-term monitoring can be met.

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