

POLICY ISSUE INFORMATION

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SECY-07-0180

FOR: The Commissioners

FROM: Luis A. Reyes
Executive Director for Operations

SUBJECT: STRATEGIC ASSESSMENT OF LOW-LEVEL RADIOACTIVE WASTE
REGULATORY PROGRAM

PURPOSE:

To provide the Commission with a description and results of the staff's strategic assessment of the U.S. Nuclear Regulatory Commission's (NRC's) low-level radioactive waste (LLW) regulatory program. The results of this strategic assessment include a prioritized listing of ongoing and future staff actions and activities, along with associated schedules and resource estimates. This paper does not address any new commitments.

SUMMARY:

In this paper, the NRC staff provides the results of its strategic assessment of the agency's LLW regulatory program, along with a description of the process used to perform the assessment. Twenty potential activities that the staff could undertake to improve the LLW regulatory framework were evaluated and prioritized. The staff ranked 7 of these as high priority. The enclosed report provides a detailed discussion of the strategic assessment process and results.

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BACKGROUND:

The primary statutory drivers of the NRC's LLW regulatory program are the Atomic Energy Act (AEA) of 1954, as amended, and the Low-Level Radioactive Waste Policy Amendments Act (LLRWPA) of 1985. The AEA provides the authority by which the NRC regulates the possession and use of nondefense-related radioactive material.

Congress enacted the LLRWPA to ensure that disposal capacity would be available for all types of LLW generated by AEA licensees. The LLRWPA also required that certain actions be undertaken by NRC, including development of guidance for licensing engineered disposal facilities, promulgation of a rulemaking for granting emergency access to disposal facilities, and establishing procedures and the technical capability for processing a LLW disposal facility license application within 15 months of receiving an application. As a result, the NRC's LLW regulatory program at its height (in 1986) was staffed by approximately 28 full-time equivalents (FTE). The FTE level ranged from 13 to 22 until the mid-1990s, when the program was scaled back because of the completion of the NRC's LLRWPA-related activities and an overall reduction in LLW activities nationwide, as no new disposal sites were developed.

The magnitude and scope of the NRC's current LLW regulatory program reflects a decision made by the Commission in response to an issues paper prepared by the staff in 1996.¹ The Commission chose to maintain a program of 5-10 FTE, 1 of 6 options presented in the paper. Currently, more than half of these resources (i.e., approximately 70% of the 5 FTE in fiscal year (FY) 2008) are dedicated to baseline work, which includes: (1) import/export licensing; (2) providing technical support to other programs on LLW disposal issues; (3) reviewing and approving 10 CFR 20.2002 alternative disposal requests; and (4) addressing issues identified by the Commission, such as depleted uranium waste classification and 10 CFR 20.2002 transparency measures. The staff also works with external organizations (for example, the Agreement States and other Federal entities such as the U.S. Government Accountability Office (GAO), U.S. Department of Energy, U.S. Environmental Protection Agency, and U.S. Army Corps of Engineers) in addressing LLW disposal issues.

Meanwhile, several issues have been identified and grown in importance, in part because no new disposal sites have been developed. Examples of these issues include the following:

- The desire of industry for greater flexibility and reliability in LLW disposal options;
- Increased storage of Class B and Class C LLW because of the potential closing of the Barnwell, South Carolina, disposal facility in 2008 to out-of-compact waste generators;
- The coming need to dispose of large quantities of power plant decommissioning waste, as well as depleted uranium from enrichment facilities;
- Increased security concerns; and,

¹ "Direction Setting Issue 5: Low-Level Waste," September 16, 1996, ADAMS ML061700297.

- New waste streams that may be generated (for example, by the next generation of nuclear reactors and the potential reemergence of nuclear fuel reprocessing in the United States).

These and other issues have prompted much interest from several national organizations regarding the current status of regulation and disposal of LLW. The concerns of several of these groups are contained in position papers issued by the American Nuclear Society and Health Physics Society; ACNW&M letter reports; recent reports issued by the GAO; and questions and issues raised in various forums by the National Academy of Sciences (NAS), industry groups, such as the Nuclear Energy Institute (NEI) and Electric Power Research Institute (EPRI); and public interest groups, such as the Sierra Club. In some cases, these organizations have recommended specific actions the staff could take to address their concerns, ranging from developing regulatory guidance for implementing 10 CFR 20.2002 (alternative disposal methods) to making major revisions to the NRC's LLW disposal regulations in 10 CFR Part 61.

In addition to such external factors, internal factors also influence the staff's ability to achieve the agency's LLW objectives. An example of an internal factor is the serious challenge to the agency's knowledge base in the LLW area posed by the approaching retirement of much of the senior staff. The small size and unique nature of the program make it difficult to recruit and train new staff while meeting programmatic goals.

Because the demands on LLW program resources are greater than the resources available, the program needs a strategy to identify and prioritize the tasks to be performed in response to these internal and external considerations. Consequently, NRC staff undertook the effort described below to assess the current LLW regulatory program to ensure that it remains positioned to achieve agency objectives.

DISCUSSION:

The strategic assessment process involved four major steps: (1) development of strategic objectives and goals; (2) information gathering; (3) evaluation of the information obtained; and (4) decisionmaking. The complete report is contained in the enclosure. With regard to the first step, the staff formulated a strategic objective to be consistent with, and to complement, the overall agency goals provided in the NRC's FY 2004 – 2009 Strategic Plan² and draft FY 2007- FY 2012 Strategic Plan.³ 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,

² U.S. Nuclear Regulatory Commission, "FY 2004–2009 Strategic Plan," NUREG-1614, Vol. 3, August 2004.

³ U.S. Nuclear Regulatory Commission, "FY 2007 - 2012 Strategic Plan," NUREG-1614, Vol. 4, August 2007. The draft plan, which will be finalized by the Commission after it receives and considers public comments, will replace the current FY 2004-2009 Strategic Plan.

“ . . . anticipate challenges and respond quickly to changes in the regulatory and technical environment.”

The strategic objective developed for the LLW program is as follows:

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.

In carrying out this strategic assessment, the staff used a variety of means to elicit stakeholder input, including participating in a workshop organized and led by the Low-Level Waste Working Group of the Advisory Committee on Nuclear Waste and Materials (ACNW&M) and issuing a *Federal Register* Notice⁴ asking for comments from the public on the staff’s approach. The staff also solicited opinions and suggestions from Agreement State regulators and representatives of industry groups. In addition, the staff considered concerns and opinions presented in recent position papers issued by national scientific and technical organizations.

After considering stakeholder input and factoring in its own experience, the staff developed a list of proposed activities that supported the strategic objective and were responsive to identified programmatic needs. The staff evaluated 20 activities and assigned them priorities of high, medium, or low. The enclosed report contains a full discussion of the bases for the ranking and prioritization of each of the 20 tasks, including those with a medium or low ranking. After consideration of the potential activities that the staff could undertake to improve the LLW regulatory framework, the staff believes, like ACNW&M,⁵ 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.

Table I shows the activities assigned a high priority. The staff evaluated these activities in more detail to determine how budgeted resources in FY 2008 and FY 2009 should be applied, using the same prioritization criteria described above. The staff then established tentative schedules for FY 2008 and FY 2009. As shown in the table, the staff projects that it will complete the first three of the highest ranked tasks by the end of FY 2008. The staff expects to initiate work on the fourth task in second quarter of FY 2008 and will complete it no earlier than FY 2009, based on available resources. The staff will initiate work on the remaining tasks listed in the table as resources become available. It is important to note that the staff’s projected schedule assumes the expertise of the current staff (as discussed in Appendix E of the enclosed report); significantly more time would be needed to complete the activities using new or less-experienced staff). The staff plans to revisit the unscheduled tasks as part of the budget process in the out-years to assess whether the current priorities should change as a result of changing external and internal factors.

⁴ *Federal Register* Notice, Vol. 71. No. 130, pp 38675-38676, July 7, 2006.

⁵ Letter from Michael Ryan, Chairman, ACNW&M, to Nils Diaz, Chairman, NRC, December 27, 2005.

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 2 nd Quarter FY08 (first task) Complete 4 th Quarter FY08 (second task)
2	Develop and Implement Guidance on 10 CFR 20.2002 Alternate Disposal Requests	1.3	Initiated 3 rd Quarter FY07 Complete 4 th Quarter FY08
3	Determine if disposal of large quantities of depleted uranium from enrichment plants warrant change in uranium waste classification	1.4	Initiated 3 rd Quarter FY07 Complete 4 th Quarter FY08
4	Update Branch Technical Position on Concentration Averaging and Encapsulation	2.0	Begin 2 nd 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

It should also be noted that the NEI has recently indicated that it plans to submit reports for NRC review addressing some of the activities in the above table. NRC staff has met several times with NEI to discuss their efforts, which in the near-term, include an industry report on extended storage guidance for nuclear power plants which the staff plans to review. Staff also plans to meet with NEI on other reports as they are developed. NRC's review and endorsement of industry reports on these issues will leverage industry's efforts, will save staff resources, and will enable the staff to address a broader set of LLW issues with the current resources.

The activities in Table I address a number of important issues. Several of the activities are focused on facilitating the disposal of LLW, while looking for opportunities to further risk inform LLW management, and ensure that LLW will continue to be managed safely whether or not the Barnwell disposal facility closes to out-of-compact LLW generators in 2008, as currently projected. Updated LLW storage guidance, new or updated guidance on risk-informing disposals (using the provision in 10 CFR 61.58 and staff's concentration averaging guidance), and an examination of financial assurance in light of increased costs due to storage of LLW will help to ensure safe LLW management and facilitate disposal of certain wastes. Further, the development of staff procedures for evaluation of 10 CFR 20.2002 alternate disposal and import/export licensing requests will significantly improve internal efficiency, as well as provide needed guidance to licensees on staff's expectations for these requests. Lastly, the examination of disposal of large quantities of depleted uranium from enrichment plants will be responsive to a specific Commission request of the staff and provide a predictable regulatory framework for these licensees.⁶

In conducting this assessment, the staff sought the views of the Agreement States, which play a significant role in the regulation of LLW management and disposal. The States of

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

Washington, South Carolina, and Texas commented on the NRC LLW regulatory program at the ACNW&M working group meeting, or in formal letters, or both. The staff also held teleconferences with officials from the States of Tennessee and Utah to obtain their views. These particular States play major roles in the regulation of LLW in the United States. As the staff implements the activities in Table I, it will continue to coordinate with Agreement States to ensure that their experience is considered and that the guidance developed will be useful in their programs.

RESOURCES:

Schedules for the activities in tasks 1-4 in Table I are based on budgeted resources. In FY 2008 and FY 2009, the LLW program budget is 5.0 and 7.0 FTE respectively. In both years, 3.5 FTE per year is allocated to baseline LLW activities. The remaining 1.5 FTE (FY 2008) and 3.5 FTE (FY 2009) will therefore be used for the tasks identified in Table I. No new resources are required. Schedules for other activities in Table I and in this assessment (Appendix C, Table C-1) will be addressed later in FY 2008 and beyond, and as the first several tasks near completion.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objections. The Office of the Chief Financial Officer has reviewed this paper for resource implications and has no objections. The staff plans to brief the ACNW&M on this topic later this calendar year.

/RA/

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Enclosure:
Strategic Assessment of the NRC's
Low-Level Radioactive Waste
Regulatory Program

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Enclosure:
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Low-Level Radioactive Waste
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EDATS: FSME-2007-0005

OFC	EPPAD	EPAD:BC	EPAD:DD	OGC	CFO
NAME	MTokar	RWhited	SFlanders	FCameron (NLO) (GSMizuno for)	LBarnett
DATE	05/25/07	06/04/07	05/31/07	05/24/07	05/14/07
OFC	DWMEP	TechEd	FSME	EDO	
NAME	LCamper	CPoland	CMiller	LAReyes	
DATE	06/01/07	06/19/07	10/01/07	10/17/07	

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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

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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 (LLRWPA) 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 LLRWPA was to ensure that disposal capacity would be available for all types of LLW generated by AEA licensees. The LLRWPA 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 LLRWPA 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 LLRWPA incorporated milestones, incentives, and penalties to encourage States to pursue development of new facilities.

In implementing the provisions of the LLRWPA, 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 LLRWPA 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 LLRWPA.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.

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 facilities² 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 LLRWPA, 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 LLRWPA, 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 LLRWPA. 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 LLRWPA.

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 LLRWPA 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

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 LLRWPA, 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 LLRWPA, 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

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 staff⁶ 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 LLRWPA, 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 LLRWPA, and allowing private

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 LLRWPA. 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 LLRWPA 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 LLRWPA 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 Strategic 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.

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

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 2 nd Quarter FY08 (first task) Complete 4 th Quarter FY08 (second task)
2	Develop and Implement Guidance on 10 CFR 20.2002 Alternate Disposal Requests	1.3	Initiated 3 rd Quarter FY07 Complete 4 th Quarter FY08
3	Determine if disposal of large quantities of depleted uranium from enrichment plants warrant change in uranium waste classification	1.4	Initiated 3 rd Quarter FY07 Complete 4 th Quarter FY08
4	Update Branch Technical Position on Concentration Averaging and Encapsulation	2.0	Initiate 2 nd 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 section²⁶. 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

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&M²⁸, 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.

APPENDIX A

STAKEHOLDER VIEWS - EXAMPLES

The solicitation and subsequent consideration of stakeholder views were major steps in the development of the low-level waste (LLW) Strategic Assessment. External stakeholder views and opinions were primarily obtained in the following ways: (1) from comments provided by invited speakers and other attendees at a May 2006 Advisory Committee on Nuclear Waste and Materials (ACNW&M) two-day Working Group Meeting (i.e., a “fact-finding” workshop), which was attended by representatives from industry, states and compacts, academia, other federal government agencies, environmental groups, and professional societies; (2) from responses to a Federal Register Notice (FRN) , issued on July 7, 2006 (and later modified on July 27, 2006 to extend the comment period), which asked for comments from the public on the staff’s approach toward the strategic assessment; (3) via teleconferences with certain Agreement State regulators; and (4) from comments received in a December 2006 public meeting with the Nuclear Energy Institute (NEI) and Electric Power Research Institute (EPRI). In addition, apart from the information received in the contacts described above, several national organizations have published position papers that express various concerns and opinions regarding LLW management in the U.S. Those written positions have also been taken into consideration in the development of this Strategic Assessment and are summarized below as they relate to specific issues of interest. The following discussion, in brief, provides examples of stakeholder positions on some key issues. Stakeholder comments on these and other issues are provided in full in the transcripts¹ of the May 2006, ACNW&M workshop and in the public responses² to the staff’s FRN.

As noted earlier in this report, the staff factored in its own experience and knowledge base and developed a list of potential activities for the LLW program after considering stakeholders’ input on their issues of concern. The activities selected, and listed in Appendix C, were based upon programmatic needs, including responsiveness to stakeholder concerns, some of which are discussed below. While all stakeholder suggestions and recommendations for NRC action were given serious consideration by the staff, those that are outside of the scope of this effort and/or outside of NRC’s regulatory responsibility, and those that require changes in legislation or regulations that are unfeasible at the present time are not incorporated in the staff’s list of proposed activities. The priority (high, medium, or low) for each activity identified in Appendix C was ultimately based upon the staff’s qualitative assessment of the task’s relative “return on investment” (ROI), (i.e., the potential benefit in terms of meeting the LLW program’s strategic objective and goals versus the resources and time required to obtain the expected benefits), as well as additional considerations such as the potential for unintended consequences.

Risk-informing

In December 2005, the ACNW&M provided a letter to the Commission that contained a preliminary list of areas where Part 61 might be more risk-informed. In keeping with that theme, the ACNW&M’s stated purpose for its May 2006 workshop was to provide a forum for the collection of information from stakeholders regarding areas where Part 61 might be better risk-

¹ ADAMS Accession Number ML061530321; also at <http://www.nrc.gov/reading-rm/doc-collections/ACNW&M/tr/2006/nw052306.pdf>, and ML061530441; <http://www.nrc.gov/reading-rm/doc-collections/ACNW&M/tr/2006/nw052406.pdf>.

² ADAMS Accession Number ML 070871208.

informed, with the aim thereby of improving the overall effectiveness of the current regulatory framework for LLW disposal. It follows that much of the discussion during the workshop focused on risk-informing the regulatory approach toward LLW management and disposal. Statements on risk-informing generally involved the following four areas: (1) disposal of very low-level radioactive waste (VLLW); (2) assumptions and basis for the intruder protection requirements in 10 CFR Part 61; (3) waste classification; and (4) managing and disposing of radioactive waste in ways commensurate with its degree of hazard, not its origin. As evidenced by the discussion below, it is difficult to treat these issues separately, as in many ways they are interrelated. For example, the Part 61 waste classification system, which establishes maximum concentrations for specific radionuclides, is based on a desire to protect inadvertent intruders. The classification system is founded upon certain assumed scenarios that are described in the Draft Environmental Impact Statement for Part 61, involving resident farmers, residence excavations, and waste exhumations. Therefore, as noted by several participants at the ACNW&M workshop, attempting to develop more “risk-informed” intruder scenarios or applying scenarios differently for different types of sites; (e.g., arid versus humid sites), could have a significant effect on what types and quantities of waste can be disposed of at a particular site (leaving aside other constraints that may be imposed by state or federal regulations or statutes).

The subject of risk-informing radioactive waste disposal has also been addressed in recent position papers issued by some national professional organizations. In March 2006, NAS issued one such paper³ the central theme of which is that LAW should be regulated and managed according to their intrinsic hazardous properties and the associated health risk, instead of via the current regulatory structure, which is based primarily on the origin of the waste (e.g., defense, medical, nuclear industry, non-nuclear industry). A similar view was articulated by the Health Physics Society (HPS) in a revised *Position Statement*⁴ issued in September 2005. Some speakers at the ACNW&M workshop supported the NAS/HPS position on risk-informing. One participant opined that the current (source-based) waste classification system cannot be defended on the grounds of human health protection and should be replaced with a system based on the health risks that could arise from the disposal of the wastes. Further, this participant noted that such a system would also include a general class of waste that would be exempt from regulation. However, another workshop participant, who represented a public interest organization, stated that any attempt to alter the current LLW classification system by risk-informing would be objectionable if such changes include raising the concentration limits for one or more radionuclides in the current system, as that would be viewed as a reduction in the amount of protection. This opinion was reiterated in written comments by that speaker (and others holding similar views) that were later submitted in response to the staff’s FRNs.

Even though many workshop participants who favored making LLW management and disposal more risk-informed, there was no groundswell of support for modifying 10 CFR Part 61 through rulemaking. This position was not universally held, however, as one of the respondents to the FRN suggested that Part 61 should be updated by following a risk-informed system such as

³ *Improving the Regulation and Management of Low-Activity Radioactive Waste* (National Research Council of the National Academies, March 2006).

⁴ *Low-Level Radioactive Waste Management Needs a Complete and Coordinated Overhaul* (Health Physics Society, <http://www.hps.org>, September 2005).

that proposed (in 2002) by the National Council on Radiation and Measurements.⁵ This respondent further stated that “. . . all limits that are promulgated should not only be risk-informed, but should also be expressed in terms of risks . . .” (rather than as dose limits). Some industry groups also advocated various Part 61 rulemakings that would have the potential effect of increasing flexibility in disposal options for certain types of LLW.

For many, the subject of risk-informing LLW disposal regulations and practices is closely tied to the current origin-based system for disposal of LAW. Accordingly, the primary recommendation of one of the respondents to the staff’s FRNs is that the regulatory agencies (viz., NRC and EPA) should implement risk-informed regulation of LAW through “integrated strategies” that would involve adoption of risk-informed approaches in incremental steps. In this respondent’s view, this approach would improve communication with affected and interested stakeholders because the current system is so “rigid and hard to understand.” As noted earlier, however, other respondents, strongly oppose risk-informing and consider it to be tantamount to “deregulation.”

The ACNW&M identified specific areas for risk-informing the regulatory framework for LLW management, but stopped short of recommending rulemaking.⁶ A representative of an industry support group opined that 10 CFR Part 61 has significant built-in flexibility that allows the updating of dose models and concepts as well as the potential for removal of the intruder “ingestion” pathway for certain nuclides. Several commenters touched on the potential for establishing a new or modified classification system under the provisions of 10 CFR Part 61.58. The increased flexibility in disposal options inherent in this approach could, in the opinion of some, facilitate disposal availability and reduce the average cost of disposal of some types of waste.

The use of sound science and state-of-the-art methods to establish risk-informed and, where appropriate, performance-based regulations, is a strategy that NRC has committed to in its Strategic Plan.⁷ Consequently, NRC staff activities are expected to adhere to that policy and approach. While all of the LLW program activities listed in Appendix C are expected to be risk-informed to the extent practicable, tasks that would significantly employ risk-informing are those involving rule-making and guidance development. Thus, activities related to the implementation of major revisions to 10 CFR Part 61; the development of guidance documents for implementing the LLW import/export regulations in 10 CFR Part 110 and alternative waste classification and characteristics provisions in 10 CFR Part 61.58; the updating of the Branch Technical Positions on Waste Concentration Averaging and Extended Storage of LLW; and the identification of alternatives for disposal of large quantities of depleted uranium (DU) are examples of activities that would support more risk-informed practices in LLW regulation.

Closure of Barnwell LLW Facility to Out-of-Compact Waste

The projected closing in June 2008, of the LLW disposal facility at Barnwell, South Carolina, to out-of-Atlantic Compact waste generators has been an issue of concern to several stakeholders and, not surprisingly, was a major subject of discussion at the ACNW&M workshop as well as in

⁵ *Risk-Based Classification of Radioactive and Hazardous Chemical Wastes, NCRP Report No. 139, December 31, 2002.*

⁶ *Letter, Michael Ryan, Chairman, ACNW&M, to Dale Klein, Chairman, NRC, August 16, 2006.*

⁷ *U.S. Nuclear Regulatory Commission, FY 2004-2009 Strategic Plan, NUREG-1614, Vol. E, August 2004.*

the responses to the staff's FRN. Closure of the Barnwell facility to out-of-Compact waste could require waste generators in 36 states (encompassing over 80 percent of the nation's nuclear power reactors) to store their Class B and C LLW.

At the ACNW&M workshop the nuclear utilities generally noted that the potential closure of the Barnwell facility would not present any significant problems in the short term, as they already either had in place or were making provisions to ensure that there would be adequate long-term storage capability on their reactor sites. In contrast, the closure of Barnwell was seen to be a potentially significant problem for universities and hospitals who have limited, if any, ability to store their Class B & C LLW. For some non-reactor licensees, the cost and liability issues associated with extended storage of LLW was seen to be a major problem that has rather broad, and possibly severe, societal implications in that it is reportedly already curtailing medical research. One respondent to the staff's FRN observed that many small generators faced with the need to store LLW are poorly located and equipped to deal with such storage and would require specific assistance.

In the view of some respondents to the FRN, LLW disposal problems that might occur with the closing of Barnwell could be alleviated by making DOE facilities available to waste generators that have no other viable disposal option or by expanding other options such as the use of Resource Conservation and Recovery Act (RCRA) sites. One state representative, however, expressing concerns about the economic viability of LLW disposal sites, noted that a sufficient and consistent volume of waste is required to accommodate the cost of developing and operating the sites. Accordingly, that representative cautioned the NRC to ensure that its policies and actions do not interfere with the commerce of waste disposal and contended that the development of alternative disposal options, particularly for low-activity waste (LAW) or very low-level waste (VLLW), reduces the available volume of LLW disposed of at conventional facilities and further hampers the economic viability of existing and proposed LLW disposal sites.

The staff considers the potential closure of the Barnwell site to out-of-Compact waste to be a particularly significant issue, as discussed in Section 4.3.1 (System Vulnerabilities/Challenges), and in Appendix B. The staff has ranked the on-going review and update of guidance on extended storage of LLW as a high priority task, in large part due to the potential closure of the Barnwell facility.

Disposal Options for Low Activity/Very Low Level Radioactive Waste

Another issue that is of concern to many stakeholders involves the disposal of LAW, or VLLW. In the view of most speakers at the ACNW&M workshop, the costs and limited disposal options for disposal of such wastes are not commensurate with the associated level of risk. Some participants expressed a desire for more risk-informed ways to dispose of such wastes (for example at RCRA/municipal sites). Others noted that, while many such wastes could be disposed under the provisions of 10 CFR 20.2002, NRC's process for authorizing disposals under this provision was inconsistent and needed to be clarified, simplified and made more transparent by the development of new regulatory guidance. The disposal of certain LLW under the provisions of 10 CFR 20.2002 was generally opposed by most of the respondents to the NRC's FRN who are members or supporters of public interest groups.

One speaker at the ACNW&M workshop suggested that it might be advisable to establish a clearance level below which LAW could be disposed in non-Part 61 (e.g., RCRA/municipal land-fill) sites without regulatory control or oversight. In a similar vein, a nuclear consultant, stating that “Part 61 over regulates the risk” for VLLW proposed the adoption of a 100 millirem (mrem) intruder dose limit during the post-closure period for a LLW disposal facility, along with a 25 mrem limit following the post-closure period (i.e., after 100 years). Whereas some state representatives pointed out that their states allowed certain LLW to be disposed at RCRA sites, a current LLW disposal site operator cautioned that in some areas local opposition to such disposal is very strong. A representative of a public interest group voiced opposition to what she stated would be viewed as a potential reduction in, or relaxation of, protections against exposure to radiation, if more VLLW is disposed in non-10 CFR Part 61 sites. A member of an environmental group spoke out against the creation of a lower-than-Class-A level of LLW and advocated a halt to the generation of all radioactive waste, along with a phasing out of nuclear reactors as soon as possible.

Several of the activities listed in Appendix C deal with disposal options for LAW. A high priority activity involves the development and implementation of an internal procedure and Standard Review Plan for reviewing and processing 10 CFR 20.2002 alternate disposal requests, and requests to dispose of “unimportant quantities” of source material. As indicated in Table I of this report, the staff intends to initiate work on this task during the 3rd quarter of fiscal year 2007.

Stakeholder views concerning provisions for very low level radioactive waste to exit the regulatory system, also termed “clearance,” tend to be very polarized. In policy statements issued by national organizations such as the Health Physics Society, for example, a clearance provision ranks among their highest priority actions. Those in favor of establishing an “inherently safe quantity of radioactive material,” view it as a way to ease regulatory burden and thereby reduce the cost of disposal. Some representatives of public interest groups and their supporters are on record as being strongly opposed to a clearance provision, however, because they consider it to be a generic deregulation of nuclear waste that would subject members of the public to unnecessary risk. In June 2005, the Commission decided to defer a proposed rulemaking⁸ on controlling the disposition of solid materials because the agency was faced with several high priority tasks, because the current approach (which is to review cases on an individual basis) is fully protective of public health and safety, and because there was no longer an immediate need for the rule due to the shift in timing for reactor decommissioning. The staff has addressed this issue by identifying a task in Appendix C that would summarize current guidance associated with disposition pathways for waste with very low levels of radioactivity and clearly describe the various options for disposing of this waste.

Use of DOE and/or EPA Sites for Disposal of Commercial LLW

Several participants at the ACNW&M workshop spoke to the possibility of disposal of commercial LLW at a federal (e.g., DOE) facility. A speaker from an academic institution advocated use of DOE facilities to dispose of Class B, C and greater-than-Class-C (GTCC) wastes and inquired about the possibility of using of other federal land operated either by a federal or private entity to manage LLW. In a similar vein, another speaker proposed (in the

⁸ *Staff Requirements Memorandum, SECY-05-0054, “Proposed Rule: Radiological Criteria for Controlling the Disposition of Solid Materials (RIN 3150-AH18), June 1, 2005.*

long-term) that Congress authorize DOE or some other federal agency to develop a disposal facility for “. . . commercial LLW on federal land, to be regulated by the NRC as a national disposal facility. This person also suggested that LLW from NRC licensees be allowed to be disposed at existing DOE sites under DOE rules on at least an interim basis, and cited a suggestion by the Health Physics Society that the DOE, as part of their Environmental Impact Statement for disposal of GTCC waste, also consider and address the disposal of Class B & Class C waste, on the grounds that a facility found safe for GTCC waste would also be adequate for Class B & C waste. Disposal of commercial LLW at sites managed by the DOE is an approach that was recommended by the American Nuclear Society, in a November 2004 *Position Statement*⁹ on issues related to the disposal of LLW. In contrast, a representative of a state compact commission, in response to the NRC’s FRN, cautioned against allowing such an approach. The state respondent expressed the view that the rights of interstate compacts to control the flow of waste into processing or disposal facilities within their borders must be supported and upheld. A speaker at the ACNW&M workshop, representing a state and compact group, expressed the view that until the remediation efforts at federal facilities (such as those on-going at Hanford) are completed, it will be difficult to convince the public to support the development of new disposal capacity for off-site wastes at federal facilities.

Several participants at the ACNW&M workshop offered up remarks concerning the use of EPA/RCRA sites for the disposal of LAW. The Health Physics Society has supported this proposal in its revised *Position Statement*. In the view of one current site operator, RCRA sites in arid regions, which are not susceptible to the so-called “bathtub effect,” provide a very effective means of disposal that is equivalent or even superior to 10 CFR Part 61 sites for waste containment, especially for soil and debris materials. Partly in response to this, one ACNW&M member expressed an interest in exploring the feasibility of transferring the regulatory oversight of LLW disposal from NRC to EPA. Another member pointed out an objection to this suggestion that has been voiced previously by others, viz., that while EPA regulates many different things, there are benefits from NRC’s sole focus on radioactive materials. A consultant to the ACNW&M pointed out that, for EPA RCRA facilities, performance assessments are not conducted, nor are there any provisions for protection of the inadvertent intruder.

As shown in Appendix C, the staff identified several activities that would involve systematic interaction and coordination with other Federal or State agencies on options for the management of LLW. Among these activities are the development of a standard review plan for reviewing and processing 10 CFR 20.2002 alternate disposal requests and requests to dispose of “unimportant quantities” of source material; coordinating with other Federal and State agencies on improving the regulation of LAW; developing licensing criteria for disposal of GTCC waste; and develop generic waste acceptance criteria for the disposal of LLW in 11e.(2) impoundments.

Economic Considerations

Economic factors were a major concern to many stakeholders. In the words of one respondent to the staff’s FRN, the concern stemmed from “the lack of a competitive cost environment.” The rising costs of disposal of Class B & C LLW was the source of a recommendation from one

⁹ *Disposal of Low-Level Radioactive Waste - - Position Statement No. 11; American Nuclear Society; <http://www.ans.org/>. November 2004*

respondent to allow disposals of commercial LLW at DOE sites. In a similar vein, a representative of a state regulatory agency opined that the expanded use of RCRA facilities to accept slightly radioactive materials could reduce future disposal costs for such types of waste. However, another state regulatory agency representative stated that the expanded use of RCRA facilities for disposal of LAW could impact the economic viability of the operating LLW disposal facilities and/or require LLW facilities to increase the price of waste disposal to compensate for the loss in revenue. The costs of transporting LLW over long distances was an issue raised by an industry trade association, which also expressed concerns that the lack of a disposal option for Class B and C LLW would likely translate into increased costs for LLW management (including long-term storage), and could dampen future investment in the nuclear industry.

Several of the activities evaluated in Appendix C have economic implications. The development of a Standard Review Plan for reviewing and processing 10 CFR 20.2002 alternate disposal requests, for example, would be expected to result in increased efficiency in NRC reviews of these requests as well as increased clarity for licensees and other stakeholders. The development and issuance of an Information Notice on waste minimization would benefit small institutional waste generators, in particular, by providing them with additional information on how to minimize the amount of waste produced by their operations. The identification of alternatives for disposal of large quantities of depleted uranium would have a potential impact on enrichment facility licensees with regard to the future cost of operations and associated financial assurance decisions.

Waste Classification

As noted in the discussion above regarding risk-informing, a number of stakeholder have made recommendations regarding the classification system established in 10 CFR Part 61. Some stakeholders advocate major changes in NRC's regulations that would result in a classification system that was better aligned with risk, rather than with the waste's origin or legislative stature. Others recommend that all radioactive wastes be reclassified according to the "length of time they pose a hazard." The latter group opposes risk-informed regulation on the grounds that the risks of ionizing radiation at low doses and the synergistic effects of hazardous waste are unknown and are being ignored. Thus, as with other issues, the subject of waste classification cuts across related issues such as risk-informed regulation, disposal options for very low activity waste, disposition of GTCC sealed sources and disposal options for large quantities of depleted uranium (DU).

The staff has identified several tasks in Appendix C that would further add transparency and flexibility to the waste classification process. Those tasks include the development of guidance document for implementing the alternate waste classification provisions of 10 CFR 61.58, updating the Branch Technical Position on Concentration Averaging, and identifying alternatives for safe disposal of large quantities of DU.

Unintended Consequences

In the ACNW&M workshop discussions, several speakers advised caution in making changes to the LLW regulatory framework that could result in unintended consequences. As one speaker stated, proposals for alternative approaches should be carefully analyzed from the

perspective of all parties, as it is important to consider political realities, economic consequences and regulatory concerns. An example of the kind of issue that could cause complications that are hard to quantify involves the waste classification provisions in Part 61. Those provisions are referenced and included in other regulations as well as federal and state legislation, so any changes in the waste classification system could have a cascading effect. One of the ACNW&M workshop attendees, representing an agreement state regulatory agency that is involved in the licensing review of a LLW disposal facility, expressed the view that any federal regulatory changes that might occur during the state's licensing process could have significant, and potentially negative, effects and should therefore be avoided. In a similar vein, another state agency representative, responding to the staff's FRN, opined that NRC should focus on identifying unique and emerging waste streams rather than furthering changes in regulations.

As part of the process of identifying and ranking proposed activities (discussed in section 4.3.3), the staff took into consideration the potential unintended consequences that might ensue if the activity were carried out. For those tasks having significant potential unintended consequences, the details appear in the column labeled, "Additional Considerations" Table C-III, in Appendix C.

APPENDIX B

ALTERNATE FUTURES

In conducting this strategic assessment, the staff felt it was prudent to not only consider the national low-level waste (LLW) system as it currently exists, but to also consider how the situation might change with time. After soliciting stakeholder input and combining it with the staff's own views, three scenarios, or "alternative futures," categorized as optimistic, realistic and pessimistic were developed. The "optimistic future" scenario is one in which staff envisions a continuous expansion of safe, secure and moderately priced disposal capacity for the entire spectrum of LLW. The "realistic future" scenario is characterized by a significant curtailment of disposal capacity and continued cost escalation for much of the spectrum of LLW, while the "pessimistic future" scenario presumes a virtual elimination of disposal capacity for LLW in the not too distant future.

When viewed through the lens of these postulated scenarios, potential work activities may assume enhanced or diminished importance. Accordingly, when proposed staff activities were analyzed to determine their priority, their responsiveness to each of the future scenarios was one of the factors considered. Further details regarding the assumptions used for each future scenario are provided below.

"Optimistic" Scenario Assumptions:

All aspects for management of the back end of the fuel cycle are continuously available, including uninterrupted commercial disposal capacity for all Class A, B, and C LLW and from all waste generators. Some limited competition results in disposal costs that are considered reasonable for most waste generators. Though most 11e.(3) byproduct waste (formerly discrete naturally occurring radioactive material) is disposed at the Richland, WA, disposal facility, some is disposed elsewhere. Greater-than-class-C (GTCC) LLW disposal is available at a U.S. Department of Energy (DOE) facility licensed by the NRC. A variety of low activity waste (LAW) disposal options keeps the average cost of disposal low for this type of waste. There is little need for extended storage of LLW or for new innovations regarding treatment of LLW, including volume reduction or use of surrogates. There are no significant events involving safety, security, or protection of the environment, and therefore little or no negative press. The regulatory focus is on developing a framework for accommodating the extremely large volumes of LAW associated with decommissioning of nuclear power plants, as well as alternative waste streams that may be created by fuel reprocessing and new types of nuclear facilities.

"Realistic" Scenario Assumptions:

Class A LLW has the only clear path forward for disposal. Waste generators in most states are not able to dispose of their Class B and C LLW and are storing this waste at numerous locations. Small quantities of relatively high activity LLW are stored at industrial, medical, and research facilities; larger quantities are stored at Nuclear Power Plants (NPPs). Limited quantities of 11e.(3) byproduct material waste can be disposed at the Richland, WA disposal facility. A small percentage of GTCC - - mainly sealed sources - continues to be moved out of the commercial sector into DOE storage, but a disposal facility for GTCC waste is still many years away. Orphan waste is identified in an ad hoc fashion, and a path forward for disposition/disposal becomes more limited. Disposal options for LAW are few, and approvals continue to be on a case-by-case basis. Life-cycle costs for some radioactive materials

increase significantly, as significant storage costs are added to increased costs for ultimate disposal. The LLW regulatory framework is relatively stable, but necessarily reactive to certain circumstances, such as development of new technology, external events and innovations in waste processing, stabilization, and storage technology.

“Pessimistic” Scenario Assumptions:

Disposal capacity for all types of LLW is severely constrained and costs of disposal are prohibitively high for many generators. Consequently, there are significant increases in both the volume and activity of LLW held in long-term storage. Disposal options for LAW are severely constrained, and there are no prospects for development of a GTCC disposal facility in the near-to-medium term. Beneficial uses of radioactive material in research, medical care and industrial applications decrease because of escalating uncertainties (both in disposal options as well as costs). Escalating costs become the driver for significant innovations in processing and storage technology. The public becomes concerned about potential safety impacts of LLW storage as it becomes increasingly aware of its widespread use by licensees. Decommissioning of NPPs is postponed, or different decommissioning strategies are used due to high disposal costs, uncertain disposal availability and conflicting public and/or political pressures.

APPENDIX C

ANALYSIS AND EVALUATION OF PROPOSED NRC LLW ACTIVITIES

This appendix provides detailed information on proposed U.S. Nuclear Regulatory Commission (NRC) low-level radioactive waste (LLW) activities and the evaluation and ranking of each as part of this strategic assessment. The staff evaluated each specific activity in terms of the LLW programmatic needs and the strategic objective of the agency as well as other attributes. Table C-I summarizes each task, its rank (high, medium, or low), and the resources needed to complete it. Table C-II contains a description of each task and a detailed evaluation of each task against the following criteria:

- activity—identification and brief description of proposed LLW staff work effort,
- description—brief explanation of scope, rationale for consideration in this assessment, and potential result of the proposed activity,
- scenario applicability—identification of the difference in value of the activity given the different possible future scenarios (optimistic, realistic, pessimistic), such as the likelihood that updating storage guidance will be more important given the realistic and pessimistic scenarios,
- impact on agency strategic goals—identification of relevant impacts, including the following:
 - safety and security, which means no significant safety or security events (overexposures, significant adverse environmental impacts, or use of materials in a manner hostile to the United States), as defined in the NRC Strategic Plan, which also includes a risk-informed, performance-based regulatory framework as a strategy for meeting this goal;
 - openness, which includes informing and involving stakeholders in NRC processes, as appropriate, and
 - effectiveness, which means: (1) generally that LLW licensing and regulatory issues are not significant impediments to the safe and beneficial uses of radioactive materials; (2) more specifically that the LLW regulatory framework is stable, reliable, and adaptable, providing predictability for licensees, yet anticipating changes in the generation and disposal of LLW that may require revisions to the NRC's LLW regulatory program; and, (3) that risk-informed, performance-based regulation and the elimination of unnecessary jurisdictional overlap are in use,
- need—brief articulation and explanation of the timeframe in which the activity is needed (near term, medium term, or long term) given the evolution of events or circumstances that it may impact,
- level of effort—approximation of the quantity of direct staff resources over a specific time period that would need to be applied to accomplish the activity,

- benefit—the direct benefit (and beneficiary) that would be derived from accomplishing the activity,
- additional considerations—articulation of indirect benefits, costs, unintended consequences, or external factors that may impact, or be impacted by, the completion of an activity, and
- summary/ranking—a concise summation of the major factors that lead the staff to the final prioritization of an activity and the priority ranking itself (high, medium, or low).

Table C-1 LLW Strategic Assessment: Summary of Tasks Evaluated by the NRC Staff

Task No.	Activity	Rank (L, M, H)	Required Resources, FTE
1	Evaluate potential changes to LLW regulatory program as a result of severe curtailment of disposal capacity	L	0.3
2	Develop internal procedure and Standard Review Plan for waste import/export license reviews	H	0.1/0.9
3	Promulgate rule for disposal of low-activity waste	L	3.6 - 4.3
4	Determine if disposal of large quantities of depleted uranium from enrichment plants warrants change in uranium waste classification	H	1.4
5	Review and update guidance on extended storage of LLW for materials and fuel cycle licensees and review industry guidance for reactors	H	1.2
6	Develop licensing criteria for greater-than-Class-C disposal facility	M	1.4
7	Develop internal procedure/Standard Review Plan for 10 CFR 20.2002 requests	H	0.4/0.9
8	Identify and evaluate potential legislative changes	L	0.15 per year
9	Consolidate LLW guidance	M	4.3
10	Implement major revisions to 10 CFR Part 61	L	10.8
11	Coordinate with other agencies on consistency in regulating LAW disposal	M	0.3 per year
12	Develop guidance that summarizes disposition options for low-end materials and waste	M	0.1
13	Identify new waste streams	M	0.2
14	Develop standard review plan for 10 CFR 61.58	H	3.6 - 4.3
15	Develop waste acceptance criteria for LLW disposal in uranium mill tailings impoundments	L	1.4
16	Update concentration averaging branch technical position	H	2.0
17	Develop information notice on waste minimization	M	0.15
18	Examine need for guidance on defining when radioactive material becomes LLW	L	0.15
19	Perform scoping study on financial assurance	H	0.3
20	Develop and implement national waste tracking system	L	3.6

Table C-II Analysis and Evaluation of Specific NRC LLW Activities

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
1. Perform a scoping study of potential changes to the Materials Licensing and Enforcement Program in the event of severe curtailment of disposal capacity	The LLW staff would determine what, if any, new provisions and limitations might be required for the issuance of radioactive materials licenses and for related inspection and enforcement in the absence of an identifiable path to ultimate disposal at the time of license issuance. These may include, but are not limited to, prospective financial assurance mechanisms, material takeback provisions, third-party commitments to take title, and provisions for long-term storage.	This task primarily responds to the pessimistic scenario. However, some provisions, such as financial assurance, would apply to other scenarios.	<p>The scoping study would have no immediate impact on safety and security goals. However, completion of the work that might ultimately result from this task has the potential for significant positive impact. The provisions ultimately envisioned would contribute to assurance that radioactive material lacking a disposal path would be maintained in a safe, secure manner, with the burden born by the beneficiary.</p> <p>The scoping study would have a very limited impact on openness goals. Some small increment of openness would be achieved by informing the study through dialogue with some stakeholders. However, significant increases in contribution to openness goals might accrue from mechanisms (e.g., rulemaking, guidance development) that would later flow from the scoping study.</p> <p>The scoping study would have a very limited impact on effectiveness goals. However, significant increases in contribution to effectiveness goals might ultimately accrue from mechanisms such as rulemaking, guidance development, or other regulatory tools that might evolve from the study. As with many new regulatory regimes, effectiveness and efficiency might decrease in the short term as the regulated and regulatory communities sort out the meaning and implications of new requirements or guidance. In the long term, however, clarity and uniform application of new requirements would result in increased efficiency.</p>	A scoping study to anticipate needs associated with severe curtailment of disposal capacity could be useful in the near-term. However, until the possibility of severe curtailment or elimination of disposal options comes closer to reality, it might be difficult to justify the significant resources necessary to implement the regulatory framework necessary to deal with such a circumstance.	The scoping study would require approximately 0.3 FTEs of staff effort. If the results of the scoping study and future driving circumstances in the regulated community indicate that additional regulatory tools, including rulemaking, are necessary, this would necessitate a substantial commitment of resources.	A scoping study would provide an overview of the types and utility of the regulatory tools necessary to ensure safe, secure disposition of radioactive material in the absence of disposal capacity. The study can then be used as a basis to advance the development of individual regulatory tools as needed. The benefit is derived from the regulatory tools that provide a transparent, uniform regulatory mechanism for full life-cycle consideration of LLW disposition options. This would enable users of radioactive material to preplan for all aspects of the use of this material.	<p>It may be difficult to justify the significant resources required for the development of regulations that might be necessary for rulemaking, particularly if no crisis is imminent. Guidance development would be somewhat easier to justify because the level of required resources would be much lower. However, guidance implementation would be optional.</p> <p>It may be prudent practice to establish and account for total life-cycle costs for radioactive material (which would ultimately result in the creation of radioactive waste) early in the licensing process and assuming this kind of scenario could occur.</p>	<p>Because the task is a scoping study, it would address a broad range of licensing activities with a modest commitment of resources. However, the scoping study itself would have a limited impact on the overall NRC mission. Furthermore, benefits are heavily weighted toward the pessimistic future.</p> <p>Ranking: Low</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
<p>2. Develop (a) internal procedures (IPs) and (b) a guidance document (GD) for reviewing waste import and export applications submitted under 10 CFR Part 110.</p>	<p>The staff would develop an IP as well as a GD (NUREG or branch technical position (BTP)) to delineate Division of Waste Management and Environmental Protection (DWMEP) roles and responsibilities related to the review of applications for licenses to import or export radioactive material/radioactive waste. The IP would include the process for vetting and resolving complex issues as well as a summary of issues previously resolved. The guidance would include a description of the technical and regulatory analyses necessary to respond to the Office of International Programs (OIP) in its processing of import/export license applications.</p>	<p>This task applies equally to all scenarios because the import and export of radioactive waste into and out of the United States is somewhat independent of the domestic waste disposal situation.</p>	<p>(a) The staff IP would have no impact on agency safety and security goals.</p> <p>Development of the IP would have little impact on openness goals.</p> <p>Completion of the IP would significantly enhance the efficiency with which the technical staff responds to requests. By incorporating precedents, it would allow rapid resolution of requests similar to those already undertaken. Completion of this task would also contribute to the NRC's knowledge management initiative.</p> <p>(b) The GD would have little, if any, impact on agency safety and security goals.</p> <p>There would be an opportunity for public scrutiny during the development of the GD. The end product would increase transparency for the benefit of licensees and applicants.</p> <p>Completion of the GD would significantly enhance the efficiency with which the technical staff responds to requests. By incorporating precedents, it would allow rapid resolution of requests similar to those already undertaken. In some cases, it might allow processing by OIP without significant DWMEP involvement. Completion of this task would also contribute to the NRC's knowledge management initiative.</p>	<p>Near-term need.</p>	<p>(a) Cost to develop the procedure anticipated herein would be modest (approximately 0.1 FTE).</p> <p>(b) Development of the GD, integration with the IP, and full implementation, including training, would require a resource commitment of approximately 0.9 FTE.</p>	<p>(a) When available, the IP would enable more efficient use of both OIP and DWMEP staff time. It would also increase the likelihood of consistency of review and outcome.</p> <p>(b) The GD would improve understanding of expectations by licensees, applicants, and regulators alike. It would probably have the corollary benefit of a more streamlined information request process as well as improved understanding of the overall review process among stakeholders.</p>		<p>Completion of this task would yield a significant near-term benefit with a modest commitment of resources. It significantly increases efficiency and effectiveness. It is germane to all futures. Ranking: High</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
<p>3. Promulgate a rule that would define the conditions under which low-activity radioactive waste (LAW), including mixed waste, could be disposed of in Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste facilities. The NRC would exempt the materials authorized for disposal.</p>	<p>This task would be similar to the rulemaking that the U.S. Environmental Protection Agency (EPA) considered in its November 2003 <i>Federal Register</i> advance notice of proposed rulemaking on the disposal of LAW (68 FR 65120, November 18, 2003), but could be independent of any EPA decision regarding rulemaking. The NRC would develop generic criteria for the disposal of radioactive materials in RCRA hazardous waste facilities. If EPA were to revise its RCRA hazardous waste regulations, the NRC rule would need to be compatible and consistent with the EPA requirements. For this rulemaking, the NRC would specify concentrations of radioactive waste that could be disposed of without any action by EPA or additional measures or controls at the RCRA facility. The NRC would exempt the materials authorized for disposal,</p>	<p>This task applies to all scenarios.</p>	<p>This task would not significantly affect safety and security.</p> <p>This task would contribute to openness by obtaining additional stakeholder input on the disposal of radioactive materials in landfills. Although the Commission has directed the staff to increase openness and transparency for the case-specific approvals of RCRA disposals that are now authorized under 10 CFR 20.2002, a rulemaking would provide extensive opportunities for public input.</p> <p>These types of disposals have been authorized under 10 CFR 20.2002, which requires staff reviews of safety assessments and approximately 6 months to process. A rulemaking would eliminate the need for case-specific approvals and thus would significantly increase effectiveness for specific requests. Currently, the NRC receives only about 3 to 6 requests each year, but a rulemaking that simplifies the process could increase the use of these types of disposals.</p>	<p>Long-term need.</p>	<p>This would require 3.6 to 4.3 FTE</p>	<p>Such a rulemaking would eliminate the need for case-specific reviews under 10 CFR 20.2002 and would provide predictability for licensees, especially those that are planning for decommissioning of facilities where large amounts of LAW are generated.</p>	<p>A number of members of the public and environmental groups oppose any disposal of radioactive materials in non-AEA licensed facilities. Special efforts would be required to address concerns related to this practice.</p>	<p>This task would facilitate the overall goal of risk-informing LLW disposal, particularly for LAW, and might be especially useful in future decommissioning of facilities with large quantities of waste. The cost to implement is relatively high, however, and the current need is not urgent.</p> <p>Ranking: Low</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
4. Determine if disposal of large quantities of depleted uranium from enrichment plants warrants change in uranium waste classification.	<p>This is a Commission directed task contained in Order CLI-05-20 (October 19, 2005). This could include the following steps</p> <p>(a) determine if current regulations, policies and practices adequately ensure that large quantities of DU will be disposed of in a manner that meets 10 CFR Part 61.</p> <p>(b) determine whether the 10 CFR 61.42 performance objective and associated dose limit for intruder protection can be met at a <i>generic</i> disposal site if large quantities of DU are disposed of under conditions currently allowed for Class A waste.</p> <p>(b) If current Class A disposal requirements are insufficient, determine specific conditions under which DU can be disposed of in a near-surface LLW disposal facility and meet the performance objectives in Part 61</p>	This task applies to all scenarios.	<p>This task might facilitate the disposal of some large quantities of DU and therefore would have a significant potential impact on safety.</p> <p>This task's contribution to openness is uncertain because it would depend on details and on the degree of stakeholder involvement.</p> <p>This task would improve effectiveness by resolving a regulatory issue in a risk-informed manner.</p>	Near-term need because of Commission interest (Commission memorandum and order, dated October 19, 2005, regarding Atomic Safety and Licensing Board decision on Louisiana Energy Services environmental contentions) and potential impact on licensee with regard to future cost of operations and associated financial assurance decisions.	Task (a) would require approximately 1.4 FTE. Tasks (b) and (c) resources will be determined later if they need to be conducted.	This activity resolves uncertainty concerning disposal of DU in a near-surface LLW disposal facility.	<p>(1) This activity may have unequal impact on disposal entities.</p> <p>(2) Depending on the results of tasks (a) and (b) in column 2, if these were found to be necessary to implement, this activity could point to the necessity of taking additional actions that could have significant resource requirements (e.g., rulemaking).</p>	<p>Heightened Commission interest is evident in disposal issues regarding large DU waste streams associated with uranium enrichment.</p> <p>Ranking: High</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
5. Review and update guidance on extended storage of LLW for materials and fuel cycle licensees and review industry guidance for reactors.	Perform a comprehensive review of all current NRC LLW storage guidance in the context of the current regulatory environment to ascertain whether there are gaps in safety or security considerations. Also, review and endorse industry LLW storage guidance applicable to reactors.	This task primarily responds to the realistic and pessimistic scenarios because these scenarios assume that disposal of LLW would be somewhat problematic and that long-term nondiscretionary storage of LLW would be necessary.	<p>This task would contribute to agency safety and security goals related to LLW that might be created and possessed by users of radioactive materials and for which long-term storage is necessary because of a loss of disposal capacity.</p> <p>The process through which guidance would be developed would contribute to openness. The data-gathering process would expand the dialogue among NRC headquarters and regions, States, and licensees regarding specific needs to facilitate regulatory aspects of long-term LLW storage.</p> <p>The magnitude of the contribution to agency effectiveness can only be determined after reviewing all existing guidance. However, carried to conclusion, this task should have a positive impact on agency effectiveness.</p>	There is a near-term need to update LLW storage guidance for licensees for Class B and C wastes in conjunction with the closure of the Barnwell LLW facility in mid-2008 to out-of-compact waste generators.	Review, update, and consolidation of LLW long-term storage guidance would require approximately 1.2 FTE, including review of industry guidance.	Storage guidance review and update would identify and eliminate gaps in knowledge related to storage principles and techniques applicable to the needs of various classes of licensees. It would also eliminate out-of-date guidance as well as any ambiguity that might impede the inspection of licensee LLW storage facilities. An increased focus on the security of nuclear materials in storage is consistent with agency security goals.	<p>Although there are no examples of health, safety, or security problems attributable to deficiencies in current storage practices or associated guidance, the staff believes that review and update of LLW storage guidance is forward-thinking, proactive, and wholly consistent with the regulatory landscape that the agency is likely to confront in the near future. It is better to anticipate problematic circumstances rather than react after they occur.</p> <p>The Nuclear Energy Institute is preparing guidance (in conjunction with the Electric Power Research Institute) for storage at reactors. NEI will submit it to NRC for review. This review should eliminate any need for NRC to revise reactor LLW storage guidance.</p>	Ranking: High

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
6. Develop licensing criteria for greater-than-Class-C (GTCC) waste, if necessary	Develop licensing criteria for GTCC disposal in facilities other than those of the deep geologic type. This could include the identification of necessary site and waste characteristics as well as facility baseline design criteria. Whether this task is necessary depends upon whether DOE chooses a non-geologic repository for GTCC disposal.	This task applies to the optimistic and realistic scenarios.	<p>This activity could contribute to both safety and security in that it would provide a clear regulatory pathway for the disposal of material in a non-geologic repository, if DOE were to choose that option.</p> <p>This activity, if it were necessary, would require continuous interaction with, and input from, stakeholders and would thus make a significant contribution to openness.</p> <p>This activity would significantly affect the U.S. Department of Energy (DOE) as well as industry generators/possessors of GTCC waste if DOE chooses a non-repository option.</p>	Potentially medium-term need. Depends upon DOE's selection and timing of disposal alternatives for GTCC, which may or may not include non-repository options. DOE's July 31, 2006 report to Congress states that a final EIS for GTCC disposal is to be published in late 2008. This date has likely slipped somewhat because an earlier milestone (issuing a Notice of Intent) was delayed.	This would require 0.2 to 1.8 FTE, depending on the disposal option that DOE selects.	In addition to increasing the effectiveness and efficiency of licensing, this activity has the potential to reduce GTCC volumes in storage. It would foster a more efficient use of resources for DOE by informing the DOE staff about the NRC's expectations and thereby focusing DOE efforts more directly on developing and providing the information needed for licensing, should DOE choose a non-geologic repository for disposal of GTCC.	The process would benefit from early communication with DOE on plans and proposed methodology. It would be premature to proceed with this activity until there is some certainty regarding the type of facility that DOE intends to recommend. DOE's EIS for GTCC disposal is scheduled for late 2008.	<p>The timing for this activity is related to DOE actions regarding GTCC disposition and when they occur.</p> <p>Ranking: Medium (Based on current DOE schedules).</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
<p>7. (a) Develop and implement an internal procedure for reviewing and processing 10 CFR 20.2002 requests (which allow for case-by-case NRC approvals for disposals in a facility other than a conventional LLW facility) and requests to dispose of "unimportant quantities" of source material (b) Develop a standard review plan for these proposed disposals for use by licensees</p>	<p>To improve consistency of reviews, to provide guidance to licensees who plan to submit such requests, and to implement the Commission's direction on improving transparency for 10 CFR 20.2002 disposals, the staff would prepare an internal procedure that describes roles and responsibilities, documentation of the reviews in a safety evaluation report and environmental assessment, review criteria, dose modeling considerations, and coordination with stakeholders. The staff also would prepare a standard review plan for licensee use and would base it on the guidance in the internal procedure. Both 10 CFR 20.2002 requests and requests for disposals of unimportant quantities of source material would be addressed.</p>	<p>This task applies to all scenarios.</p>	<p>A documented procedure and standard review plan would ensure consistency in reviews of alternative disposal requests. Safety and security impacts would be minimal, however, because these disposals currently are being accomplished safely and securely. The dose limits used are consistent or more conservative than those used internationally and in the United States (10 CFR 20.2002 disposals in fact use a dose standard that is a small fraction of the limits in 10 CFR Part 20). There is no security risk because the materials addressed by these procedures have very low concentrations of radionuclides.</p> <p>Developing a standard review plan would significantly improve openness and transparency by identifying in one place the review criteria, dose modeling considerations, and external coordination required. These are not readily available to the public at this time. The agency would issue a draft standard review plan for public comment.</p> <p>This task would significantly contribute to the effectiveness goal for individual requests by enhancing the consistency of reviews. It is also expected to result in fewer resources needed for reviews and faster review times because criteria and processes would be documented in one place. However, the NRC receives a relatively small number of these requests (3-6) each year, so the overall contribution to effectiveness is moderate.</p>	<p>Near-term need.</p> <p>A number of stakeholders support the completion of this task, and the NRC continues to receive requests for alternate disposals, at a greater rate than in previous years.</p>	<p>(a) Development of the IP would require approximately 0.4 FTE and 6 months.</p> <p>(b) Development of a standard review plan would require 0.9 FTE and 1 year (after completion of internal procedure).</p>	<p>This task would benefit licensees with large quantities of slightly contaminated material that can be safely disposed of in a facility other than a licensed LLW site. It would also foster risk-based, rather than origin-based, LAW disposal by providing for enhanced consistency and transparency in the internal review process that the NRC uses for such approvals. This task has the support of a number of stakeholders that have requested standardization of the approval processes.</p>	<p>In moving away from origin-based disposal of waste and toward risk-based disposals, licensees are use the alternative disposal provisions of 10 CFR 20.2002 as well as the Commission's policy on the disposal of unimportant quantities of source material, which is contained in its staff requirements memorandum (SRM) on SECY-00-0201. These disposals typically occur in RCRA facilities, although other types of disposal methods are not prohibited if safety can be demonstrated. The NRC has no formal, documented procedure for reviewing and processing such requests at this time. The Commission, by way of its SRM on SECY-06-0056, directed the staff to improve consistency and transparency in 10 CFR 20.2002 reviews. Although many stakeholders strongly supported improvements in the LAW disposal approval processes, almost half of the commenters on the LLW strategic assessment (all individual members of the public or environmental groups) either directly or indirectly opposed (1) risk-based disposals, (2) any additional potential for exposures to radioactive materials from nuclear fuel cycle wastes, or (3) disposal of any materials, irrespective of their concentration or hazard, in anything but an AEA-licensed facility.</p>	<p>This task would significantly improve effectiveness because there is currently no documented process for 10 CFR 20.2002 authorizations. In addition, this effort would contribute to the Commission's goal of increasing the transparency of these authorizations. This task would also assist in facilitating risk-based disposals, rather than origin-based disposals.</p> <p>Ranking: High</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
<p>8. Examine the desirability and benefits of legislative changes. One alternative to be considered would be the use of DOE facilities for non-DOE waste. NRC would identify any regulatory obstacles to such an approach as part of this activity.</p>	<p>Take initiatives to examine the desirability and benefits of implementing legislative changes that would improve the Nation's system for the disposition of LLW. This task would involve the following:</p> <p>(a) identification of potential new legislation</p> <p>(b) coordination with senior management and the Commission on potential changes</p> <p>(c) communication with Federal and State agencies</p> <p>(d) coordination with the Office of Congressional Affairs in contacting and working with appropriate congressional committees</p> <p>(e) depending on the outcome of the above, a Commission paper or other document that might be appropriate</p>	<p>This task is not applicable; (i.e., not relevant to, or dependent on, disposal availability scenarios).</p>	<p>This task by itself would have little effect on safety and security because it precedes any actual legislative changes. If new legislation were passed that enabled all LLW to have a reliable disposal path, the effect on safety and security could be significant.</p> <p>This task would not contribute much to openness initially, but would later if follow-on efforts involving interactions with stakeholders on draft legislation are needed. The task, as defined, would of necessity involve communications with other Federal and State agencies.</p> <p>The impact of this task on effectiveness would be potentially high if legislative changes are eventually made that allow similar types of waste to be disposed of similarly and on a risk-informed basis.</p>	<p>Medium-term need.</p> <p>Wastes are being disposed of under the current system of laws</p>	<p>This task would require approximately 0.15 FTE per year.</p>	<p>The ultimate benefits of this effort would be potentially large with respect to effectiveness (e.g., improvement in regulatory flexibility, elimination of regulatory overlap) as well as the cost of disposal, and potentially safety and security as well by eliminating any need for long-term storage of LLW.</p>	<p>This activity has significant political and public policy challenges because there is likely to be very large resistance to change in the current system; resistance to change is fairly common in situations in which an established system has been in place for an extended period of time.</p>	<p>The difficulty and low likelihood of effecting legislative change offset the potential benefits.</p> <p>Ranking: Low</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
9. Update and consolidate LLW guidance into one NUREG.	This task would be similar to the guidance consolidation that was conducted for the materials licensing program (resulting in NUREG-1556) and the decommissioning program (resulting in NUREG-1757).	This task applies to all scenarios, but would be particularly useful for licensing of new facilities.	<p>This task would not affect safety and security.</p> <p>This task would significantly enhance openness by making readily available and understandable the information contained in dozens of LLW guidance documents (e.g., BTPs, NUREGs, information notices, generic letters) that the NRC has issued over the last 25 years and by identifying and describing the relationship of each to the regulations in 10 CFR Part 61 and to each other.</p> <p>This task would increase effectiveness by ensuring that future LLW staff members have all of the relevant documents and understand their interrelationships and that the positions in such documents are up to date, risk-informed, and performance based. This effort would be a major contributor to knowledge management in LLW by ensuring that the knowledge relevant to the NRC's LLW responsibilities is transferred to new staff members.</p>	<p>Medium- to long-term need.</p> <p>Although completion of this task will facilitate access to LLW guidance for those needing it in the future, the guidance is currently available and accessible in some form. Therefore, the need is not acute.</p>	<p>This task would require 4.4 FTE.</p> <p>Some of this task effort could be accomplished with contractor assistance. (For updating the concentration averaging BTP and developing 10 CFR 61.58 guidance, see those tasks in this table.)</p>	<p>This effort would help to ensure that the many staff positions on LLW issues are readily available to licensees, States, future developers of LLW disposal sites, and other stakeholders. It could also play a role in future licensing of any such disposal facilities by ensuring that staff GDs, which are often used as the licensing review criteria, are risk-informed. In addition, such a consolidation would advance knowledge management by centrally locating all relevant NRC LLW guidance.</p>	<p>Since the promulgation of 10 CFR Part 61 in 1982, the NRC staff has issued numerous GDs that describe staff positions on various LLW issues. Many of these could benefit from insights gained during the last two decades, particularly regarding risk-informed, performance-based regulation. In addition, many of the documents are not readily available to stakeholders because they predate the Agencywide Document Access and Management System (ADAMS).</p>	<p>Although this task could significantly contribute to effectiveness if new LLW sites undergo licensing, it is a long-term effort that requires significant resources to accomplish.</p> <p>Ranking: Medium</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
10. Develop and implement major revisions to 10 CFR Part 61	<p>This task would address major changes to 10 CFR Part 61 that cannot be implemented through guidance. Some examples of the types of revisions that could be considered are the following:</p> <p>(a) developing more risk-based criteria, including, but not limited to, specific criteria for LAW, and using more realism and up-to-date dosimetry in the inadvertent intruder scenarios that define waste classification.</p> <p>(b) allowing credit for more than 100 years reliance on active institutional controls</p> <p>(c) allowing credit for engineered barriers for waste form, waste packaging, disposal site design, and cover design that are not explicitly included in 10 CFR Part 61</p>	This task applies to all scenarios.	<p>This task would not significantly affect safety and security.</p> <p>This task would significantly affect openness. Conducting rulemakings to significantly revise 10 CFR Part 61 would increase awareness of the underlying 10 CFR Part 61 assumptions and manipulations thereto.</p> <p>A more risk-informed 10 CFR Part 61 would likely facilitate any future licensing reviews for 10 CFR Part 61 facilities.</p>	Long-term need.	This task would require 11 FTE over 5 years.	Although it is difficult to predict all of the benefits that might result, some might include the potential for facilitating future licensing of LLW sites by eliminating some current requirements, and eliminating unnecessary conservatism and thereby facilitating disposal of more types of waste.	States have previously noted to the NRC that the agency should not undertake 10 CFR Part 61 revisions when a new license application is anticipated or under review. The provisions of 10 CFR Part 61 provide for adequate protection of public health and safety, but any changes to it have the potential to disrupt the ongoing review of an application.	<p>Although the existing 10 CFR Part 61 could be made more risk-informed, as the Advisory Committee on Nuclear Waste and Materials (ACNW&M) has noted, there is no need for change at this time.</p> <p>Furthermore, the staff can develop or revise guidance to address any emerging LLW issues, such as the use of alternate waste classification provisions in 10 CFR 61.58.</p> <p>Ranking: Low</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
<p>11. Coordinate with other Federal and State agencies on improving the consistency of regulation of LAW, including the low end of LLW and AEA 11e.(2) byproduct material, Formerly Utilized Sites Remedial Action Program waste, and technologically enhanced naturally occurring radioactive material (TENORM)</p>	<p>The effort would involve, working through the Interagency Steering Committee on Radiation Standards (ISCORS) initially, the identification of LAW disposal regulations and practices for different agencies and programs, specific improvements that can be made within the existing legislative and regulatory framework to effect the needed changes, and identification of potential legislative changes. Coordination with States would be both through ISCORS and the National Materials Program.</p> <p>Specific products would depend on the results of discussions with other Federal agencies and States. The staff would prepare a Commission paper every 2 years that would summarize work on this task.</p>	<p>This task applies to all scenarios.</p>	<p>This task would not significantly affect the safety and security of AEA-related materials, but could improve the safety of TENORM management and disposal. It would contribute to the risk-informed management and disposal of AEA materials.</p> <p>This task would not significantly contribute to openness, but, if it leads to greater awareness of LAW regulation in general (e.g., through proposed legislation), it could significantly increase understanding and awareness of LAW regulation in the United States. The National Academy of Sciences (NAS) and other stakeholders commenting on the national LLW program have noted that the complex, origin-based system of regulating radioactive waste is difficult to understand.</p> <p>This task would not contribute to effectiveness, but potential long-term improvements in regulation (e.g., resulting from legislative changes) would result in significant improvements in effectiveness.</p>	<p>Near-term need.</p>	<p>This task would require .3 to .4 FTE per year of coordination through ISCORS and with States.</p> <p>There is a potential for higher resource commitments if specific improvements are identified and implemented through interagency coordination.</p>	<p>The lack of consistency in the regulation and management of LAW of all types in the United States is widely recognized. This effort could lead to the improved protection of public health and safety regarding certain wastes, such as TENORM, that are not consistently regulated now. It could also facilitate the disposal of materials by ensuring that safe options that are available for one type of waste are also available for other types of waste with similar associated radiological hazards.</p>	<p>This task would address the inconsistency in LAW regulation that has been highlighted in recent years in a variety of reports, including National Council on Radiation Protection (NCRP) Report No. 139 and the NAS study, "Improving the Regulation and Management of Low-Activity Radioactive Wastes." The NAS report specifically recommended that government agencies continue to harmonize their regulations for LAW so that those wastes would be controlled consistently according to their radiological hazards rather than their origins. This task would implement that recommendation. The NRC has taken a number of steps to implement regulation of LAW disposal based on the hazard posed, including authorizing 10 CFR 20.2002 disposals and, in the near future, standardizing and ensuring the transparency of the process for review and approval.</p>	<p>Moving from an origin-based system for radioactive waste disposal to a more risk-informed system has widespread support among many stakeholders (although some groups and individuals oppose not only any radiation exposures from nuclear fuel cycle materials, but also the adoption of risk-informed regulation in general).</p> <p>Ranking: Medium</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
12. Develop and issue guidance that summarizes the existing disposition options for low-activity materials and waste	A number of different documents contain the NRC's positions on dispositioning low-activity materials and waste. This task would be to issue a regulatory issue summary (RIS) that contains all of the existing staff positions in one document.	This task applies to all scenarios.	<p>This task would not have any significant effect on safety and security because it would document existing practices.</p> <p>This task would enhance openness by making clear, in a single document, all of the NRC's options for addressing low-end radioactive material. Currently, the options appear in a number of different documents that are not readily available to stakeholders.</p> <p>This task would increase effectiveness by ensuring that all licensees and other stakeholders are aware of NRC policies and procedures for dispositioning low-end radioactive material.</p>	Near-term need.	This task would require 0.1 FTE over 6 months.	This effort would help to ensure that licensees and other stakeholders know and understand the various staff positions on dispositioning low-end materials.	The existing documents containing these positions include Regulatory Guide 1.86, staff positions on implementing 10 CFR 20.2002 requests for alternate disposals, all Agreement State letters, information notices, and Commission SRMs (e.g., for unimportant quantities of source material disposals). This effort would facilitate knowledge management.	<p>Although this task involves relatively few resources to implement, it would have little impact on safety and security, and many waste generators are already aware of applicable staff positions.</p> <p>Ranking: Medium</p>
13. Identify new waste streams	Engage in interaction with other NRC offices and other Federal agencies to identify potential new waste streams that have different radionuclide and/or radionuclide concentrations (compared to waste that has been disposed of before) or that have not been addressed or accounted for in existing regulations, such as the waste classification tables in 10 CFR 61.55. This task would require communication with DOE and industry representatives.	This task is not applicable to, or dependent on, any disposal site scenario; (i.e., it is not dependent on near-term disposal availability).	<p>This task would have no effect on safety and security in the near term, but would potentially have effects in the long term.</p> <p>This task would make a small contribution to openness. DOE and industry stakeholders would be involved to the extent that they would be contacted for information.</p> <p>This task would make a significant contribution to effectiveness. The information gained from this effort would be used to identify preparatory efforts that would be required to ensure that the necessary regulatory framework is in place when new waste streams appear. Such efforts could, for example, include rulemaking and/or guidance development.</p>	The need for this task is not urgent.	This task would require approximately 0.15 hours over 1 year.	This activity positions the NRC to be better prepared to address future issues. It also would benefit the nuclear industry by ensuring that the regulatory framework would be in place when needed.	This task would necessitate interactions with other NRC offices as well as other Federal agencies.	<p>Although the level of effort would be small, there is no immediate need for this task, nor would it have a near-term impact on safety goals.</p> <p>Ranking: Medium</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
14. Develop guidance for implementing 10 CFR 61.58	Develop and implement guidance that explains how to meet the provisions of 10 CFR 61.58 regarding the alternative means for classifying and characterizing waste on a case-specific basis.	This task mainly applies to the realistic and pessimistic scenarios, within which paths-forward to waste disposal become increasingly problematic. It is assumed that, within the optimistic scenario, other (e.g., economic, competitive) drivers would facilitate the path to disposal.	<p>Although a guidance document, such as a standard review plan, is not necessary to access the provisions of 10 CFR 61.58, such a tool would facilitate the process and foster common expectations. Therefore, the staff anticipates that the completion of this task would have a small, but positive, impact on safety and security goals because it would facilitate the safe disposal an increment of waste that might otherwise have to be stored. (The realistic and pessimistic scenarios envision some difficulty in the development of GTCC disposal capacity by DOE.)</p> <p>The GD development process would be subject to stakeholder review, comment, and critique.</p> <p>The staff believes that once significant adoption by State regulators and other stakeholders occurs, overall cost-effectiveness and efficiency in the regulatory process of LLW disposal would accrue as a result of a uniform, transparent process for considering alternative characterization and classification strategies. Because the level of such use by Agreement States is difficult to predict, it also is difficult to assess the overall contribution to effectiveness. One of the States in which a disposal site is located does not currently have a provision in its regulations equivalent to 61.58.</p>	Subject to the caveats discussed herein, the staff concludes that there is a near-term need for this standard review plan. The increased flexibility in disposal options implied by such an effort might both facilitate disposal availability and reduce the average cost of disposal at the upper end of the activity spectrum.	Because of the technical and regulatory issues involved, resource requirements would be significant (3.6 - 4.3 FTE). The development and vetting of conceptual approaches that are acceptable to the NRC, as well as the development of compatible analysis tools would be very resource-intensive activities.	The potential benefits of this task are very significant. It would afford industry and regulators a consistent framework for proposing and evaluating alternative classification and characterization strategies. Ultimately, this may lead to expanded flexibility in disposal practices as well as waste isolation (and disposal costs) consistent with risk. Implementation might allow a reduction in the classification of some waste streams and thus might enhance flexibility in disposal options (both location and method).	<p>The utility of this effort is closely related to the willingness of host States to adopt it. It is noteworthy that not all disposal site host States have adopted a 10 CFR 61.58 provision in their regulations.</p> <p>Stakeholder involvement is imperative to counter the perception of reduced protection of health, safety, and the environment associated with implementation.</p>	<p>Potential benefits and contributions are high, subject to licensing States' adoption.</p> <p>Ranking: High</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
<p>15. Define LLW that is acceptable for disposal in uranium mill tailings impoundments to facilitate the approval of such disposals in the future</p>	<p>Develop generic waste acceptance criteria for the disposal of LLW in AEA 11e.(2) mill tailings impoundments. Alternatively, if generic criteria are not feasible, develop performance-based license conditions for specific licensees for the disposal of such wastes.</p>	<p>This task is not applicable (i.e., not relevant to, or dependent on, disposal availability scenarios).</p>	<p>This task would make a small to moderate contribution to safety. Depending on the costs of disposal, the task could lead to the potential elimination of legacy decommissioning sites (i.e., sites that do not have the funds to fully decommission the site).</p> <p>This activity would involve/require substantial and continuous stakeholder involvement and would thus make a significant contribution to openness.</p> <p>This activity would make a moderate contribution to agency effectiveness. Defining the waste characteristics in advance would eliminate uncertainty for licensees considering the disposal of LLW in tailings impoundments. At the same time, other significant steps need to be taken for such disposals to occur, including DOE agreement that it would take custody of, and provide long-term care for, a site that accommodates the disposal of other than 11e.(2) material.</p>	<p>Near-term to medium-term need.</p> <p>However, licensees currently have disposal options for the types of waste suitable for disposal at mill tailings impoundments.</p>	<p>This task would require approximately 1.5 FTE.</p>	<p>This task has the potential to greatly increase the flexibility of disposal of certain types of LLW, such as some DU and other waste streams that behave similarly and offer an equivalent risk when disposed of as 11e.(2) byproduct material.</p>	<p>RIS-00-023 contains guidance on the disposal of non-11e.(2) byproduct material in uranium mill tailings impoundments. It defines a number of other conditions for NRC approval, including concurrence by DOE or the State that would assume long-term care responsibilities and by the regional LLW compact. Thus, although completion of this task could facilitate approvals, it could not guarantee them.</p>	<p>Although this task would make a small to medium contribution to safety, it would require a relatively significant amount of resources.</p> <p>Ranking: Low</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
16. Update the BTP on concentration averaging and encapsulation	Update the BTP guidance by, for example, revisiting the "Factor of 10" rule, allowing some blending of waste to lower the waste class, and providing needed clarification of complex sections in the current BTP as well as articulating the bases/rationales for the positions in these sections.	This task is not applicable (i.e., not relevant to, or dependent on, disposal availability scenarios).	<p>This task would have a low but not insignificant impact on safety and security, in the sense that making the BTP easier to understand would help avoid situations in which waste could be misclassified and thereby not be disposed of adequately from a safety or security standpoint. It could potentially enhance safety and security by enabling disposal of waste that would otherwise have to be stored.</p> <p>The contribution to openness would be high because this activity would involve/require substantial and continuous stakeholder involvement.</p> <p>This task would have a significantly high impact on agency effectiveness because it would resolve waste classification and concentration issues in a risk-informed manner.</p>	Near-term need. Comments received at the ACNW&M workshop as well as in response to the staff's <i>Federal Register</i> notices (FRNs) indicate that stakeholders have considerable interest in this subject.	This task would require approximately 2.0 FTE over 2 years. The resources and time required to accomplish this task are not trivial, in part because of the need to perform some fundamental health physics analyses to determine the bases for current or potentially new provisions in the BTP. In addition, by its very nature, a guidance development activity requires a significant quantity of resources and time for interaction with stakeholders.	This task has the potential to greatly increase the flexibility of disposal of certain types of LLW, particularly sealed sources and irradiated hardware. This task would use risk-informed approaches and knowledge that were not available at the time of the last update.	There is general agreement that many statements in the current BTP are difficult to interpret and that the underlying rationales for many if not most are not self-evident. This continues to require the staff to respond to requests from licensees for interpretation of certain provisions and is an inefficient use of staff resources that would be available for other work if the BTP were more transparent. It may be possible to benefit from industry reports submitted to NRC on this topic for review. If so, the time needed to complete the task and the magnitude of the NRC staff effort would both decrease. Finally, any new positions on blending, averaging, etc. may need to be addressed in other BTPs (waste classification, e.g.) as well, depending upon the specific changes.	<p>This task responds to stakeholder requests and would yield significant benefits in clarifying classification allowances and expanding flexibility.</p> <p>Ranking: High</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
17. Develop and issue an information notice on waste minimization	Develop and issue to 10 CFR Part 30 and 10 CFR Part 40 byproduct and materials licensees an information notice that describes techniques and methods that small institutional waste generators (e.g., laboratories and hospitals) could use to minimize the volumes of waste that they generate.	This task applies to the status quo as well as pessimistic scenarios.	<p>Reducing the volume of waste that might otherwise have to be stored contributes positively to both safety and security.</p> <p>Compared to the efforts needed for developing GDs such as BTPs and standard review plans, development of an information notice does not necessitate significant stakeholder involvement.</p> <p>This effort has the potential to facilitate the safe and effective use of radioactive materials by small materials licensees that currently face issues related to waste storage and associated costs.</p>	Near-term need. Comments received in response to the staff's FRNs, coupled with remarks from speakers at the ACNW&M workshop, indicate that stakeholders have an interest in this subject and would benefit from this information.	<p>This task would require approximately 0.2FTE.</p> <p>The resources and time required to accomplish this task should be modest, especially if NCRP Report No. 143 (mentioned in a response to the staff's FRN) or other publically available documents, such as an NRC policy statement issued in 1981 (46 FR 51100) and Information Notice 89-13 can be used as sources of information and/or cited as references.</p>	This task has the potential to (1) reduce the quantity of LLW generated and thereby contribute to safety and security as well as (2) relieve regulatory burden and cost for materials licensees.	Although 10 CFR Part 50 utility licensees have extensive waste management (including storage) expertise and resources, some small institutional waste generators would benefit from having additional detailed information on how to minimize the amount of waste produced during their operations. Some industry spokespeople have expressed the opinion, however, that any reduction in the quantity of waste requiring disposal would (1) adversely affect the economic viability of existing sites and (2) reduce incentives to develop new sites. This activity should have some appeal for those stakeholders who oppose the use of radioactive materials and their release into the environment.	<p>This task would yield modest benefits to some licensees in the overall LLW management system. Required resources also would be modest.</p> <p>Ranking: Medium</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
18. Examine the need for guidance on defining when radioactive material becomes LLW	Determine whether a need exists for the NRC staff to provide guidance to licensees on when radioactive material becomes LLW. Radioactive material that is LLW can be subject to measures, such as storage guidance and/or financial assurance provisions, that differ from those for radioactive materials for which there is an intended use.	This task applies to all scenarios.	<p>This task could have an impact on the type of safety and security measures that are needed for different types of radioactive material.</p> <p>This task would contribute to the agency's openness goal because it provides transparency to the interpretation of the concept of "waste."</p> <p>This task would contribute to effectiveness because it would help to provide consistency in the management of radioactive waste as radioactive waste.</p>	<p>Near-term need.</p> <p>This issue is relevant as waste generators, processors, and brokers deal with the numerous challenges associated with the creation, management, and disposition of radioactive waste.</p>	This task would require only 0.1 to 0.2 FTE, but would necessitate significant coordination with individual State radiation control programs.	This task would provide national consistency and clarity regarding the point of genesis of radioactive waste. It could help clarify State/compact responsibilities regarding waste disposition. It also could help to clarify liability issues associated with radioactive waste.		<p>This activity would improve consistency and potentially reduce the likelihood of financial assurance concerns for some licensees.</p> <p>Ranking: Low</p>

Activity	Description	Scenario Applicability	Impact on Strategic Goals	Need (near term, medium term, long term)	Level of Effort	Benefit	Additional Considerations	Summary/ Ranking
19. Perform a scoping study of the need to revise/expand byproduct material financial assurance to account for total life-cycle (operational) cost, including dispositioning	Review the adequacy of the financial assurance requirements of 10 CFR 30.35 to determine whether regulatory changes are warranted to adjust front-end requirements to anticipate the ultimate costs of disposing of/dispositioning radioactive sources not addressed by the Task Force on Control of Radioactive Sources (which addressed Categories 1 and 2) and other radioactive material.	This task addresses the realistic and pessimistic scenarios. Financial assurance becomes more acute as a function of the high cost and problematic availability of disposal.	This task could affect safety and security. Any rulemaking that might result from this task would require public involvement and would thus be consistent with the openness goal. This task would have a significant impact on agency effectiveness because it would reduce or eliminate the need for using DOE or Conference of Radiation Control Program Directors source recovery programs and would ensure that licensee funds are available for the disposal of all waste.	Near-term need.	The staff resources needed for a scoping review/study are projected to be less than approximately 0.2 to 0.4 FTE. If a subsequent rulemaking were deemed appropriate, time and cost would be very significant.	If additional financial assurance requirements are needed, they would be crafted to eliminate or minimize the likelihood of orphaned, abandoned, or stolen radioactive material (particularly sealed sources) by ensuring funding availability for disposal activities during the total life cycle.	Any rulemaking to expand 10 CFR 30.35 requirements would necessitate extensive interaction with the affected stakeholders.	A scoping study to determine whether financial assurance measures are sufficient for the future could be accomplished by expending modest resources. Ranking: High
20. Develop and implement a national tracking system for LLW disposed of and in storage	Promulgate regulation that would identify the data necessary to track the origin, management, and disposition of all LLW. Require the promulgation of a compatible State regulation by all Agreement States with licensees that produce LLW. By these regulations, require that licensees provide necessary information to regulatory authorities on a regular, prescribed basis. A national tracking system has been suggested by GAO.	This task applies to all scenarios.	The NRC and Agreement States already have regulatory programs in place to ensure the safe, secure use of all radioactive material, including LLW. With respect to openness, this task would make available to the public information about licensees' waste that is disposed of and in storage. This task would not contribute to the NRC's effectiveness goal.	Near-term need.	The staff resources necessary to develop and implement a regulatory framework for a national tracking system would be very significant, estimated at 3.7 FTE.	This task would provide transparency on quantities and locations of LLW in storage and disposed of by licensees in the United States. It would also enable forecasting of future waste volumes.	The regulatory burden would be significant on thousands of NRC and Agreement State licensees. Efforts would go well beyond the recently implemented National Source Tracking System. See also the NRC May 25, 2004, letter and comments regarding GAO-04-604, contained in an appendix to that report.	This activity does not significantly contribute to safety, security, effectiveness, or openness Ranking: Low

APPENDIX D

CROSS-WALK OF NAS, ACNW&M, and GAO RECOMMENDATIONS WITH THE NRC STAFF'S LLW STRATEGIC ASSESSMENT

In this appendix, the U.S. Nuclear Regulatory Commission (NRC) staff analyzes recommendations contained in the following documents:

- National Research Council, "Improving the Regulation and Management of Low-Activity Radioactive Wastes," National Academy of Sciences, Washington, DC, March 2006. Recommendations NAS-1 through NAS-5.
- August 16, 2006, letter from Michael Ryan, Advisory Committee on Nuclear Waste (ACNW&M), to Chairman Dale Klein, NRC, summarizing the results of the May 2006 ACNW&M Low-Level Radioactive Waste (LLW) Working Group meeting. Recommendations ACNW&M 1 through ACNW&M 5.
- December 27, 2005, letter from Michael Ryan, ACNW&M, to Chairman Nils Diaz, NRC. Recommendations ACNW&M 6 through ACNW&M 11.
- GAO-07-221, "Approaches Used by Foreign Countries May Provide Useful Lessons for Managing U.S. Radioactive Waste," Government Accountability Office (GAO), Washington, DC, March 2007.

Recommendation	Staff Assessment	Strategic Assessment Activity and Ranking
NAS-1. The committee recommends that low-activity radioactive waste (LAW) regulators 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 NRC, U.S. Environmental Protection Agency, U.S. Department of Energy, U.S. Department of Defense, and other Federal and State agencies.	The staff agrees with this recommendation. It is consistent with agency goals for risk-informing the regulation of NRC activities. It also has significant stakeholder support and the potential for increasing disposal options available to waste generators as well as increasing public understanding of LAW regulation, which is currently based on origin, not risk.	Activity 11--Coordination with other agencies on LAW regulation, including use of the Interagency Steering Committee on Radiation Standards and National Materials Program for this coordination (Medium)
NAS-2. The committee recommends that regulatory agencies adopt a risk-informed LAW system in incremental steps, relying mainly on their existing authorities under current statutes and using a four-tiered approach, specifically (1) changes to specific facility licenses or permits and individual licensing decisions, (2) regulatory guidance to advise on specific practices, (3) regulation changes, or, if necessary, (4) legislative changes.	The staff agrees with this recommendation. Similar to the first recommendation, it has widespread stakeholder support (with some exceptions from public interest groups) and is practical. A number of specific activities identified in this strategic assessment (SA) address this recommendation.	Activity 3--Rulemaking for LAW (Low) Activity 7--Internal procedure and external guidance for 10 CFR 20.2002 LAW requests (High) Activity 8--Legislative changes (Low) Activity 11--Coordination with other agencies (Medium) Activity 12--Guidance on existing LAW disposal options (Medium)

Recommendation	Staff Assessment	Strategic Assessment Activity and Ranking
<p>NAS-3. The committee recommends that government agencies 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.</p>	<p>The staff agrees with this recommendation. In addition to identifying several proposed activities that address this recommendation, the NRC has already begun to implement improved transparency measures (including methods for obtaining public views) for 10 CFR 20.2002 LAW disposals. In addition, as part of the SA effort, the staff solicited stakeholder input.</p>	<p>Activity 3--Rulemaking for LAW (Low) Activity 7--Internal procedure and external guidance for LAW (High); staff to seek public input on guidance</p>
<p>NAS-4. The committee recommends that Federal and State agencies continue to harmonize their regulations for managing and disposing of wastes regulated under the Atomic Energy Act of 1954 (AEA) and non-AEA wastes so that those wastes will be controlled consistently according to their radiological hazards rather than their origins.</p>	<p>The staff agrees with this recommendation. Legislation causes some of the differences, which could constrain agencies' ability to harmonize regulations.</p>	<p>Activity 3--LAW rulemaking (Low) Activity 8--Legislative changes (Low) Activity 11--Coordination with other agencies (Medium)</p>
<p>NAS-5. The committee recommends 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. The International Atomic Energy Agency (IAEA) waste classification system is based on the radiological properties of the waste rather than its origins.</p>	<p>The staff agrees with this recommendation. The staff has extensive involvement with IAEA (through the Waste Safety Standards Committee) and the Nuclear Energy Agency in their waste activities and thereby influences standards published by these organizations. If the agency initiated any LAW or LLW rulemakings, the staff would give strong consideration to international standards. The staff will also consider international standards and technical experience when updating or revising guidance.</p>	<p>Activity 3--LAW rulemaking (Low) Activity 5--Update of storage guidance (High) Activity 6--Licensing criteria for greater-than-Class-C (GTCC) waste (Medium) Activity 10--Major revisions to 10 CFR Part 61 (Low) Activity 14--Guidance for 10 CFR 61.58 implementation (High) Activity 16--Update of concentration averaging branch technical position (High) Activity 17Waste minimization information notice (Medium)</p>
<p>ACNW&M-1. The Committee believes that there is no need to revise the NRC's LLW regulations in 10 CFR Part 61 at this time.. The Committee recommends that the Commission develop license conditions and regulatory guidance to better implement the provisions of 10 CFR 20.2002 and 10 CFR 61.58, which give specific authority to implement such guidance.</p>	<p>The staff agrees with this recommendation. Although the staff evaluated major revisions to 10 CFR Part 61 as part of the LLW strategic assessment, such changes are ranked low in priority.</p>	<p>Activity 7--Internal procedure and external guidance for 10 CFR 20.2002 requests (High) Activity14--Guidance for 10 CFR 61.58 implementation (High)</p>

Recommendation	Staff Assessment	Strategic Assessment Activity and Ranking
<p>ACNW&M-2. The Committee recommends that the NRC develop guidance permitting the management and disposal of unique and emerging waste streams. Such guidance should consider waste types and forms, packaging, and disposal site conditions in a way that is risk-informed and performance based, consistent with the performance criteria in 10 CFR 61.41 to 10 CFR 61.44 and 10 CFR 61.58, as appropriate.</p>	<p>The staff agrees with this recommendation and has included two activities that address it. The first is to identify alternatives for the disposal of large quantities of depleted uranium (DU) from licensed enrichment facilities. The second is to identify new waste streams from, for example, Global Nuclear Energy Partnership facilities that might require new approaches for disposal.</p>	<p>Activity 4--Alternatives for disposal of large quantities of DU (High) Activity 13--Identification of new waste streams (Medium)</p>
<p>ACNW&M-3. The Committee recommends that the NRC should encourage a more risk-informed approach to LLW management that places greater emphasis on the radionuclide content of the waste rather than the waste source or origin.</p>	<p>The staff agrees with this recommendation and has proposed several activities that address it. The staff sees an opportunity to effect change in the near term by focusing on activities to further risk-inform current guidance. Other activities that will require either agreement from other agencies to implement (e.g., disposal of LLW in 11e.(2) cell) or legislative changes were ranked lower because they will likely take more time to implement and will have a lower likelihood of success.</p>	<p>Activity 3--LAW rulemaking (Low) Activity 4--Alternatives for large quantities of DU (High) Activity 6--Licensing criteria for GTCC waste (Medium) Activity 7--Internal procedure and external guidance for 10 CFR 20.2002 disposals (High) Activity 11--Coordination with other agencies (Medium) Activity 14--Guidance for 10 CFR 61.58 implementation (High) Activity No. 15, criteria for LLW disposal in mill tailings impoundments (Low)</p>
<p>ACNW&M-4. The Committee recommends examining how the NRC and the Agreement States are preparing to regulate potential increases in the storage of Class B and C LLW if and when Barnwell closes to out-of-compact waste in July 2008 and if no alternative options become available.</p>	<p>The staff agrees with this recommendation and has included it in the LLW SA.</p>	<p>Activity 1--Evaluation of changes to licensing and enforcement in the event of widespread storage (Low)</p>
<p>ACNW&M-5. The Committee recommends that, because legislation and other regulations reference and include the waste classification provisions in 10 CFR Part 61, it is important to identify and evaluate any unintended consequences from changes recommended in this letter. The Committee believes that the incremental changes and improvements suggested in this letter are unlikely to have such unintended consequences.</p>	<p>The staff agrees with this recommendation and included it in the LLW SA.</p>	<p>The staff has attempted to identify unintended consequences through its solicitation of public comments on the SA. In addition, in the evaluation of each specific LLW activity, the staff considered unintended consequences under the "Additional Considerations" column.</p>

Recommendation	Staff Assessment	Strategic Assessment Activity and Ranking
<p>ACNW&M-6. The 10 CFR Part 61 intruder scenarios are not risk-informed. They are based on bounding or extremely conservative assumptions and conditions. Furthermore, there is no guidance on performing an LLW human intrusion calculation. The assumptions used in the intruder scenario have a direct bearing on the Class A, B, and C concentration limits in 10 CFR 61.55. The provisions of 10 CFR 61.58 allow for alternative requirements for waste classification and characteristics. This section could serve as a basis for better risk-informing 10 CFR 61.55.</p>	<p>The staff agrees, in part, with this recommendation and has included it in the LLW SA. The staff agrees that guidance is needed on performing LLW human intrusion calculations. The staff also agrees that the assumptions and analysis for LLW human intrusion need to be updated using current knowledge, models, and other analytical tools.</p>	<p>Activity 14--Guidance for 10 CFR 61.58 implementation (High)</p>
<p>ACNW&M-7. The NRC has updated the provisions of 10 CFR Part 20 to incorporate recent recommendations of the International Commission on Radiological Protection (ICRP). However, 10 CFR 61.41 relies on older ICRP dosimetry models that are based on a different system of dose calculation. This inconsistency can cause confusion.</p>	<p>The staff agrees with this recommendation, and the NRC has endorsed the more recent dosimetry models. The February 22, 1999, <i>Federal Register</i> notice for the proposed 10 CFR Part 63 stated (on page 8644) that "As a matter of policy, NRC considers 0.25 mSv (25 mrem) TEDE as the appropriate dose limit within the range of potentials doses...of 0.25 mSv (whole body), 0.74 mSv (thyroid dose) and 0.25 mSv (to any other critical organ)." In addition, Section 3.3.7.1.2 of NUREG-1573 specifically endorses ICRP 30 (the basis for 10 CFR Part 20 standards) for LLW performance assessments to determine compliance with 10 CFR Part 61 performance objectives.</p>	<p>NRC guidance addresses the ACNW&M recommendation. Activity No. 10, Major Revisions to Part 61 (currently Low), could codify the Commission guidance in the 10 CFR Part 63 proposed rulemaking notice, but in the meantime no action is needed.</p>
<p>ACNW&M-8. With one exception, the Subpart D siting criteria are qualitative. A more quantitative and risk-informed or performance-based approach to siting criteria might be helpful in developing new sites.</p>	<p>The staff agrees in general with this recommendation and would consider it as part of other revisions to 10 CFR Part 61 if they were undertaken.</p>	<p>Activity 10--Major revisions to 10 CFR Part 61 (Low)</p>
<p>ACNW&M-9. The 10 CFR Part 61 institutional controls and financial assurance measures have recently been considered in the proposed revision to decommissioning guidance. The updates may provide insights into the institutional control and financial assurance requirements for LLW sites.</p>	<p>The staff agrees in general with this recommendation and would consider it as part of other revisions to 10 CFR Part 61 if they were undertaken.</p>	<p>Activity 10--Major revisions to 10 CFR Part 61 (Low)</p>

Recommendation	Staff Assessment	Strategic Assessment Activity and Ranking
<p>ACNW&M-10. Collection of environmental monitoring data is required during the operational and institutional control periods. These data could be used to increase confidence in long-term predictions of performance of LLW facilities.</p>	<p>The staff agrees with this recommendation. Although not identified as a specific task in the SA, this issue could be addressed in any major revisions to 10 CFR Part 61 and/or in updating and consolidating LLW guidance into one document. At this time, however, the Agreement States perform all licensing and must ensure that long-term performance of sites is adequate. There is no prohibition on considering these data in such predictions.</p>	<p>Activity 5--Update to, and consolidation of, LLW guidance (Medium) Activity 10--Major revisions to 10 CFR Part 61 (Low)</p>
<p>ACNW&M-11. The provisions of 10 CFR Part 61 did not explicitly include credit for engineered barriers for waste form, waste packaging, disposal site design, and cover design. It would be an improvement to consider appropriate credit for the contribution of these engineered features to system performance.</p>	<p>The staff agrees with this recommendation, although the priority is low. NUREG-1573 has an extensive discussion of the role of engineered barriers in the performance of LLW disposal facilities and provides staff positions on taking credit for engineered barriers in performance assessments. Agreement States regulate all of the LLW disposal sites in the United States, and, in part for that reason, this task is ranked as low priority.</p>	<p>Activity 10--Major revisions to 10 CFR Part 61 (Low)</p>

Recommendation	Staff Assessment	Strategic Assessment Activity and Ranking
<p>GAO-1. To improve the management of LLW in the United States and to address a potential shortfall of disposal availability for higher activity LLW in 2008 as well as other management concerns, GAO recommends that the Chairman of the NRC and the Secretary of Energy evaluate and report to Congress within 1 year on the usefulness to the United States of the following:</p> <p>(1) adopting the LLW management approaches used in the countries discussed in the report as well as the steps and any authorities necessary for their implementation, if deemed appropriate. These approaches include the following:</p> <ul style="list-style-type: none"> (a) national database of LLW (b) timely removal of higher activity LLW (c) alternative disposal options for LAW (d) improved financial assurance <p>(2) developing a U.S. radioactive waste management plan and the potential costs, steps, and any authorities necessary to develop such a plan, if deemed appropriate</p>	<p>Activities evaluated in this assessment (see next column) include most of the specific approaches identified by GAO for investigation, and all will be evaluated if the NRC and DOE are required to issue a report to Congress. The staff has specifically evaluated in this assessment (a) the usefulness of a national database, (b) alternative options for disposal of LAW, and (c) improved financial assurance. The staff does not evaluate here the timely removal of LLW and centralized storage of LLW because there is currently no basis for either, in the staff's view. With respect to the second recommendation, the staff (in its February 21, 2007, comments on the draft report) did not agree with the recommendation for a national waste management plan and has no plans at this time for additional evaluation. However, if the NRC and DOE are required to submit a report to Congress, as recommended by GAO, additional evaluation will be required.</p>	<p>Activity 19--Scoping study for financial assurance (High) Activity 20--National LLW database (Low) Activity 7--10 CFR 20.2002 procedure development (High)</p>

APPENDIX E

LOW-LEVEL WASTE PROGRAM KNOWLEDGE MANAGEMENT

Knowledge management (KM) is a key issue that must be addressed in the near term for the NRC's Low-Level Waste (LLW) program to remain effective in future years. As characterized in the body of this strategic assessment, the LLW program encompasses a broad range of issues that often have complex technical, policy and political considerations. In many cases these issues also have a long and complex history. Understanding of how these issues, as well as NRC's positions on them, have evolved over time is critical to effectively executing programmatic activities. Over time as the scope and structure of the LLW program evolved, essential knowledge has been concentrated in only a few individuals, several of whom are currently retirement-eligible or are nearing this point. These staff have been involved in the LLW program for multiple decades, including the 1980s when the program was at its high point in terms of budget and scope of activities.

While having such depth and expertise among the staff currently allows the LLW program to perform at a high level, it is expected that a significant portion of the program's knowledge base will be lost in the coming years. Program management has been aware of this challenge for some time and has initiated a knowledge management strategy to assure the program maintains its high level of performance. The strategy can be described as consisting of two key components: (1) recruitment of key employees and (2) knowledge transfer program. Starting in FY2004, program management initiated an effort to bring in experienced staff to address the increasing interest in LLW and to serve as mentors for junior staff. This effort included using the retired annuitant process to bring back one former NRC staff member with significant experience, rehiring a former NRC staff person with significant NRC and industry LLW experience, and recruiting a senior NRC staff person back to the program. Starting in FY 2006, NRC received a budget increase for LLW and was able to recruit one Nuclear Safety Professional Development Program (NSPDP) employee and in FY 2007 the program hired one new GG14 level staff person. The staff will continue to use this recruitment strategy, including use of the NSPDP, as new LLW staff are hired in the future.

LLW program staff and management have considered the strategies described in the agency's KM plan¹ and have developed a program-specific knowledge transfer plan. The plan is based on a practical framework for KM that includes three elements: (1) documenting historical knowledge and developing written procedures; (2) teaching junior staff in focused topic areas; and (3) on-the-job training and mentoring (including strategies such as double encumbering senior staff as soon as practicable after they become eligible for retirement). The implementation of this knowledge transfer plan is being initiated. Maintaining the level of expertise needed to effectively conduct the LLW activities identified in this assessment will require a focused and sustained KM effort. Given the complexity of the LLW program, significant time will be required for training and mentoring of junior staff. It is important to note that KM activities require an investment on the part of senior staff as well as new staff. In some instances, the productivity of senior staff may be impacted as they work to document procedures and practices and mentor junior staff, as opposed to simply completing activities independently.

¹ SECY-06-0164, The NRC Knowledge Management Program, July 25, 2006.

The staff did not attempt to estimate resources needed for knowledge transfer (i.e., on the job training) for all twenty activities identified in the strategic assessment, primarily because there is limited baseline data from which to generate a meaningful estimate. However, staff's current schedule and resources for activities in Table 1, that are expected to be completed in FY 2008 reflect consideration of the resources and time needed for knowledge transfer activities. Staff intends to collect baseline data on the cost and time of knowledge transfer activities in FY 2008 and FY2009 to inform future budget and planning decisions. .