STRATEGIC ASSESSMENT OF THE U.S. NUCLEAR REGULATORY COMMISSION'S LOW-LEVEL RADIOACTIVE WASTE REGULATORY PROGRAM

1. INTRODUCTION

In this paper, the U.S. Nuclear Regulatory Commission (NRC) staff describes its strategic assessment of the NRC's regulatory program for low-level radioactive waste (LLW). The staff undertook this effort in recognition of significant new and emerging LLW disposal issues, as well as stakeholder concerns related to the Nation's management of commercial LLW. A structured process is needed to ensure that the NRC applies the resources available to address these issues effectively and efficiently and in a manner consistent with its regulatory responsibilities. Accordingly, the goal of this strategic assessment is to identify and prioritize staff activities that should continue to: (1) ensure safe and secure LLW disposal; (2) improve the effectiveness, efficiency, and adaptability of the NRC's LLW regulatory program; and (3) ensure regulatory stability and predictability, while allowing flexibility in disposal options.

The main body of this document contains a brief description and historical perspective for the current national program for LLW disposal and the NRC's LLW regulatory program, a description of the process used by NRC staff to perform this strategic assessment, and the results of the assessment. In addition, this document contains the following five appendices that provide detailed supplemental information:

- Appendix A contains examples of stakeholder opinions and recommendations used by the staff to inform the assessment.

- Appendix B describes assumptions used by the staff to forecast how LLW disposal scenarios may change over time and thereby affect industry and regulatory needs.

- Appendix C provides a comprehensive summary showing the relationship of each proposed activity to its potential impact on strategic goals, the relative need for the task, the estimated level of effort required, anticipated benefits, potential unintended consequences, and ranking of each task as low, medium, or high priority.

- Appendix D presents a tabulated correlation of the staff's proposed activities with recommendations provided by the Government Accountability Office (GAO) in a number of publications, by the Advisory Committee for Nuclear Waste and Materials (ACNW&M) in a recent white paper, and in a recent report produced by the National Academy of Sciences (NAS).

- Appendix E discusses knowledge transfer issues that have an impact on the agency's LLW regulatory program.

2. BACKGROUND

A number of factors define the NRC's LLW program activities. These include the NRC's legal authorities and responsibilities, Commission direction on particular issues, and the national LLW disposal situation. This section briefly discusses the major factors that affect the types of

actions the NRC takes in its LLW program, thus providing a context for later sections of this paper that address what the NRC might do in the future.

2.1 Legislative Framework for the LLW Program

The national LLW system is principally conducted under two U.S. laws, the Atomic Energy Act of 1954 (AEA), as amended, and the Low-Level Radioactive Waste Policy Amendments Act (LLRWPAA) of 1985. The AEA provides the authority by which the NRC regulates nondefense-related possession and use of radioactive material. Under the AEA, the NRC promulgated Title 10, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," of the *Code of Federal Regulations* (10 CFR Part 61), which defines the requirements for the licensing of LLW disposal facilities, and developed extensive regulatory guidance that covers the storage, packaging, and disposal of LLW. The three currently operating LLW disposal facilities, as well as one facility that is presently undergoing license review, are licensed or will be licensed by the Agreement States using disposal regulations that are compatible with 10 CFR Part 61.

While NRC and Agreement State regulatory responsibilities under the AEA are focused on safety, security, and protection of the environment, the primary goal of the LLRWPAA was to ensure that disposal capacity would be available for all types of LLW generated by AEA licensees. The LLRWPAA gave States the responsibility to develop this disposal capacity for Class A, B, and C LLW and assigned the U.S. Department of Energy (DOE) the responsibility for disposal of greater than Class C (GTCC) waste (the most hazardous class of LLW). The LLRWPAA also authorized States to form regional LLW compacts to share the responsibilities for disposal and gave the compacts the ability to exclude out-of-compact waste. In addition, the LLRWPAA incorporated milestones, incentives, and penalties to encourage States to pursue development of new facilities.

In implementing the provisions of the LLRWPAA, States and compacts at one time had programs for the development of 12 new LLW disposal sites in the United States. One license was issued, for the proposed U.S. Ecology disposal facility in Ward Valley, California, and several other developers submitted license applications to Agreement State regulatory organizations for review. The Ward Valley facility was never constructed, and ultimately no other licenses were granted. Thus, at one point, the LLRWPAA disposal facility development goal created a need for both the NRC and the Agreement States to undertake a number of new and significant LLW facility licensing activities. Currently, however, only one State, Texas, has a new site under license review. The current issues in LLW are generally not associated with the licensing of new facilities but rather relate to disposal availability limitations and associated cost issues for certain types of LLW.

Section 2.2 describes the evolution of the NRC's LLW regulatory program in response to national LLW program developments, including the implementation of the requirements of the LLRWPAA.[1] Section 2.3 addresses the current system for disposal of LLW in the United States and new issues that the NRC may need to address as disposal capacity becomes more limited.

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1 The ACNW&M report NUREG-1853, "History and Framework of Commercial Radioactive Waste Management in the United States," NUREG-1853, issued January 2007, provides a comprehensive summary of the U.S. program for LLW disposal and the NRC's regulatory program.

Section 2.4 discusses potential improvements to the LLW regulatory program that stakeholders have suggested. Subsequent sections of this report discuss a process for prioritizing activities that the NRC could undertake to best use LLW program resources.

2.2 Evolution of the NRC's LLW Regulatory Program

Consistent with the agency's safety, security, and environmental protection responsibilities, the NRC has a long history of responding to the needs of the Nation's commercial LLW management system. In the late 1970s, when three of the six operating disposal facilities[2] were closed because of performance problems, the NRC initiated the development of an extensive regulatory framework for LLW disposal. In 1982, the NRC promulgated 10 CFR Part 61, which establishes the procedures, criteria, and terms and conditions under which the Commission regulates the land disposal of LLW. Subsequent to the development of the 10 CFR Part 61 rule, and until the mid-1990s, the NRC developed an extensive set of implementing regulatory guidance, including technical positions on LLW concentration averaging, site selection, monitoring, waste classification, and many other topics.

In the LLRWPAA, Congress assigned specific activities to the NRC. These included development of procedures for processing applications for LLW disposal facilities and regulatory guidance for various types of LLW disposal sites, particularly for those that would rely more heavily on engineered features than did the shallow land disposal facilities at that time. Through the late 1980s and into the early 1990s, the NRC developed the guidance required by the LLRWPAA, along with other guidance the staff believed was needed to assist staff and licensees in the implementation of 10 CFR Part 61. The magnitude of the program varied during this period. At its height in 1986, the NRC LLW program comprised approximately 28 full time equivalents (FTE), largely in response to the requirements in the LLRWPAA. From 1987 to 1995, the program ranged between 13 and 22 FTE. The program was then scaled back to 5–10 FTE because of reduced national activities (individual Agreement States, not the NRC, regulated operations at the existing facilities) and the completion of the tasks identified for the NRC in the LLRWPAA.

In 1996, the NRC undertook a strategic assessment of 20 of the agency's "direction setting issues" to determine how best to address them in the future. The NRC's LLW regulatory program was one of these issues. For the LLW program, the staff presented six alternative implementation strategies, ranging from becoming a national leader that would be active in promoting the development of new disposal sites, to asking Congress to transfer the program to the U.S. Environmental Protection Agency. After consideration of public comments, the Commission decided in 1997 to "maintain the current program," which at that time comprised approximately 5–10 FTE. The specific kinds of activities included in this option were limited to actions such as providing technical assistance to States and limited guidance development.

The Commission based its 1997 decision in part on the perceived needs and scope of the national program, which by that time had diminished because the LLRWPAA had been in place for nearly 10 years, and most of the new siting efforts by States had come to a halt. The Commission also decided that the NRC's role should be limited primarily to those activities that had a direct bearing on the agency's regulatory mission to protect public health and safety and

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2 The facilities were located in Sheffield, Illinois; Maxey Flats, Kentucky; and West Valley, New York.

the environment. The basic Commission decision in 1997 concerning the size and scope of the LLW program remains in effect and has guided planning and budgeting since that time. Meanwhile, several new developments have occurred in the national LLW management system, and a number of stakeholders have called for changes, both to the national LLW management system and to the NRC's LLW regulatory program.

2.3 Current LLW Environment

To date, no new disposal sites have been developed under the LLRWPAA, even though States, compacts, private companies, and the Federal Government have spent more than $600 million over two decades in attempting to do so. Even so, most LLW may be disposed of in one of the three operating facilities in the United States: (1) the U.S. Ecology facility in Hanford, Washington, which accepts LLW waste from the Northwest and Rocky Mountain Compacts; (2) the EnergySolutions facility in Clive, Utah, which accepts only Class A LLW waste from all States; and, (3) the EnergySolutions facility in Barnwell, South Carolina, which currently accepts LLW waste, including Class B and C waste, from all States. However, the Barnwell facility is scheduled to close to out-of-compact generators in mid-2008, leaving LLW generators in 36 States with no option but to store the Class B and C waste that they generate.

One new LLW disposal facility is under development. In 2003, Texas passed legislation that provides for development of an LLW disposal facility by a private company. The State is currently reviewing a license application, and a recommendation from the State regulatory authority on whether to issue a license is expected in January 2009. The facility will accept waste only from Texas and Vermont, the members of the Texas Compact. The compact could authorize the disposal of out-of-compact waste, but such an action is speculative at this time. A separate part of that facility would also be licensed to accept DOE LLW.

Under the LLRWPAA, DOE is responsible for providing for disposal of GTCC LLW and has recently taken some concrete steps to fulfill this responsibility. In July 2006, DOE reported to Congress on its plans for GTCC disposal, and in July 2007, DOE issued a Notice of Intent to prepare an environmental impact statement (EIS) for disposal of greater-than-class C LLW.[3, 4] In that report, DOE stated that it intends to issue an EIS in 2008 that would examine disposal alternatives. After issuing the EIS, DOE plans to await direction from Congress before proceeding with implementing any of the alternatives. Thus, disposal of GTCC waste remains at least several years away. Ultimately, NRC is responsible for reviewing a license application for a GTCC disposal facility submitted by DOE, and the DOE's report to Congress and EIS are important steps that will lead to development of a license application.

Since September 11, 2001, the security of radioactive materials in general has been a greater concern, and Federal agencies, States, and licensees have taken many steps to increase the assurance of adequate security. LLW does not, generally speaking, have many unique security

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3 U.S. Department of Energy, "Report to U.S. Congress: The Estimated Cost and Proposed Schedule to Complete the Environmental Impact Statement and Record of Decision for the Disposal of Greater-Than-Class-C Low-Level Radioactive Waste," July 2006.

4 U.S. Department of Energy, "Notice of Intent To Prepare an Environmental Impact Statement for the Disposal of Greater-Than-Class-C Low-Level Radioactive Waste," *Federal Register*, July 23, 2007, Vol. 72, No. 140, pp. 40135-40139.

requirements. One exception to this general rule, however, concerns sealed sources. In a recent report to Congress,[5] the Radiation Source Protection and Security Task Force provided several recommendations concerning sealed sources that no longer have a use and therefore must be managed and disposed of as radioactive waste. A number of the sources may be classified as GTCC waste and thus cannot be disposed of at this time. The staff has developed an implementation plan for the task force report, which includes several waste-related activities.

In the last 10 years, generators of all types of radioactive waste have made increasing use of Resource Conservation and Recovery Act (RCRA) facilities, particularly hazardous waste facilities, for disposal of low-activity waste (LAW). Limited disposal options for LLW and the cost of disposal have been factors in the use of these facilities, which are not licensed under the AEA but are permitted under RCRA by the States in which they are located. LAW includes not only LLW at the low-end of Class A concentrations, but also waste containing naturally occurring radioactive materials (NORM), tailings from the extraction of uranium from ore, and exempt concentrations of source material (e.g., less than 0.05 weight %). Based on comments received from stakeholders, they continue to have a significant interest in the use of these disposal facilities and would like the NRC to issue additional guidance on the provision in 10 CFR 20.2002, "Method for Obtaining Approval of Proposed Disposal Procedures," that licensees use to obtain approval for such disposals. However, some stakeholders, particularly public interest groups, oppose the use of these facilities for AEA materials.

In the next few years, Louisiana Energy Services will begin operation of an enrichment plant that will produce large amounts of depleted uranium (DU). In 2005, the Commission directed the staff[6] to consider whether the waste classification of DU (currently Class A) from enrichment plants needs to be reassessed in the NRC's LLW disposal regulation in 10 CFR Part 61 because the development of the regulation did not explicitly consider a waste stream involving the large amounts of DU that will ensue from the operation of a licensed enrichment plant.

The above circumstances suggest or require certain actions by the NRC, ranging from updating storage guidance (because many generators may no longer have a disposal option for Class B/C waste beginning in mid-2008), to developing licensing criteria for GTCC facilities, to developing guidance for LAW disposal. Many LLW stakeholders also believe that other changes are needed, ranging from amending or eliminating the LLRWPAA, to specific suggestions for revising NRC LLW guidance. The following section describes improvements in the current LLW disposal system that various organizations have proposed.

2.4 Potential Improvements in the National LLW System

Over the last several years, several organizations have published position statements or reports that recommend changes to the current LLW system. In 1999 and 2004, at the request of Congress, GAO explored alternatives to the current U.S. system for commercial LLW disposal, including the use of DOE sites, the rescinding of the LLRWPAA, and allowing private

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5 Radiation Source Protection and Security Interagency Task Force, "The Radiation Source Protection and Security Task Force Report," August 2006.

6 Commission Memorandum and Order CLI-05-20, October 19, 2005.

developers to pursue new facilities.[7, 8] GAO did not recommend any specific changes; in fact, in its 2004 report, it asked Congress to consider assigning the NRC the responsibility to report when it felt changes were needed to the LLRWPAA. Congress, however, has not acted on that suggestion.

In late 2004, the Senate Energy and Natural Resources Committee held a hearing on alternatives to the LLRWPAA and heard testimony from GAO and others on potential changes.[9] The Chairman of the Committee expressed his belief that using Federal land for private development of LLW sites may be an attractive alternative. The Health Physics Society, the Council on Radionuclides and Radiopharmaceuticals, the Calrad Forum, the American Nuclear Society, and others have recommended that the LLRWPAA be replaced and that private companies be allowed to develop new disposal facilities for LLW on land owned by the Federal government, or that existing DOE sites be used for commercial disposal.[10, 11, 12, 13] The LLW Forum, representing existing compacts and States involved in LLW disposal, has published a position statement arguing for moderation and consideration of whether any changes would in fact improve the current national LLW disposal system or would instead have unintended negative consequences.[14]

The NRC has also recognized that changes may be needed in the national system. In a letter to GAO commenting on a draft of its 2004 report on LLW,[15] the NRC stated that the current system was neither risk-informed nor reliable (i.e., the system did not provide LLW generators with adequate assurance of disposal for generators for the next 5–10 years), was not cost-effective, and that the time was right to begin exploring alternatives. In response to another request from Congress, GAO has been investigating approaches taken by other countries in

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7 Government Accountability Office, "Low-Level Radioactive Wastes: States Are Not Developing Disposal Facilities," GAO/RCED-99-238, September 1999.

8 Government Accountability Office, "Low-Level Radioactive Waste: Disposal Availability Adequate in the Short Term, but Oversight Needed to Identify Any Future Shortfalls," GAO-04-604, June 2004.

9 U.S. Senate, Committee on Energy and Natural Resources, "Low-Level Radioactive Waste," Hearing 108-756, September 20, 2004.

10 Health Physics Society, "Low-Level Radioactive Waste Management Needs a Complete and Coordinated Overhaul," http://www.hps.org September 2005.

11 Council on Radionuclides and Radiopharmaceuticals, "Council on Radionuclides and Radiopharmaceuticals Position Paper on Low-Level Radioactive Waste Disposal," http://www.corar.org April 6, 2001.

12 California Radioactive Materials Management Forum, "A National Solution for a National Problem," http://calradforum.org/, 2003.

13 American Nuclear Society, "Disposal of Low-Level Radioactive Waste—Position Statement No. 11," http://www.ans.org/, November 2004.

14 LLW Forum, "Management of Commercial Low-Level Radioactive Waste," http://www.llwforum.org/, September 22, 2005.

15 Letter from Luis A. Reyes, NRC, to Robin Nazarro, GAO, May 25, 2004.

managing their LLW to determine whether any of those approaches might be applicable in the United States.

Two other national organizations have also addressed changes in LAW regulation in the last several years. In March 2006, the NAS issued a report that described a patchwork system of LAW regulation in the United States that is based on the origin of the waste (DOE, commercial, non-AEA, etc.) rather than the hazard associated with the waste.[16] The NRC was one of the study's sponsors. NAS recommended that Federal agencies risk-inform LAW disposal in incremental steps, relying mainly on existing authorities under current statutes, while noting that specific, targeted legislation could be helpful. In 2002, the National Council on Radiation Protection and Measurements (NCRP) issued a report recommending that the United States adopt a framework for classifying radioactive and hazardous waste based on its risk (hazard) rather than its origin.[17] Though the NCRP recommendation included chemical as well as radioactive waste, the scope was similar to that of the 2006 NAS study in its call for some significant changes in the way that hazardous and radioactive materials are regulated.

The NRC's own ACNW&M has also been active in encouraging the use of more risk-informed regulation of LLW. In December 2005, the ACNW&M provided a draft white paper to the Commission that included a historical summary of the commercial management of LLW in this country. In its transmittal letter, ACNW&M identified specific areas for risk-informing the regulatory framework for LLW management.[18] In May 2006, ACNW&M held a workshop with numerous national LLW stakeholders to obtain more ideas on risk-informing the framework and provided the results of the workshop to the Commission.[19] In January 2007, the ACNW&M published its final version of this white paper as NUREG-1853.[20]

3. PURPOSE OF THE LLW STRATEGIC ASSESSMENT

The purpose of this LLW strategic assessment is to identify the actions that the NRC could take as part of its LLW program and to prioritize them in accordance with the program's strategic objective, as discussed below. Although the stakeholders have suggested many improvements and changes, this assessment places greatest emphasis on those that are directly related to the NRC's responsibilities to ensure safety, security, and environmental protection. Schedules for completing high priority tasks are based on budgeted resources. An important part of this assessment is the prioritization of those activities that will contribute the most to the strategic objective that the staff developed for the LLW program, as well as to the NRC's safety, security, openness, and effectiveness goals. Many of the activities considered

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16 National Research Council of the National Academies, "Improving the Regulation and Management of Low-Activity Radioactive Waste," March 2006.

17 National Council on Radiation Protection and Measurements, "Risk-Based Classification of Radioactive and Hazardous Chemical Wastes," NCRP Report No. 139, 2002.

18 Letter from Michael Ryan, Chairman, ACNW&M, to Nils Diaz, Chairman, NRC, December 27, 2005.

19 Letter from Michael Ryan, Chairman, ACNW&M, to Dale Klein, Chairman, NRC, August 16, 2006.

20 ACNW&M, "History and Framework of Commercial Low-Level Radioactive Waste Management in the U.S.," NUREG-1853, January 2007.

involve more risk-informed approaches to LLW management, for example, and most deal with effectiveness issues. The following sections discuss the process the staff used to identify, evaluate, and prioritize activities it could conduct in the next few years.

4. PROCESS

The staff's strategic assessment process involved four major steps. They are: (1) development and validation of a strategic objective for the NRC's LLW regulatory program; (2) information gathering; (3) evaluation of the information obtained and identification of potential work activities; and, (4) decisionmaking.

4.1 LLW Program Stategic Objective

On June 28, 2007, the Commission approved the NRC's draft FY2007-FY2012 Strategic Plan.[21] The draft plan, which will be finalized by the Commission after it receives and considers public comments, will replace the current FY2004-2009 Strategic Plan.[22] As indicated in both plans, the agency's overarching strategic objective is to "enable the use and management of radioactive materials and nuclear fuels for beneficial civilian purposes in a manner that protects public health and safety and the environment, promotes the security of the nation, and provides for regulatory actions that are open, effective, efficient, realistic and timely." Both plans call for the assessment of key issues affecting the safe management of civilian LLW, and further note that NRC programs should "... anticipate challenges and respond quickly to changes in the regulatory and technical environment."

Consistent with the strategies and means identified in the strategic plans and briefly summarized above, the following strategic objective for the NRC's LLW regulatory program was developed:

> The objective of NRC's LLW regulatory program is to provide for a stable, reliable, and adaptable regulatory framework for effective LLW management, while maintaining safety, security, and protection of the environment.

As noted in Section 3, the purpose of this strategic assessment is to identify and prioritize activities that will position the LLW program to meet this strategic objective. In striving to ensure stability and reliability in the LLW regulatory framework, the staff is building on a regulatory system that has at its heart a regulation, 10 CFR Part 61, that was established over two decades ago. While that regulation and its associated regulatory guidance have, by establishing firm and clear procedures and criteria, facilitated the safe and secure disposal of LLW, the staff's overall approach to LLW management, including disposal, is intended to be sufficiently flexible and adaptable to allow modifications to be made to accommodate changing conditions in a reasonably facile and straightforward manner.

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21 U.S. Nuclear Regulatory Commission, "FY (fiscal year) 2007-2012 Strategic Plan," NUREG-1614, Vol. 4, Draft for Comment.

22 U.S. Nuclear Regulatory Commission, "FY (fiscal year) 2004–2009 Strategic Plan," NUREG-1614, Vol. 3, August 2004.

The discussion that follows describes the process used to identify challenges to the NRC's LLW regulatory program and the actions that the staff can take to address those challenges.

4.2 Information Gathering

The staff used several means to gather information, starting with participation in a May 2006 workshop organized and led by the ACNW&M Low-Level Waste Working Group. The workshop was designed to provide a forum that would support the working group's ongoing broad review of the NRC's LLW program, as well as the staff's LLW strategic assessment. Meeting participants included a wide range of stakeholders, including representatives from the nuclear industry, academia, other Federal agencies, professional societies, States and compacts, and public interest groups, as well as the ACNW&M members and their staff and current and former NRC staff. The workshop included presentations by invited speakers that addressed the status of the current LLW program and current framework for managing LLW. The workshop also included panel discussions such as an industry roundtable at which participants described their perspectives on the staff's LLW strategic assessment, and opportunities for public comment during which stakeholders could convey their views on LLW issues. Before the meeting, ACNW&M issued a public announcement that contained the agenda, the names of invited speakers, and a list of questions generated by the NRC staff that were intended to stimulate a dialogue among the attendees. ACNW&M summarized the meeting in a memorandum to the Commission, dated August 16, 2006.[23]

To ensure that all stakeholders would have an opportunity to make their views known, the staff issued a *Federal Register* notice (FRN), later modified to extend the comment period, requesting comments on the staff's approach to the strategic assessment.[24] Specifically, the FRN solicited public comment on what changes, if any, should be made to the current framework for the NRC's regulatory program for LLW, as well as what specific actions the staff could take to facilitate such changes. In addition, the FRN asked whether there were any vulnerabilities or impediments in the current regulatory approach toward LLW disposal in the United States. The notice also requested suggestions on ways to improve interagency communication and cooperation. The FRN elicited a broad range of responses, ranging in detail from one or two sentences to several pages.

Other sources of stakeholder input included discussions held with Agreement State regulators, comments received in a public meeting with representatives of the Nuclear Energy Institute and Electric Power Research Institute, and concerns and opinions contained in published position papers by several national organizations such as the American Nuclear Society, Health Physics Society, and LLW Forum. Appendix A provides an illustration of the variety of stakeholder views on key LLW issues.

4.3. Evaluation of Information Received

The approach taken in evaluating the information received involved: (1) identification of current system vulnerabilities/challenges; (2) consideration of alternative futures; and, (3) identification

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23 Letter from Michael Ryan, Chairman, ACNW&M, to Dale Klein, Chairman, NRC, August 16, 2006.

24 *Federal Register*, Volume 71, pp. 38675–38676, July 7, 2006.

and evaluation of potential activities that would support the LLW program strategic objective. The following discussions address the particular relevance of each of these steps in the evaluation process, the manner in which the staff carried out these steps, and the relationship between the steps.

4.3.1 System Vulnerabilities/Challenges

The term "vulnerabilities" as used in this strategic assessment refers to challenges to the current LLW regulatory framework that could have an impact on the LLW program's ability to maintain safety and security or could affect system reliability, predictability, adaptability, and burden (cost). As noted, the staff's FRN asked that persons consider whether there were any vulnerabilities or impediments in the current regulatory approach toward LLW disposal in the United States. In addition to the valuable input obtained from stakeholders (as discussed in Appendix A), the staff has also identified several new and significant issues that have surfaced and grown in importance. These issues include but are not limited to the following:

- the desire of industry for greater flexibility and reliability regarding disposal options, particularly for LAW,
- increased storage of Class B and C LLW because of the potential closing to out-of-compact waste generators of the Barnwell, South Carolina, disposal facility in 2008,
- other new waste streams not previously considered in the technical basis for 10 CFR Part 61 that may be generated (for example, by the next generation of nuclear reactors) and the reemergence of nuclear fuel reprocessing,
- the coming need to dispose of large quantities of power plant decommissioning waste, as well as large quantities of DU from enrichment facilities,
- lack of a disposal option for GTCC LLW,
- increased security concerns.

The staff requested stakeholder input on whether there were any actions, either regulatory or industry-initiated, that should be taken in regard to these or other specific issues. As discussed below, the staff considered the information received in response to its questions, along with the perspectives presented by participants at the ACNW&M workshop and policy statements issued by national organizations and industry groups, in the context of alternative futures.

4.3.2 Alternative Futures

During the initial conceptual stage of this strategic assessment, the NRC staff realized that it would be necessary to consider not only the current state of affairs regarding LLW disposal but also how conditions might change in the relatively near future (approximately 5 years) and the longer term (about 20 years). Consequently, at the May 2006 ACNW&M workshop and in the subsequent FRN, the staff asked for stakeholder opinions on what the future might be with respect to the types and volumes of LLW streams and availability of LLW disposal options, as well as how potential future disposal scenarios might affect LLW storage and disposal in the

United States. In addition, the staff asked what actions the NRC and other Federal and State authorities, as well as private industry and national scientific and technical organizations, could take to optimize management of LLW and improve the future outlook. The staff identified three alternative futures labeled optimistic, realistic, and pessimistic, from stakeholder input and staff discussions. The optimistic scenario assumes unencumbered disposal of all classes of LLW at reasonable costs, while the other scenarios assume increasing impediments and costs for disposal and related activities. Appendix B contains additional details about the assumptions applied in these scenarios.

4.3.3 Identification of Proposed Activities

After considering stakeholder input on system vulnerabilities/challenges and potential alternative futures, the staff factored in its own experience and knowledge base and developed a list of potential activities for the LLW program that supported the strategic objective and were responsive to identified programmatic needs. For each identified activity, the staff developed evaluation worksheets describing the activity's purpose and expected product, the alternative futures (i.e., scenarios) that best apply to the activity, the activity's relative impact on or contribution to the agency's strategic goals, the degree of urgency (need) for the activity and the benefit to be derived, the resources (cost and estimated time) required to complete the activity, and additional considerations (including the potential for unintended consequences). Ultimately, the staff ranked each proposed task by reaching a consensus, based on subjective judgments to some degree, on the relative "return on investment" (i.e., the potential benefit in terms of meeting the LLW program's strategic objective versus the resources and time required to obtain the expected benefits). Appendix C provides a table summarizing the proposed tasks, including the staff's evaluation and prioritization of each activity per the criteria discussed above. Appendix D offers a cross-reference of recommendations provided by the ACNW&M, GAO, and NAS with the staff's proposed activities.

Some stakeholder suggestions and recommendations for NRC action are not included in the staff's list of proposed tasks and activities because: (1) they are considered to be outside of the scope of this effort, which is focused on the NRC's regulatory framework for LLW; (2) they are outside of the NRC's purview; and/or, (3) they require changes in legislation or regulations that are simply not feasible at present. Examples include suggestions that there be no radiation exposure allowable from LLW (in place of the current dose limits) and that the NRC's regulations should address the synergistic effects of combinations of radioactivity, toxic chemicals, and other contaminants in the biosystem. While the staff did not evaluate these and similar recommendations, it did attempt to consider all other suggestions that were within the scope of this assessment. In some instances, the staff combined suggestions in the context of other tasks rather than treating each recommendation separately. Most of the various recommendations for specific revisions to 10 CFR Part 61 were handled in that way.

4.4. Decisionmaking

The final step in the strategic assessment process, decisionmaking, requires assignment of the resources expected to be available in the near term (i.e., fiscal year (FY) 2008 and 2009) to a subset of the activities identified and prioritized by the staff in Appendix C.

4.4.1 Current Work Resource Requirements

The FY 2008 and FY 2009 resource allocation for the NRC's LLW regulatory program is six FTE, much of which is consumed by the baseline program. The baseline LLW regulatory program involves a variety of activities such as the following:

- providing support to other NRC offices and programs on matters such as rulemakings (e.g., on naturally occurring or accelerator-produced material), licensing activities, and allegations,
- providing technical support on LLW issues (e.g., review of dose assessments for 10 CFR 20.2002 requests)
- providing technical assistance to Agreement States,
- participating in Integrated Materials Performance Evaluation Program reviews of Agreement States' LLW programs,
- assisting the Office of International Programs in the review of license applications for the import and export of radioactive waste,
- participating in activities that involve international agreements, such as the review of draft standards developed by the International Atomic Energy Agency and the review of National Reports prepared by contracting parties to the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management,
- assisting external stakeholders such as the GAO, DOE, U.S. Environmental Protection Agency, NAS, the Army Corps of Engineers, the Conference of Radiation Control Program Directors, members of the public, waste generators and processors, and the media,
- responding to Commission direction on selected issues, most recently on identifying and implementing measures to improve transparency in NRC's review of 10 CFR 20.2002 alternate disposal requests, and
- monitoring developments in the national LLW disposal system by maintaining liaison with LLW stakeholders.

Though the fraction of staff resources needed to carry out specific functions within the baseline program varies somewhat from year to year, experience suggests that the baseline program will continue to utilize about half of the total staff resources available during FY 2008 and FY 2009, or about 3.5 FTE per year. This leaves the other half of the available staff resources for new work, such as the activities identified in this strategic assessment.

4.4.2 Available Resources for LLW Program Activities

The resources currently budgeted for FY2008 and FY 2009 are 5.0 FTE and $160K, and 7 FTE and $300K respectively. As discussed above, approximately half of available resources is

required for baseline activities. Consequently, in FY 2008 and FY 2009, approximately 2.5 FTE and 5.0 FTE respectively are available for new and/or high-priority work, including new activities identified in this strategic assessment.[25] Appendix E discusses knowledge transfer issues that the staff is addressing to help ensure the LLW staff hired in the future will be effective in completing LLW tasks.

4.4.3 Potential Options for Accomplishing High-Priority Activities

Considering the resources projected to be available, the staff considered two approaches for accomplishing high-priority work. The first is to carry out high-priority activities in series in ascending order of resource requirements, i.e., those requiring the fewest resources would be accomplished first. The second is to work on several of the highest priority tasks at the same time, considering the level of effort, the need, and the schedule for completion. In identifying specific tasks to be completed and their schedules, the staff used the latter approach. Section 5 details the results of the final ranking of high-priority activities.

5. RESULTS

Given the resources in place for FY 2008 and projected to be available in FY 2009 for the agency's LLW regulatory program, the staff focused its attention on the activities with high priority as identified in Appendix C. These seven tasks are presented in Table I. The staff evaluated these activities in more detail to determine how budgeted resources in FY 2008 and FY 2009 should be applied, as discussed above, and then established tentative schedules.

Table I LLW Program Tasks Prioritized as High

Task No.	Task Description	Resources (FTE)	Schedule
1	Review and Update Guidance on Extended Storage of LLW for Materials and Fuel Cycle Licensees, and Review Industry Guidance for Reactors	1.2	Complete 2nd Quarter FY08 (first task) Complete 4th Quarter FY08 (second task)
2	Develop and Implement Guidance on 10 CFR 20.2002 Alternate Disposal Requests	1.3	Initiated 3rd Quarter FY07 Complete 4th Quarter FY08
3	Determine if disposal of large quantities of depleted uranium from enrichment plants warrant change in uranium waste classification	1.4	Initiated 3rd Quarter FY07 Complete 4th Quarter FY08
4	Update Branch Technical Position on Concentration Averaging and Encapsulation	2.0	Initiate 2nd Quarter FY08
5	Develop Procedures for Import/Export Reviews	1.0	Initiate in FY09
6	Develop Guidance Document on Alternate Waste Classification (10 CFR 61.58)	3.6 - 4.3	Revisit in FY09
7	Perform Scoping Study on Byproduct Material Financial Assurance	0.2 - 0.4	Revisit in FY09

25 Based on $143K per FTE for contract funding.

As shown in Table I, the staff could potentially complete the first three tasks listed by the end of FY 2008. The first task, to review and update guidance on extended storage of LLW, was begun in FY 2006. This task is needed because of the potential closure of the Barnwell, South Carolina, facility as discussed in Section 2.3. Given that the agency's existing guidance on LLW storage is in some cases obsolete and may also have gaps in areas related to security, the staff finds that this task should proceed as currently scheduled. It will contribute to the agency's safety and security goals, as well as to the LLW program strategic objective. This activity is scheduled for completion in the second quarter of FY 2008.

The second task, to develop an internal procedure and guidance document for 10 CFR 20.2002 alternative disposal reviews, will have little impact on safety and security, as such alternative disposals are currently proceeding in a safe and secure manner. This task will, however, significantly improve openness and transparency by clearly identifying, in a guidance document readily available to all stakeholders, the review criteria, dose modeling considerations, and external coordination required. The internal procedure will significantly improve the effectiveness and efficiency of the NRC's regulatory program for LLW by enhancing consistency and transparency in the internal review process and will assist in facilitating risk-based disposal of LLW, an objective supported by a number of stakeholders.

The third task, to identify and analyze alternatives for disposal of large quantities of DU, responds to a directive from the Commission to consider whether the quantities of DU at issue in the waste stream from new uranium enrichment facilities warrant amending 10 CFR 61.55(a)(6) or waste classification tables in that section[26]. When the NRC was developing the regulation (10 CFR Part 61) for near-surface disposal of LLW, it did not consider the disposal of large quantities of DU at an LLW disposal site. This task will thus provide a clear regulatory path for disposal of commercial DU.

The fourth task, to update the branch technical position (BTP) on LLW concentration averaging and encapsulation, has the potential to greatly increase the flexibility of disposal of certain types of LLW, particularly sealed sources and irradiated hardware.[27] The staff will use risk-informed approaches and knowledge that were not available when the BTP was developed and last updated (in 1995). In comments made at the ACNW&M workshop and in response to the staff's FRNs, stakeholders indicated a belief that this effort will facilitate disposal of LLW in a risk-informed manner. This task would also contribute to the agency's strategic goal of openness, because it would require substantial stakeholder involvement. However, the staff is aware of ongoing industry effort in this area and may be able to utilize the results of the industry's activity and thereby reduce the level of staff resources and time required to complete the BTP update. The staff also intends to employ contractor assistance for this task.

As the highest priority tasks are completed, the staff will initiate work on other tasks in Table I and establish schedules for their completion. While the staff considers all the tasks listed in Appendix C to be worthy endeavors, it has no plans at present to schedule work on those that

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26 Commission Memorandum and Order CLI-05-20, October 19, 2005.

27 U.S. Nuclear Regulatory Commission, "Final Branch Technical Position on Concentration Averaging and Encapsulation," January 17, 1995 (ADAMS Accession No. ML033630732).

are ranked as having a medium or low priority. The staff believes, like ACNW&M[28], that the current regulations are fully protective of the public health and safety and worker health and safety. At the same time, there are a number of opportunities for better risk-informing the LLW regulatory framework and improving the effectiveness of LLW management and regulation. The 20 activities evaluated in this assessment would contribute to those goals. The staff will continue to monitor developments in the national LLW disposal system, as well as other internal and external events that impact the NRC's LLW program, and will periodically revisit and update this strategic assessment and modify the priority of its activities, as appropriate.

28 Letter from Michael Ryan, Chairman, ACNW&M, to Nils Diaz, Chairman, NRC, December 27, 2005.