

June 15, 2010

MEMORANDUM TO: Chairman Jaczko  
Commissioner Svinicki  
Commissioner Apostolakis  
Commissioner Magwood  
Commissioner Ostendorff

FROM: R. W. Borchardt */RA by Michael F. Weber for/*  
Executive Director for Operations

SUBJECT: PROJECT PLAN FOR THE REGULATORY PROGRAM REVIEW TO  
SUPPORT EXTENDED STORAGE AND TRANSPORTATION OF  
SPENT NUCLEAR FUEL

The purpose of this memorandum is to request Commission approval of the Project Plan for the Extended Storage and Transportation Regulatory Program Review in Enclosure 1. The staff developed this plan in response to staff requirements memorandum (SRM) COMDEK-09-0001, "Revisiting the Paradigm for Spent Fuel Storage and Transportation Regulatory Programs." In this SRM, the Commission directed the staff to develop a project plan to conduct a thorough review of the regulatory programs for spent nuclear fuel (SNF) storage and transportation, and to evaluate their adequacy for ensuring safe and secure storage of SNF for extended periods beyond 120 years. The Commission also directed the staff to undertake research to bolster the technical bases of the regulatory framework in support of extended periods, and to leverage ongoing improvement initiatives.

The staff has developed a plan for Integrating Spent Nuclear Fuel Regulatory Activities (ISNFRA) to address future regulatory challenges related to the management of SNF and high-level waste. The three core areas of the ISNFRA plan are storage and transportation, reprocessing, and disposal. As part of the ISNFRA plan, the staff will coordinate the extended storage and transportation regulatory program review with the reprocessing and disposal regulatory program activities, as appropriate, to address changes to national policy and industry programs related to SNF management.

The staff believes that the current regulatory framework can be enhanced to ensure the safety and security of extended storage and transportation with additional research, guidance, review processes, and potential rule changes. The project plan includes two main goals to enhance the regulatory programs for both interim storage and extended storage and transportation:

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(1) identification and implementation of regulatory improvements to current licensing, inspection, and enforcement programs; and (2) enhancement of the technical and regulatory basis of the existing regulatory framework, and modification as necessary, to support extended storage and transportation.

The plan also details cross-cutting strategies that the staff will apply to help achieve the two main goals, as applicable. These strategies include applying risk-informed and performance-based (RIPB) enhancements, promoting development of domestic codes and standards, promoting international cooperation on extended storage and transportation regulatory issues, exploring incentives for industry adoption of state-of-the-art technologies, and engaging stakeholders. The staff plans to implement risk-informed enhancements using the "Risk-Informed Decision Making for Nuclear Material and Waste Applications" (RIDM), Revision 1 (ML080720238), as appropriate. The RIDM has been developed for generic use in Office of Nuclear Material Safety and Safeguards (NMSS) risk-informing activities, and provides a systematic process for evaluating the feasibility of risk-informing improvements and implementing risk insights into existing regulatory frameworks.

Further, Appendix A of the project plan identifies potential policy issues. These issues are related to the storage cask certification rulemaking process, the integration of transportation and storage safety design standards, maintaining fuel cladding integrity during the backend of the fuel cycle, and financial qualifications and assurance of licensees for extended storage and transportation. The staff plans to evaluate these issues as part of the project plan and present policy recommendations to the Commission, as warranted.

The staff has developed a seven-year plan for enhancing the technical and regulatory basis for extended storage and transportation by FY 2017. This would be followed by potential rulemaking activities, as warranted. The staff considered shorter time frames for enhancing the regulatory program, however, schedule constraints are influenced by the time needed to sequence various gap assessments and complete multiple research activities (e.g., high-burnup fuel research), participate in external research initiatives, engage international counterparts, and engage stakeholders and other interested parties in development of guidance and potential environmental assessments. The staff plans to implement the near-term regulatory improvements to guidance and procedures by late fiscal year (FY) 2013, with potential rule changes completed in FY 2015. These improvements would enhance the effectiveness of the current regulatory program for interim storage and transportation, and would also be durable in supporting future licensing and inspection activities related to extended storage and transportation. The staff also plans to complete aging research gap assessments in FY 2011 and environmental gap assessments in FY 2012. These and other gap assessments will systematically identify technical and regulatory differences between the current regulatory framework, and that needed to support extended storage and transportation in the future. These gap assessments will also inform the estimated time and effort that will be needed for enhancing the extended storage and transportation regulatory framework. Appendix B of the project plan provides an integrated overview of projected schedules for all activities.

The staff notes that one significant outcome of the various research studies may be identification of timeframes that require significant mitigation actions (e.g., replacement of cask components) to ensure continued safe storage and transportability. The staff has not yet identified any such timeframes, and has preliminarily selected an analytical timeframe of 300 years for the scope of the extended storage and transportation regulatory program review elements, such as extrapolating research data, conducting potential risk and environmental assessments, and developing aging management and design performance guidelines.

Prior to issuance of SRM-COMDEK-09-0001, the staff had several initiatives underway which will continue in fiscal year (FY) 2010, and are leveraged in the enclosed project plan. These ongoing initiatives include a Lean Six Sigma review of the general licensing process; aging research and gap assessments; participation with the Electric Power Research Institute and the U.S. Department of Energy in the Extended Storage Collaboration Program; engaging stakeholders and interested parties; and implementing various research activities that support emergent issues on fuel cladding integrity, potential degradation of cask components, criticality safety, and transportation risk.

Upon Commission approval, the staff plans to implement major elements of the project plan (i.e., initiatives that are not already underway) in FY 2011 and FY 2012. These activities include a comprehensive review of the inspection and enforcement programs, gap assessments to identify research and assessment needs in the safety, security, and environmental arenas, and interactions with international counterparts to compare regulatory frameworks and share research. In summary, the staff expects to achieve several outcomes in FY 2011 and FY 2012, including revision of internal procedures for licensing, inspection, and enforcement to improve efficiency, and completion of (or significant progress on) several gap assessments for extended storage and transportation.

It is also important that current and future rulemakings are informed to the extent practical by relevant findings generated from the gap assessments. The staff will coordinate the safety, security and environmental gap assessments with current and future rulemakings that are related to those areas, such as the rulemaking on security enhancements for independent spent fuel storage installations. This coordination could result in adjustments to rulemaking or extended storage and transportation gap assessment schedules. The staff will inform the Commission of any proposed changes to planned rulemaking activities as a result of this coordination effort.

The budgeted resources for FY 2010, for initiatives already underway related to the project plan, are 2.0 FTE and \$1.15M. Projected resources required to implement this plan in FY 2011 will be approximately 21 FTE and \$3.4M. Resources for the FY 2011 project plan activities are included in the NMSS-lead, Spent Fuel Storage and Transportation business line, or are requested on the FY 2011 Shortfall Request. The staff will prioritize and reallocate FY 2011

resources among the offices, as necessary. Projected resources required to implement the plan in FY2012 are pre-decisional and discussed separately in Enclosure 2 (Official Use Only).

SECY, please track.

Enclosures:

1. Project Plan for the Extended Storage and Transportation  
Regulatory Program Review
2. Official Use Only - Projected Resources for the Extended Storage and  
Transportation Program Review

cc w/encl: SECY

OGC

OCA

OPA

CFO

**Project Plan for the  
Extended Storage and Transportation  
Regulatory Program Review**

**- Revision 0 -**

**- June 2010 -**

**Enclosure 1**



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## ACRONYMS

<b>CFR</b>	<i>Code of Federal Regulations</i>
<b>DOE</b>	U.S. Department of Energy
<b>DOT</b>	U.S. Department of Transportation
<b>EA</b>	environmental assessment
<b>EIS</b>	environmental impact statement
<b>EPRI</b>	Electric Power Research Institute
<b>ESCP</b>	Extended Storage Collaboration Program
<b>EST</b>	extended storage and transportation
<b>FSME</b>	Office of Federal and State Materials and Environmental Management Programs
<b>FTE</b>	full-time equivalent
<b>FY</b>	fiscal year
<b>GEIS</b>	generic environmental impact statement
<b>GWd/MTU</b>	gigawatt-days per metric ton uranium
<b>HBU</b>	high burnup
<b>HLW</b>	high-level waste
<b>IAEA</b>	International Atomic Energy Agency
<b>ISFSI</b>	independent spent fuel storage installation
<b>LSS</b>	Lean Six Sigma
<b>MDEP</b>	Multinational Design Evaluation Program
<b>MOX</b>	mixed oxide
<b>MRS</b>	monitored retrievable storage
<b>NEA</b>	Nuclear Energy Agency
<b>NEPA</b>	National Environmental Policy Act
<b>NMSS</b>	Office of Nuclear Material Safety and Safeguards
<b>NRC</b>	U.S. Nuclear Regulatory Commission
<b>NRO</b>	Office of New Reactors
<b>NRR</b>	Office of Nuclear Reactor Regulation
<b>NSIR</b>	Office of Nuclear Security and Incident Response
<b>NWPA</b>	Nuclear Waste Policy Act of 1982
<b>OCFO</b>	Office of the Chief Financial Officer
<b>OE</b>	Office of Enforcement
<b>OECD</b>	Organization for Economic Development
<b>OGC</b>	Office of the General Counsel
<b>OIP</b>	Office of International Programs
<b>OPA</b>	Office of Public Affairs
<b>RES</b>	Office of Nuclear Regulatory Research
<b>RIDM</b>	“Risk-Informed Decisionmaking for Nuclear Material and Waste Applications”
<b>RIPB</b>	risk-informed and performance-based
<b>SA</b>	security assessment
<b>SFP</b>	spent fuel pool
<b>SFST</b>	spent fuel storage and transportation
<b>SNF</b>	spent nuclear fuel
<b>SRM</b>	staff requirements memorandum
<b>SSC</b>	structure, system, and component
<b>UO<sub>2</sub></b>	uranium dioxide

## Executive Summary

In Staff Requirements Memorandum (SRM)-COMDEK-09-0001, "Revisiting the Paradigm for Spent Fuel Storage and Transportation," dated February 18, 2010, the Commission directed the staff of the Nuclear Regulatory Commission (NRC) to undertake a thorough review of the regulatory programs for spent fuel storage and transportation to evaluate their adequacy for ensuring safe and secure storage and transportation of spent nuclear fuel (SNF) for extended periods beyond 120 years. The staff believes that the current regulatory framework can be enhanced with additional research, analyses, guidance, and rule changes, to ensure the safety and security of extended storage and transportation (EST) of spent fuel. This project plan focuses on gap assessments and the additional research, data, technical analyses, guidance development, and rule changes that may be needed to implement appropriate enhancements to the NRC's regulatory programs for SNF storage and transportation. This project plan does not govern extended wet storage of SNF in spent fuel pools. The staff will address extended reactor operations, including continued functionality of spent fuel pools, in a separate effort.

In SRM-COMDEK-09-0001, the Commission requested that the staff develop a project plan for a thorough regulatory review of EST. The Commission directed that the project plan contain objectives, plans, potential policy issues, projected schedules, performance measures, and projected resource requirements. This project plan is the staff's response to the Commission's direction. The figure below provides an overview of the project schedule and Appendix B provides projected schedules for major activities. Under the projected schedules, the staff could complete guidance updates and potential rulemaking activities to improve regulatory processes by fiscal year (FY) 2015. For enhancing the regulatory framework to support EST, the staff could publish a potential Generic Environmental Impact Statement on EST in FY 2016 (if needed), and complete potential EST safety and security rulemaking activities in FY 2020. The staff will provide periodic updates of progress, and keep the Commission informed of any significant changes to the project plan or other relevant issues that impact plan implementation, as warranted.

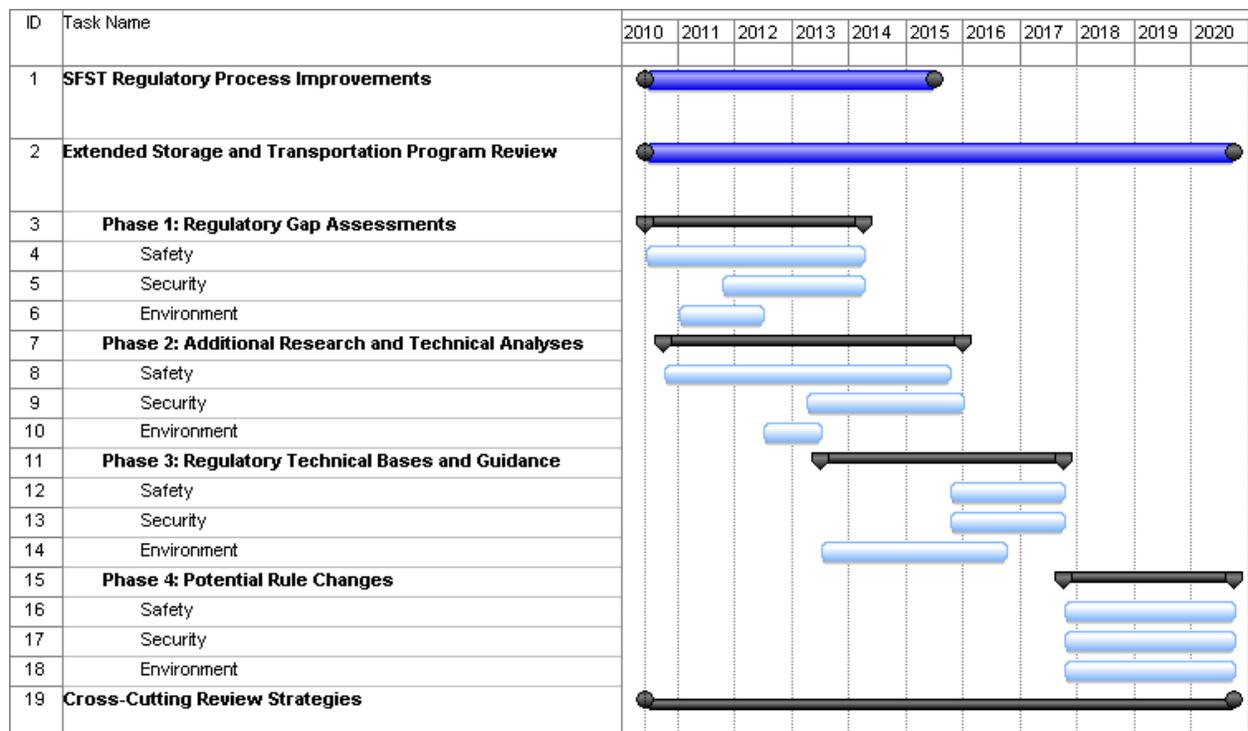
The project plan has two main goals: (1) identify and implement near-term regulatory improvements to the efficiency and effectiveness of the licensing, inspection, and enforcement programs (within the current technical bases) associated with storage and transportation of SNF, and (2) enhance the technical and regulatory basis of the existing regulatory framework to support EST. Key objectives in meeting the first goal include performing systematic, comprehensive reviews of the licensing, inspection, and enforcement processes and implementing guidance; developing new guidance and rulemaking technical bases for regulatory improvements; and implementing enhanced processes, review guidance and potential rule changes (if needed) within the current technical bases for storage and transportation.

For the second goal, the staff will evaluate and enhance the technical and regulatory bases in the safety, security, and environmental areas for the safe, secure storage and transportation of SNF for extended periods. Key objectives in meeting this goal include performing regulatory gap assessments and technical reviews; implementing additional research and technical assessments; revising and/or developing guidance and regulatory bases; and implementing guidance and potential rule changes to support EST. Completion of the latter objectives will depend in part on the additional research and technical assessments identified by the gap assessments. In addition, the staff will coordinate the safety, security and environmental gap

assessments with current and future rulemakings that are related to those areas. This coordination could result in adjustments to rulemaking or EST gap assessment schedules.

The project plan also specifies cross-cutting strategies, which the staff will apply to all activities as appropriate. These strategies include implementing risk-informed and performance-based enhancements, promoting development of domestic codes and standards, promoting international cooperation, exploring incentives for industry adoption of state-of-the-art technologies, and ensuring opportunities for stakeholder participation. The staff will implement risk-informed enhancements using the “Risk-Informed Decision Making for Nuclear Material and Waste Applications” (RIDM), Revision 1 (ML080720238), as appropriate. The RIDM has been developed for generic use in NMSS risk-informing activities, and provides a systematic process for evaluating the feasibility of risk-informing improvements and implementing risk insights into existing regulatory frameworks.

Appendix A identifies potential policy issues. These issues will be examined as the staff completes initial evaluations and gap assessments described in the project plan. The outcomes of the review may involve policy issues for Commission consideration. In addition, other policy issues could emerge during implementation of the project plan, and possibly as the result of external events affecting the national policy for SNF management (e.g., executive, legislative, or judicial actions). The following figure depicts the schedules of major activities:



# Extended Storage and Transportation Regulatory Program Review

## 1.0 Project Overview

This project plan describes the staff's plans to review the adequacy of the existing spent nuclear fuel (SNF) storage and transportation regulatory framework for extended storage and transportation of SNF. The first goal is to identify and implement regulatory improvements for the efficiency and effectiveness of licensing, inspection, and enforcement programs (within the current technical bases) associated with the storage and transportation of SNF. The second goal is to enhance the technical and regulatory basis of the existing regulatory framework to support extended storage and transportation (EST). The staff believes that the current regulatory framework can be enhanced with additional research, analyses, guidance, and rule changes, to ensure the safety and security of EST. This plan will initiate gap assessments to identify the additional research, data, technical analyses, guidance development, and rule changes that could be needed to bolster the technical and regulatory basis for EST. Gap assessments generically refer to the identification of technical and regulatory differences between the current, established framework, and that which may be needed to develop an enhanced, future EST framework. This project plan does not govern extended wet storage of SNF in spent fuel pools (SFPs). The staff will address extended reactor operations, including continued functionality of SFPs, in a separate effort (see Section 3.1).

This project plan has been developed by the Office of Nuclear Material Safety and Safeguards (NMSS) in coordination with the NRC Regions and the Offices of Nuclear Regulatory Research (RES), Nuclear Reactor Regulation (NRR), Nuclear Security and Incident Response (NSIR), Federal and State Materials and Environmental Management Programs (FSME), New Reactors (NRO), International Programs (OIP), General Counsel (OGC), Enforcement (OE), and the Chief Financial Officer (OCFO).

### 1.1 Existing Regulatory Framework

The existing regulatory framework for SNF transport, specified in Title 10 of the Code of Federal Regulations (10 CFR) Part 71, "Packaging and Transportation of Radioactive Material," has been effectively demonstrated through significant operational experience over a period of more than 40 years. Similarly, the existing regulatory framework for SNF storage, specified in 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste," has been effectively demonstrated for almost 20 years, with over 1,200 casks loaded at 55 independent spent fuel storage installations (ISFSIs) in the United States. The current regulatory framework supports at least the first 60 years of dry cask storage (i.e., a 20-year initial licensing term, followed by a 40-year license renewal). ISFSI licensees seeking to renew beyond the first 20 years of cask service are required to have an appropriate aging management program that considers the effects of aging on systems, structures, and components (SSCs).<sup>1</sup> Combined with a 60-year operating term for reactor spent fuel pools (SFPs) (i.e., a 40-year initial reactor licensing term, followed by a 20-year license renewal), a regulatory framework for safe and secure spent nuclear fuel management exists for up to 120 years.

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<sup>1</sup> The aging management requirement and 40-year license renewal term are being codified in a final rule package that is currently under Commission consideration (SECY-10-0056; ML100710052).

For most (if not all) reactor sites, the SFPs do not have sufficient capacity to hold all the spent fuel generated during 60 years of potential operation under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." Therefore, most reactor licensees will employ dry cask storage under 10 CFR Part 72, well before 60 years of potential reactor operation. Most licensees will need to seek multiple dry cask storage license renewals (i.e., combined 10 CFR Part 72 storage terms beyond 60 years) to reach a total of 120 years of onsite spent fuel management (SFP and casks) if needed. A general regulatory framework exists for multiple storage license renewals with aging management. However, licensees will need to provide appropriate technical bases for identifying and addressing aging-related effects, and develop specific aging management plans to justify extended operations of ISFSIs under multiple renewed license terms. This project plan addresses, in part, the technical and regulatory basis that may be needed by NRC to effectively license and regulate extended periods of spent fuel management (up to and beyond 120 years) through multiple dry cask license renewals.<sup>2</sup>

The regulatory frameworks for both storage and transportation are supported by well-developed regulatory guidance; voluntary domestic and international consensus standards; research and analytical studies, and processes for implementing licensing reviews, inspection programs, and enforcement oversight. These items, along with the regulatory requirements, form the overall current regulatory framework for storage and transportation.

## 1.2 Summary of Regulatory Review Approach

This project plan identifies objectives, plans, potential policy issues, projected schedules, performance measures, and projected resource requirements. Section 2 describes plans for near-term regulatory process improvements and enhancements, which include leveraging initiatives that are already underway. The staff expects these enhancements to support interim storage and transportation within the current regulatory bases, and also be applicable to the development of future regulatory bases for EST.

Section 3 describes the staff's plans to conduct an in-depth review assessing the adequacy of the current regulatory framework to support EST. Overall, this review will focus on three key regulatory program areas: safety, security, and the environment (i.e., consistent with the National Environmental Policy Act). In each area, the regulatory review is divided into four phases: (1) regulatory gap assessments and analyses, (2) follow-on research and technical analyses, (3) development and extension of guidance and regulatory technical bases, and (4) implementation of potential rule changes.

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<sup>2</sup> This discussion should not be confused with the analysis in the Commission's Waste Confidence Decision. The technical bases discussed here are the designs, data, analyses, and operating and monitoring procedures that support the issuance of certificates and licenses for specific dry cask storage systems, and that provide reasonable assurance that the waste will be stored safely for the term of the license or certificate. The Commission's Waste Confidence Decision is a generic action where the Commission found reasonable assurance that the waste can be stored safely and with minimal environmental impacts until a repository becomes available. The Waste Confidence Decision does not license or certify any dry cask storage system; the additional research, assessments, guidance, and regulations discussed in this plan provide the regulatory framework that could be necessary to license or certify a dry cask storage system for extended operations. Nothing in this paper challenges the bases discussed in the existing Waste Confidence Decision or rule, the draft Waste Confidence rulemaking published for comment, or the final version of that rulemaking prepared by the staff in response to comments that is currently before the Commission (SECY-09-0090; ML091660274).

Several of these review activities require a finite timeframe for analytical purposes (e.g., extrapolating research data, performing risk or environmental assessments, and developing aging management guidelines). Therefore, the staff has preliminarily selected an analytical timeframe of 300 years as the scope of the EST regulatory program review. The staff's planned research and analyses could, theoretically, identify potential timeframes within this period that could require significant aging management mitigation actions, such as extensive cask maintenance or repackaging of SNF into new systems. In addition, external initiatives such as the industry's Extended Storage Collaboration Program (ESCP) may look generically at aging phenomena and potential times-to-failure for various cask components and SNF. Therefore, the staff may revise the project plan, as appropriate, to consider other analytical timeframes based on insights gained from external research, analyses, or industry plans.

Section 4 of this project plan addresses cross-cutting strategies that will be applied, as appropriate, to all activities discussed in this project plan. The strategies include: (1) implementing risk-informed and performance-based (RIPB) enhancements, (2) promoting domestic standards development, (3) promoting international cooperation, (4) exploring incentives for industry adoption of state-of-the-art technologies, and (5) ensuring opportunities for stakeholder participation.

Section 5 of this project plan discusses management of the project plan, including schedules, resources, and performance measures. The schedule and objectives for the latter phases of this project plan depend on several factors including the outcomes of the earlier phases and stakeholder participation. Therefore, the project plan will be evaluated for any necessary revisions near the end of the initial activities such as the technical gap assessments and comprehensive licensing and inspection process reviews. The staff will provide updates of progress and any significant changes to the project plan at the annual NMSS Program Briefs for the Commission.

The scope of the project plan includes the storage and transportation activities listed in Table 1-1, that are currently within NRC's regulatory oversight. There is one licensed wet-storage facility at GE Morris, which has a unique licensing basis under 10 CFR Part 72. To address any future challenges related to GE Morris, the staff will leverage the aging research associated with reactor SFP life extensions. However, this project plan does not specifically govern research program activities for extended storage of SNF in reactor SFPs under 10 CFR Part 50. RES and NRR have initiated several efforts in support of the continued safe operation of SFPs. These activities will be coordinated with the dry cask storage and transportation activities described in this project plan. Finally, this project plan does not address research-reactor SNF, production-reactor SNF, naval-reactor SNF, defense high-level waste (HLW), or potential reprocessed HLW. The NRC does not typically regulate (or have not regulated yet) the dry storage of these forms under 10 CFR Part 72, and staff would need additional data regarding the characteristics of such forms. However, the staff expects that most regulatory framework enhancements would be generically applicable to these waste forms (or could be reasonably extended with additional data), if the need arose for NRC regulation.

Table 1-1. Scope of Storage and Transportation Activities

Functional Areas	Types
Contents	<ul style="list-style-type: none"> <li>▪ Commercial UO<sub>2</sub> Fuel</li> <li>▪ Mixed Oxide Fuel</li> <li>▪ Damaged Fuel</li> <li>▪ High Temperature Gas Cooled Fuel (Fort St. Vrain only)</li> <li>▪ Greater-than-Class-C Waste</li> </ul>
Cask Designs	<ul style="list-style-type: none"> <li>▪ Bolted-Closure</li> <li>▪ Welded Canister—Overpack (vertical and modular)</li> <li>▪ Welded Canister—Underground Silo</li> <li>▪ Modular Dry Vault (Fort St. Vrain only)</li> <li>▪ Wet Storage (GE Morris only)</li> </ul>
Uses	<ul style="list-style-type: none"> <li>▪ Storage-Only Cask</li> <li>▪ Transportation-Only Package</li> <li>▪ Dual-Purpose Cask (storage and transportation)</li> </ul>
Sites	<ul style="list-style-type: none"> <li>▪ Reactor Sites</li> <li>▪ Decommissioned Reactor Sites</li> <li>▪ Away from Reactor sites</li> <li>▪ Monitored Retrievable Storage Sites (NWPA option)</li> </ul>
Licensing	<ul style="list-style-type: none"> <li>▪ Part 72 Site-Specific Storage License</li> <li>▪ Part 72 General License and Storage Cask Design Certification</li> <li>▪ Part 71 General License and Transport Package Certification</li> </ul>

## 2.0 Regulatory Process Improvement Review

The goal of the regulatory process improvement review is to identify and implement near-term efficiency and effectiveness enhancements within the current regulatory technical bases and framework. This review will address two key areas: (1) licensing and (2) inspection and enforcement. The staff plans to perform systematic, comprehensive reviews and evaluations of these key areas, as they exist today. Appendix B provides schedules for major activities of the regulatory process improvement reviews. The strategies and objectives described in Section 4 will also be implemented as part of the process improvement reviews, as applicable. As a result of these activities, the following projected outcomes are expected for the regulatory process improvement reviews in fiscal year (FY) 2011 and FY 2012:

- Identification of enhancements for storage cask certification (including rulemaking approval), general license, and site-specific license review processes
- Identification of enhancements for SNF package certification review processes (including storage and transportation compatibility)
- Identification of enhancements for inspection and enforcement processes (including integration of inspection & licensing)
- Enhanced internal procedures and guidance for licensing reviews

## 2.1 Licensing Review

### Key Objectives

- Perform a comprehensive Lean Six Sigma (LSS) review of the general license and cask certification process, including the rulemaking process that supports cask certification.
- Perform a comprehensive review of site-specific storage license processes.
- Perform a comprehensive review of SNF transportation certification processes.
- Update guidance and procedures with process enhancements identified through the reviews.
- Revise 10 CFR Parts 71 and 72 to facilitate improved licensing processes, as appropriate.
- Revise 10 CFR Part 73 to facilitate improved security licensing processes, as appropriate.

### Summary

The staff will perform comprehensive reviews and evaluations of the licensing review program within the current regulatory technical bases. These reviews will consider the past two decades of experience with licensing and oversight of dry cask storage. The staff will systematically examine relevant rules, guidance, standards, assessments, and internal processes to identify near-term efficiency and effectiveness enhancements. The staff has targeted completion of procedure and guidance updates in FY 2013 and potential rule changes in FY 2015. As part of the licensing reviews, the staff will examine the rulemaking process currently used to certify casks, and the integration of 10 CFR Part 71 and Part 72 requirements and review processes. These reviews may identify potential policy issues, as further described in Appendix A.

### Discussion

The staff will systematically examine the general license and certification review process (including rulemaking aspects), the site-specific storage facility review process (excluding hearing aspects), and the transportation certification process. Currently, the staff is applying the LSS method to the general license process, to review the process NRC uses to issue certificates of compliance for cask designs (including the rulemaking process), and the ways in which the NRC exercises its oversight of 10 CFR Part 50 licensees invoking the general license granted to them in 10 CFR 72.210, "General Licensed Issued." The LSS effort will examine improvements to the general license process under 10 CFR Part 72 by enhancing the efficiency and effectiveness of efforts required to conduct safety reviews, and by reducing the time to process applications for storage certificates of compliance, as appropriate. Similar systematic, comprehensive reviews will be performed for other 10 CFR Part 71 and Part 72 site-specific licensing processes. In addition, the staff will be revising several division-level procedures and interim staff guidance documents to increase efficiency and improve knowledge management. Subsequent activities will include updates to license review guidance and processes, and potential implementation of 10 CFR Part 71 and Part 72 rule changes to incorporate enhancements identified as part of the review. The staff will consider soliciting input specifically on any resource impacts as part of any proposed rules and address the feedback in developing

the final rule implementation schedules, as appropriate. These rule changes would also require development of an environmental assessment (EA) or environmental impact statement (EIS), as appropriate.

#### Review of Certification by Rulemaking

The Nuclear Waste Policy Act of 1982 (NWPA) directs the NRC to establish procedures for approval of SNF storage casks. The NWPA (Sections 133 and 218) mandates the Commission to “by rule, establish procedures for the licensing of any technology approved by the Commission under section 219(a) for use at the site of any civilian nuclear power reactor” and “without, to the maximum extent practical, the need for additional site specific approvals by the Commission.” To satisfy this law, the NRC granted a general license to all 10 CFR Part 50 licensees to allow use of casks certified by NRC. The NRC uses the rulemaking process to approve new cask designs and amendments, and to add them to the list of certified casks in 10 CFR Part 72. This is the mechanism that affords stakeholders the opportunity to comment on final cask approval after NRC’s safety review. The rulemaking process requires significant resources and adds several months to the approval process. The LSS effort may identify efficiencies to be gained in the rulemaking process. Additionally, as part of the comprehensive review of the general licensing process, the staff will (1) assess the past experience and value of cask rulemakings, (2) assess specific regulations and laws that govern the cask rulemaking process, and (3) identify recommendations for streamlining the rulemaking process.

#### Review of 10 CFR Part 71 and 72 Compatibility of SNF Cask Approvals

SNF storage regulations in 10 CFR Part 72 specify requirements for maintaining cladding integrity, criticality safety, and offsite radiation dose limits for normal and off-normal conditions, and credible design-basis accidents specified by the licensee. SNF transport regulations in 10 CFR Part 71 specify requirements for maintaining configuration of contents, criticality safety, radionuclide release limits, and surface dose limits for normal and hypothetical accident conditions prescribed in the regulations. While there are differences between 10 CFR Part 71 and Part 72 requirements, the major cask components (such as inner, welded SNF canisters) of large-capacity SNF transportation packages and SNF storage casks are often the same design. These casks are referred to as “dual-purpose” casks. Applicants often request storage approval of these designs under 10 CFR Part 72, well before seeking transportation approval under 10 CFR Part 71, in order to accommodate more immediate needs to maintain full-core offload capability at reactor sites. Given this current licensing practice, there is no regulatory assurance that loaded and sealed storage casks (including currently-loaded and future casks loaded with high-burnup [HBU] SNF) will later meet all transportation requirements under 10 CFR Part 71. Therefore, some storage casks may later need to be opened to allow repackaging of the fuel into acceptable transportation packages.

The staff will evaluate the compatibility of 10 CFR Part 71 and Part 72 requirements to identify (1) areas of overlap where the requirements are substantially similar, (2) areas where the performance requirements are significantly different, (3) specific regulations that must be met for transportation for which there is no similar storage regulation, and (4) recommendations for improving the compatibility and efficiency of the 10 CFR Part 71 and Part 72 review processes. The staff will also evaluate the different types of currently-authorized dry cask storage systems to identify any potential unique compatibility issues. This assessment will also consider potential integration of the storage and transportation safety reviews conducted under 10 CFR

Part 71 and Part 72. This could enhance the effectiveness and efficiency by eliminating any unnecessary duplication of technical reviews that currently occur within the two different licensing actions for the same system.

### ISFSI Security Rulemaking

As part of the ongoing ISFSI security rulemaking, the staff is evaluating the structure of the NRC's security plan review processes and whether the process for general license ISFSIs should more closely follow the current process for specific license ISFSIs, as a near term process improvement. The rulemaking effort is discussed in greater detail in Section 3.2.

## 2.2 Inspection and Enforcement Review

### Key Objectives

- Perform a comprehensive review of the ISFSI operation and cask vendor inspection program and enforcement policies, and associated rules, guidance, and procedures.
- Update guidance and procedures with process enhancements identified through the reviews, including RIPB improvements and improved integration with licensing programs.
- Revise the Enforcement Policy, if necessary, to implement potential changes in the enforcement process.
- Revise 10 CFR Parts 71, 72, and 73 to implement potential rule changes for improved inspection and enforcement processes, as appropriate.

### Summary

The staff will perform comprehensive reviews and evaluations of the inspection and enforcement programs within the current regulatory program. These reviews will consider the past two decades of licensing and oversight experience of dry cask storage and transportation. The staff will systematically examine relevant rules, standards, guidance, procedures, and internal processes used to conduct inspections and enforcement of SNF storage and transportation, and identify near-term efficiency and effectiveness enhancements. The staff will also identify areas where licensing reviews and inspection can be integrated to be more effective in a RIPB manner. Concurrently with the inspection process reviews, the staff is planning to develop guidance on inspecting aging management programs at ISFSIs with renewed license terms. The staff has targeted completion of procedure and guidance updates in FY 2013 and potential rule changes in FY 2015.

### Discussion

The staff will systematically examine the NRC inspection and enforcement oversight processes and associated procedures for fabricators, certificate holders, and licensees for storage and transportation activities. The goal of this review is to identify process improvements within the current technical and regulatory basis and oversight regulatory structure that can be implemented in the near term. The staff will also review current NRC inspection guidance to assess the efficacy of the inspection and enforcement of aging management plans that are

associated with the 40 year license renewals that are expected under 10 CFR Part 72. Further, the staff's review will assess if changes are necessary to key regulatory and licensing documents such as the inspection manual and the enforcement policy. This will include examination of how NRC inspects and enforces licensee change authority and quality assurance. Finally, the staff will identify areas where licensing review findings can be integrated into the inspection process, and where inspection findings can provide feedback in future licensing actions. The staff will review, at a minimum, areas for integration between licensing and inspection and ways to leverage the inspection program to improve the quality of licensing applications for both storage and transportation activities. Concurrently with the inspection process reviews, the staff is planning to develop guidance on inspecting aging management programs at ISFSIs with renewed license terms.

### **3.0 Extended Storage and Transportation Program Review**

The objective of the EST program review is to bolster the technical bases and enhance the NRC's regulatory framework to support EST. This broad-scope review is divided into three key regulatory areas: safety, security, and environmental. In each area, the regulatory review is divided into four phases: (Phase 1) regulatory gap assessments and analyses; (Phase 2) additional research and technical analyses; (Phase 3) development and/or extension of guidance and regulatory technical bases; and (Phase 4) implementation of potential rule changes. The four review phases will be performed in a concurrent and/or staggered manner for some activities, to assure appropriate coordination and integration among the key regulatory areas. This section describes the staff's objectives and bases for review in each area. Appendix B provides schedules for major activities of the EST program review. The review strategies and objectives described in Section 4 will also be implemented as part of the EST program review, as applicable. As a result of these activities, the following projected outcomes are expected for the EST program review in FY 2011 and FY 2012:

- Safety gap assessment reports for EST regulatory issues
- Environmental gap assessment report for EST regulatory issues

Because the performance of storage and transportation casks should consider the interface between security and safety, and associated common technical issues, the staff will coordinate the results of respective gap assessments and subsequent research before any enhancements to the safety and security regulations are made for EST. This coordination will improve the compatibility and effectiveness of any enhancements to the security and safety regulatory frameworks. Also, it is important that current and future rulemakings are informed to the extent practical by all relevant findings generated from the Phase 1 gap assessments. The staff will coordinate the safety, security and environmental gap assessments with any current and future rulemakings that are related to those areas. This coordination could result in adjustment to rulemaking or EST gap assessment schedules. Additionally, the staff will consider soliciting input specifically on any resource impacts, as part of any proposed rules and address the feedback in developing the final rule implementation schedules, as appropriate. The staff will inform the Commission of proposed changes to planned rulemaking activities as a result of these coordination efforts.

## 3.1 Safety Program Review

### Key Objectives

- Perform gap assessment for EST technical and regulatory issues.
- Perform gap assessment of financial assurance and qualification requirements for EST scenarios (safety and security).
- Perform short-term research and testing of materials for issues and phenomena identified by gap assessment.
- Perform research and analyses of burnup credit for criticality safety (ongoing effort).
- Perform research on cladding integrity of HBU SNF (ongoing effort).
- Participate in an industry and government Extended Storage Collaboration Program (ESCP) and independently observe a future long-term cask demonstration program.
- Update licensing and inspection guidance for EST.
- Develop regulatory bases and revise 10 CFR Parts 71 and 72 for EST, as appropriate.

### Summary

The goals of the safety program review are to assess the adequacy of the current safety framework and to enhance the technical bases, as necessary, to support regulation of EST. In Phase 1, the staff will prepare gap assessments to identify technical safety issues and regulatory framework issues that may impact EST, with a focus on extended aging management issues. The staff will also examine financial assurance and qualification requirements, to evaluate potential issues with the ability of licensees to reasonably maintain safe and secure operation and decommissioning of SNF storage facilities for EST periods. In Phase 2, focused research will be implemented as a result of the technical gap assessments for extended storage. Additionally, NRC will encourage and independently participate in an Extended Storage Collaboration Program (ESCP) that is an effort led by the Electric Power Research Institute (EPRI) to demonstrate safety of SNF storage casks (i.e., fuel cladding and cask components) over extended periods. In Phase 3, the staff will update guidance and regulatory bases based on the data and insights obtained from gap assessments and research studies. In Phase 4, staff will implement any necessary rule changes to 10 CFR Part 71 and Part 72 to support EST. As part of these overall activities, the staff will examine EST cladding integrity and financial issues that may result in potential policy issues, which are further characterized in Appendix A.

### Discussion

Under the current regulatory framework, a safety basis has been demonstrated by licensees for safe operation of SNF storage casks for 60 years (i.e., an initial, 20-year license followed by a 40-year renewal period with an aging management program). SNF storage cask facilities are required to have an active aging management plan for license terms beyond the initial 20 years

of cask service. The 60-year safety basis with aging management is supported by the results of the U.S. Department of Energy (DOE) Cask Demonstration Program that examined a cask loaded with lower burnup fuel (approximately 30 GWd/MTU). Following 15 years of storage, the cask internals and fuel did not show any significant degradation. The data from this study can be extrapolated to maintain a licensing safety finding that low-burnup SNF can be safely stored in a dry storage mode for at least 60 years with an appropriate aging management plan. The evidence also indicates that dry storage of SNF can likely be maintained up to 100 years without the need for significant aging management mitigation actions; however, licensees have not developed a safety basis and the NRC has not reviewed such a request for extended periods of storage.

While a spent fuel cask system maintains an independent confinement system, the spent fuel cladding is credited as the primary fission product barrier during interim storage and transportation. However, industry has limited operational experience with the transport of HBU fuel, and there is little operational or experimental data regarding HBU fuel behavior during storage and transportation. This gap in data should be resolved because industry intends to seal HBU fuel in dry storage casks under 10 CFR Part 72 and later transport it under 10 CFR Part 71, without reopening the cask. This may also be an important consideration for future ISFSI sites at decommissioned reactors that may request to load HBU fuel in storage, and later decommission fuel-handling facilities (e.g., spent fuel pools).

The scope of data varies with potential long-term degradation phenomena of cask SSCs, such as concrete, steel, resins, seal materials, and unique basket materials. These materials and structures will be credited with providing adequate structural integrity, confinement of SNF, criticality safety, shielding, and heat removal for SNF during EST. These SSCs will need to continue to perform their safety functions for normal conditions, accidents, and natural phenomena over EST timeframes.

#### Gap Assessments and Short-Term Research for Dry Cask EST

During the first phase of the safety review, the staff will perform gap assessments to identify technical issues that require research and analyses for EST. This will involve revisiting the conclusions of previous evaluations underlying the current technical and regulatory basis to identify information and technical research needed to enhance the framework for effective regulation of EST scenarios. The staff expects that the outcome of the gap assessments will include a prioritized list of information needs and a recommendation of the most effective means (e.g., confirmatory testing) to obtain the information.

The gap assessments should identify phenomena warranting further investigation through analyses and short-term research. One phenomena of consideration will likely be the aging effects on cladding integrity in various combinations of extended wet storage and dry storage modes. Through frequent communication and coordination, the staff will also maintain awareness of industry, Department of Energy (DOE), and Electric Power Research Institute (EPRI) plans to conduct research to justify EST safety. The staff will independently observe and review research data that is provided by these groups.

As part of this coordination, the staff is participating in an ESCP led by EPRI. The program group includes EPRI, DOE, the Nuclear Waste Technical Review Board, cask vendors, and utilities. The group also intends to establish a long-term cask demonstration program to monitor

and evaluate aging effects. As an independent regulatory agency, the NRC will independently observe and review test plans and research data that is developed by the program group. The long-term cask demonstration program could provide confirmation and validation of the extrapolations that were made from short-term data, and could identify any previously unrevealed aging effects detrimental to the performance of dry cask storage systems during extended periods. This would ensure that appropriate monitoring, mitigation, corrective actions, and other regulatory actions are implemented during extended storage operations. An understanding of aging mechanisms (e.g., concrete degradation or corrosion of materials) will allow NRC to formulate requirements and guidance for time-limited aging analyses and aging management programs that will be needed from licensees to allow EST operations. The long-term cask demonstration program may also identify potential aging issues (in addition to analytic predictions) inside the cask system that could require physical monitoring of internal components and fuel during extended storage. The staff notes it may not be able to rely upon DOE for contractor support to assist in independent NRC observations and analyses of the demonstration program results, and would likely need to obtain support from other conflict-free contractor entities, as appropriate

In addition to conducting the gap assessments and follow-on short-term research, and participating in the ESCP, the staff will leverage and integrate initiatives already underway (before the issuance of SRM-COMDEK-09-0001) to address emergent issues within the current licensing basis. These ongoing initiatives include HBU cladding integrity research, burnup credit criticality safety research, transportation criticality risk assessments, and various other transportation risk assessments. Finally, the staff will also seek areas for international cooperation, as appropriate, for sharing and coordinating EST research activities of common interest (see Section 4.3).

#### Gap Assessment for Financial Qualification and Assurance

The regulation in 10 CFR Part 72 provides two types of ISFSI licenses: specific and general. Under the provisions of 10 CFR 72.22, a specific-license applicant must show it possesses or has reasonable assurance of obtaining funds to cover the estimated costs of constructing, operating, and decommissioning the ISFSI. Financial qualification typically refers to the ability to fund construction and operation. Financial assurance typically refers to the assurance that funds will be available when needed for decommissioning. The financial assurance requirements for an ISFSI that are required as part of a decommissioning plan included with the specific-license application are provided in 10 CFR 72.30.

There are no financial qualification requirements for ISFSIs operating under the general license, as these licensees submit information regarding financial requirements for spent fuel management under 10 CFR 50.54(bb). The general licensees must show how they intend to manage and provide funding for the management of all irradiated fuel on the reactor site, including the SNF stored in the ISFSI. The spent fuel management programs submitted under 10 CFR 50.54(bb) assume the fuel will be shipped to DOE at some point in the future. Under 10 CFR 72.30(c)(5), the reactor licensee may use the methods of 10 CFR 50.75 to provide financial assurance for decommissioning the ISFSI.

The current regulatory structure for financial assurance and qualification for ISFSI licenses is founded on the premise that dry cask storage is an interim operation, and that DOE would provide for long-term spent fuel management, including bearing the costs of shipping the spent

fuel from reactor sites to the permanent repository. Therefore, it was not incumbent upon ISFSI licensees to demonstrate financial assurance for these activities over an extended period of time. The future national policy on spent fuel disposition is uncertain. It is unclear whether judicial settlements, legislative actions, or other types of agreements will result in DOE, for example, funding the costs associated with ISFSI operations for extended onsite storage of fuel. In the interim, the staff may need to consider how the licensees will finance operational expenses for extended storage times. These expenses could include extended storage operations, security personnel, monitoring, possible inspection and repackaging operations, and decommissioning with inflated costs in EST scenarios. The staff will conduct a financial gap assessment for EST. To ensure potential extended safety and security costs are considered, the financial gap assessment will begin after safety and security gap assessments have progressed to provide insights on future costs.

#### Life Extension Efforts for Reactor Spent Fuel Pools

As part of the dry storage gap assessments, staff will generically consider high-level functional and compatibility needs of SFPs to support extended periods of dry cask storage operations and transportation. NMSS staff will coordinate these efforts with NRR and RES to provide insights on future research needs for reactor SFPs under 10 CFR Part 50 life extension efforts.

For the foreseeable future, the staff anticipates dry cask storage will be the alternative preferred by industry for providing additional storage capacity at operating and new reactors and for providing ultimate spent fuel management needs at decommissioned sites or at away-from-reactor sites. The 10 CFR Part 50 reactor SFPs will continue to play an integral role in storing and handling spent fuel at reactors during renewed license terms and eventual decommissioning. Operational SFPs are required to store spent fuel assemblies safely until sufficient radioactive decay has occurred to allow loading in dry storage casks and transportation packages. Therefore, the staff expects reactor SFPs will need to be operational beyond 60 years (through Part 50 licensing actions), to support extended reactor lives, storage, transportation needs, and decommissioning.

In separate activities, RES and NRR have initiated several efforts in support of the continued safe operation of SFPs. The first and broader activity is to evaluate the feasibility of reactor license renewal beyond 60 years. This activity includes evaluation of aging management issues associated with extending the operating life of SFPs and fuel handling facilities beyond 60 years (through 10 CFR Part 50 licensing actions). This activity will also consider concrete degradation mechanisms, which may inform concrete aging issues with concrete dry cask storage technologies. In a second activity, NRR and RES are initiating near-term efforts to examine degradation issues with SFP neutron absorbers, and to evaluate methods for monitoring material condition and mitigating degradation. This project plan does not govern these specific activities.

## 3.2 Security Program Review

### Key Objectives

- Leverage activities with the ongoing transportation and storage security rulemakings.
- Perform gap assessment of the regulations, guidance, and processes related to SNF storage security.
- Perform gap assessment of the regulations, guidance, and processes related to SNF transportation security.
- Conduct research and/or assessments based on the outcome of the gap assessments.
- Revise 10 CFR Part 73, "Physical Protection of Plants and Materials" and 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material," based on the outcome of gap assessment and research, as appropriate.

### Summary

The goal of the security program review is to evaluate the adequacy of the security framework and to expand the bases, as necessary, to support regulation of EST. The security review will leverage results ongoing storage and transportation security rulemaking activities. In Phase 1, the staff will implement regulatory gap assessments regarding technical security issues and regulatory framework issues that may impact EST. In Phase 2, security-related research and analyses will be implemented as a result of the gap assessments. In Phase 3, the staff will update security guidance and regulatory bases based on the data and insights obtained from gap assessments and research studies. In Phase 4, the staff will implement any necessary rule changes to 10 CFR Parts 73 and 74 to support EST.

### Discussion

The NRC requires a high assurance of the common defense and security for facilities and licensees storing and/or transporting SNF and high-level radioactive waste. After the events of September 11, 2001, under Commission direction, the staff reviewed the existing requirements for SNF storage and transportation, and determined that Orders were necessary to put further enhancements in place. Following the issuance of the Orders, the staff conducted security assessments (SAs) to evaluate a number of representative storage cask and transportation package designs against a variety of land-based threats and a deliberate plane crash. The results of these security assessments showed that no additional immediate enhancements were necessary for common defense and security and the protection of the public health and safety, and the environment.

SECY-06-0045, "Results of Implementation of the Decisionmaking Framework for Materials and Research and Test Reactor Security Assessments," dated March 1, 2006 (ML060340420), documented the results of the SAs. This paper describes a process to reinstate the SAs, should the need arise in the future. The process includes seven different criteria that would cause the staff to apply the SA framework. Under this project plan, the staff will assess these criteria in light of the potential changes to the current regulatory framework to determine whether

additional SAs are necessary. The acceptance criteria for the storage security assessments have evolved since SECY-06-0045, with the ISFSI security rulemaking currently underway as directed by SRM-SECY-07-0148, "Independent Spent Fuel Storage Installation Security Requirements for Radiological Sabotage," dated December 18, 2007 (ML073530119). However, the SA process itself (e.g., consequence and attractiveness assessments) is still relevant, and will be applied as needed.

The staff will perform a technical and regulatory gap assessment to identify any issues associated with potential changes in the cask or institutional controls over extended periods. The gap assessment will identify areas of the regulations and guidance documents (e.g., DG-5033, discussed below) that should be updated. Further, the gap assessment will assess whether EST considerations meet any of the criteria in SECY-06-0045 for reinitiating the SA framework.

It is preferred that current security rulemakings are completed, or reach the proposed rule stage, prior to the security gap assessment process. The EST security gap assessment will be based on the new regulations. The staff will also coordinate the safety, security and environmental gap assessments with any current and future security rulemakings that are related to those areas, such as rulemakings for SNF transportation security and SNF storage facility security, the rulemaking to revise the material, control, and accountability (MC&A) requirements in 10 CFR Part 74 for SNF storage facilities, and potential rulemaking impacts on physical security requirements resulting from the material categorization paper (SECY-09-0123; ML092230646) currently before the Commission. Future security rulemakings will be informed to the extent practical by all relevant findings generated from the Phase 1 gap assessments.

#### Security Gap Assessment for Spent Nuclear Fuel Storage

The current security regulations for ISFSIs are quite complex and pose challenges to both NRC staff and to the regulated industry. This regulatory complexity stems from multiple factors, including the two different types of ISFSI licenses (general and specific licenses) under 10 CFR Part 72, and the varying applicability of regulations based on whether the ISFSI is collocated with an operating power reactor, is collocated with a decommissioning power reactor, or is located away from any power reactors. The nature and characteristics of the threat environment have also evolved significantly over time. In light of this complexity, the orders issued to ISFSI licensees ensure that a consistent overall protective strategy is in place for all ISFSIs.

In SRM-SECY-07-0148, the Commission directed the staff to undertake a rulemaking to update the ISFSI security requirements with three main objectives: (1) apply consistent standards to all types of ISFSI licensees and monitored retrievable storage (MRS) facilities to improve the clarity of the NRC regulations, (2) to establish generically applicable requirements similar to those imposed on ISFSI licensees by the post-9/11 security orders, and (3) to use a RIPB structure in ISFSI and MRS security regulations. In accomplishing these objectives, this rulemaking will incorporate the Commission's directions on several specific policy issues. Further, the staff will develop several regulatory guidance documents to support implementation of this planned rulemaking. In addition, the staff will consider rescinding, relaxing or modifying the ISFSI security orders after the rulemaking is completed, if appropriate. In developing this rulemaking, the staff issued the draft technical basis for public comment and received significant comments from a diverse range of stakeholders. The staff is currently evaluating the issues raised by the

stakeholders and assessing potential options for the rulemaking. The staff may provide a supplemental paper in the near term to inform the Commission of these comments for further consideration.

The staff has contracted with Sandia National Laboratories to support the development of the rule. The first phase of this work will group casks and facilities into families, identify appropriate security scenarios, and estimate additional calculations and modeling that will be necessary to develop the regulatory guidance document. Following NRC review, the second phase of the contract work will include the detailed calculations and modeling, development of the draft proposed guidance document, support of stakeholder meetings and resolution of comments, and development of the final guidance document.

The staff plans to conduct a EST gap assessment for SNF storage security, which will explore technical issues, such as (1) whether the potential degradation of the spent fuel storage cask system will impact cask response to security scenarios, (2) whether the potential degradation of the spent fuel will impact fuel response (and resultant release fractions) to security scenarios, (3) whether the cooling and radioactive decay of the SNF will, at some point, make it necessary to consider diversion as a credible scenario.

As part of this project plan the staff will consider potential integration of EST storage security gap assessments with any research and storage security rulemaking activities at the time of the assessment. At a minimum, the EST gap assessment will leverage the ongoing contract work with Sandia National Laboratory described above. The staff will further leverage the updated threat assessment for ISFSIs that is planned as part of the ISFSI and MRS security rule, to inform revisions to DG-5033, "Security Performance (Adversary) Characteristics for the Design, Development, and Implementation of a Physical Security Program for Spent Nuclear Fuel and High-Level Radioactive Waste Storage Facilities under 10 CFR Part 73," (Safeguards E-Safe Accession No. ES100011507). The staff will also apply the RIPB review strategy, as applicable, to the security of extended storage.

#### Security Gap Assessment for Spent Nuclear Fuel Transportation

The existing transportation security requirements for SNF have been in place, mostly unchanged, since 1980. The existing security requirements for SNF, primarily found in 10 CFR 73.37, "Requirements for Physical Protection of Irradiated Reactor Fuel in Transit," address the security of SNF transported by road, rail, or sea, and were based on preventing radiological sabotage of the shipment either in situ or by relocation of the SNF to a heavily populated area, before causing the radiological sabotage. Security measures to prevent the diversion of the SNF (i.e., extraction of the plutonium or highly enriched uranium content from the SNF for use in a nuclear device) are not included in 10 CFR 73.37, because of the reliance on the self-protecting capability of the high dose rate and the large weight of a typical power reactor SNF assembly. The staff notes that 10 CFR 73.37 also does not include security requirements for the transport of SNF by air, because 10 CFR 71.88 bans the air transport of plutonium (in the form of SNF).

SECY-09-0162, "Proposed Rule: 10 CFR 73.37 Physical Protection of Irradiated Reactor Fuel in Transit," dated October 31, 2009 (ML092710405) is under Commission review. This proposed rule considers the security concepts imposed by Commission Orders and it also addresses, in part, a petition for rulemaking from the State of Nevada (PRM-73-10) that requests NRC

strengthen the regulations governing the security of SNF shipments against malevolent acts. The rulemaking proposes enhancing security in the areas of preplanning and coordination of a shipment with the States through which it passes; continuous and active monitoring of a shipment; trustworthiness and reliability of personnel associated with a shipment; and provisions for armed escorts along the entire route. The staff will consider rescinding, relaxing or modifying the transportation security orders after the rulemaking is completed, if appropriate.

The NRC transportation security regulations are harmonized with the Convention on Physical Protection of Nuclear Material and its supporting guidance, INFCIRC/225 Revision 4, "Physical Protection of Nuclear Material and Nuclear Facilities," issued June 1999. The NRC has always maintained representatives on the working and technical groups associated with the development and revisions of INFCIRC/225. Currently, the staff is participating with DOE and the U.S. Department of State in the technical group developing Revision 5. The NRC's active participation in INFCIRC/225 development ensures the NRC regulations and guidance are harmonized with those of the international community.

The staff plans to also conduct gap assessments for SNF transportation security to (1) review the current threat assessment for transport, (2) analyze the impact of the potential increase in the number of shipments (considering a potential regionalized storage facility scenario), (3) study the implications of shipping fuel following an extended period of storage, including an analysis of when potential fuel and/or materials degradation begins to impact the cask response to security scenarios, and whether fuel cooling results, at some point, in the introduction of additional credible threat scenarios, and (4) look for RIPB enhancements. These gap assessments will inform the need for additional research and analyses to enhance the transportation security framework for EST. As part of this project plan the staff will consider potential integration of EST transportation security gap assessments with on-going research and transportation security rulemaking activities.

### 3.3 Environmental Program Review

#### Key Objectives

- Perform an environmental gap assessment for SNF storage and transportation to identify additional information and assessment needs determine whether there is a need to supplement the existing EISs or to develop a potential generic EIS (GEIS) for streamlining environmental reviews of centralized or regionalized storage applications, and development of other environmental documents to support EST.
- Initiate a public scoping process to identify issues for considering a GEIS for various EST scenarios (if appropriate).
- Issue a GEIS supporting various EST scenarios (if appropriate).
- Issue an EA or EIS supporting rule changes for EST (see Sections 3.1 and 3.2).

#### Summary

The goal of the environmental program review is to evaluate the adequacy of the current environmental framework, and prepare for environmental reviews of future EST scenarios that

may require NRC regulatory action. Potential scenarios include new cask designs for extended storage, regionalized or centralized away-from-reactor storage facilities, and associated transportation needs. In Phase 1, the staff will perform a scoping assessment of NRC's current collection of EAs or EISs (collectively referred to as NEPA documents) that support spent fuel storage and transportation actions. The scoping will identify potential information gaps that will need to be assessed and then evaluated for future regulatory actions for EST. In Phases 2 and 3, the staff may develop generic environmental review documents (e.g., GEIS) to assess the impacts of extended storage for new types of facilities (e.g., regionalized facilities) and associated transportation needs for EST scenarios. In parallel, guidance and processes could be developed and/or revised to support the development of any new environmental review documents and agency review of applicants' environmental reports. In Phase 4, the staff may develop a final EA or EIS in support of potential changes to regulations related to EST, as discussed in Sections 3.1 and 3.2.

### Discussion

The National Environmental Policy Act of 1969 requires Federal agencies, as part of their decision-making process, to consider the environmental impacts of actions under their jurisdiction. The staff will continue to perform environmental reviews, as needed, for the various licensing or regulatory actions within the scope of the storage and transportation regulatory frameworks. Specific-license issuances or renewals for at-reactor or away-from-reactor ISFSIs will continue to require the development of EAs or EISs, addressing potential impacts for at least the term of the license or renewal. Additionally, the staff will continue to perform environmental reviews for storage cask certification under 10 CFR Part 72, which currently involves the rulemaking process.

### Environmental Gap Assessments

The staff will perform a gap assessment of environmental needs for different storage and transportation scenarios, in parallel with the regulatory process improvement review and the EST program review. These review activities could result in substantive changes to 10 CFR Parts 71, 72, or 73. Such rule revisions would require the development of an EA or an EIS, depending on the significance and scope of the rule change (i.e., the significance of the proposed Federal action). The staff will develop a prioritized list of information needs to assist in determining the types of environmental analyses needed to support rule changes.

If NRC decides to implement a new licensing program to accommodate an extended storage scenario, the agency would likely need to prepare an EA or EIS (or supplement existing ones) for a rulemaking (depending on scope and significance), and then additional EAs or EISs for licensing potential large extended storage facilities in a single location (e.g., centralized storage), or multiple locations (e.g., regional storage). A GEIS may be developed to address the environmental impacts associated with extended storage of spent fuel at reactor sites, at decommissioned sites, or at potential regional sites. The GEIS would provide a starting point for the NRC's environmental reviews for site-specific license applications for potential large, regional ISFSIs. Developing a GEIS for more than one representative storage location would improve the efficiency of the licensing process by (1) providing an evaluation of the types of impacts associated with licensing a storage facility, (2) assessing impacts that are expected to be generic at storage facilities with specified characteristics, and (3) identifying the scope of impacts that must be addressed in site-specific supplemental EISs. The GEIS also would

provide information to aid in the preparation of the site-specific EISs and help the NRC maintain consistency when evaluating the license applications.

The staff may conduct certain near-term activities to prepare for the longer-term development of a GEIS. These include the development of a prioritized list of needs for a GEIS and the initiation of an environmental review public scoping process to identify storage and transportation issues appropriate for consideration in the GEIS. The final EIS developed for the Private Fuel Storage Facility license would be examined for generic insights and assessments that can be used for potential, large regional facilities. The decision to develop a GEIS (and overall scope) will also consider the industry's spent fuel management licensing plans for extended storage, as well as evolving national policy on potential central or regionalized storage facilities.

An examination of the NRC's generic environmental review documents for spent fuel transportation would be a component of the overall storage reviews and assessments. However, a review more focused on transportation could be undertaken separately to determine the additional impact analysis that may be necessary under the various extended storage scenarios. Transportation issues that could need additional environmental reviews (but may not be limited to) updating an assessment of the non-radiological impacts of spent fuel transportation; assessing the potential impacts of transporting SNF and HLW to a centralized location or to regional locations; assessing transportation of spent fuel after extended storage; assessing other conditions likely to occur but not covered by the specifications in 10 CFR 51.52, "Environmental Effects of Transportation of Fuel and Waste – Table S-4" (i.e., conditions that trigger the need for specific analyses in reactor license renewal EISs).

#### **4.0 Cross-Cutting Strategies**

This section specifies cross-cutting activities and strategies that will be applied to all initiatives described in this project plan, as applicable. The Commission directed these activities, in part, in SRM-COMDEK-09-0001. The strategies include RIPB enhancements, promoting enhancements of domestic codes and standards, promoting international cooperation on research activities and safety standard development; developing incentives for use of state-of-the-art technologies, and providing opportunities for stakeholder participation. As the project plan is implemented, the staff will assess the need to revise or add to the cross-cutting strategies identified in this section. For instance, the staff will consider adding safety culture as a cross-cutting strategy after the Commission has finalized its safety culture policy statement.<sup>3</sup>

Appendix B provides a schedule of major activities for the cross-cutting strategies. As a result of these activities, the staff expects to achieve the following outcomes in FY11 and FY12:

- Gap assessment report for potential RIPB regulatory enhancements
- RIPB plan to support EST program review
- Gap assessment report for domestic codes and standards needed to support EST
- Plan/strategy for engaging international working groups on EST
- Plan/strategy for addressing adoption of state-of-the-art technologies
- Communication plan for participation of stakeholders and other interested parties

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<sup>3</sup> Commission direction related to the draft Safety Culture Policy Statement appears in SRM-SECY-09-0075, "Safety Culture Policy Statement," dated October 16, 2009.

## 4.1 Risk-Informed and Performance-Based Enhancements

### Objectives

- Perform gap assessment of activities and regulatory framework products that may benefit from RIPB enhancements.
- Perform additional assessments and develop risk insights, as appropriate, for supporting near term regulatory process improvements and EST framework development.
- Incorporate RIPB enhancements to process, guidance, and regulation updates as appropriate.

### Summary

The purpose of this strategy is to systematically and objectively implement RIPB principles into major objectives of this regulatory program review. The first phase of this strategy will be an initial gap assessment of activities and regulatory products that may benefit from a RIPB approach. The gap study will also identify additional risk-insights and assessments that would be needed to implement risk-informed enhancements for both the near term process improvement objectives in Section 2 and the EST objectives of Section 3. In addition, existing and ongoing risk assessment activities for regulation of SNF storage and transportation will be identified for potential use in the process improvement and EST activities. Detailed plans will be developed for actual risk-informing implementation activities after completion of the gap assessment.

The “Risk-Informed Decision Making for Nuclear Material and Waste Applications” (RIDM), Revision 1 (ML080720238) has been developed for generic use in NMSS risk-informing activities and provides a systematic process for evaluating the feasibility of risk-informing improvements. The staff will tailor the risk-informing and performance-based enhancement strategy from the RIDM. Risk-informing implementation may include (1) applying existing risk insights to revise guidance, (2) obtaining additional data and developing risk insights to support future guidance or rule changes, and/or (3) examining potential new storage and transportation regulatory frameworks (e.g., regulations and guidance) that are based in part on risk analyses and performance measures. Finally, risk-informing strategies will also be implemented with the other activities and strategies in Section 4, as appropriate.

### Discussion

SECY-98-144, “White Paper on Risk-Informed and Performance-Based Regulation,” dated January 22, 1998 (ML003753601), defines the essential elements of a RIPB regulatory approach. RIPB regulation combines risk insights with a performance-based rather than prescriptive approach to regulation. Risk insights refer to the results and findings from risk assessments. In a RIPB approach, risk insights, engineering analysis and judgment, and performance history are used to focus attention on the most important activities, establish objective criteria based on risk insights for evaluating performance, develop measurable or calculable parameters for monitoring system and licensee performance, and focus on the results as the primary basis for regulatory decisionmaking.

RIDM specifies a conceptual framework for identifying and implementing risk-informed enhancements for spent fuel storage and transportation. RIDM defines a systematic process for identifying, assessing, deciding, and implementing RIPB enhancements. For those actions warranting potential risk-informed enhancements, the RIDM specifies a process to ensure that risk-informing is done cost effectively and is focused on the agency's strategic goals. In implementing the objectives and activities described in Sections 2 and 3, the staff intends to adapt the RIDM criteria when determining whether and how to adopt RIPB enhancements. The specific criteria evaluate the benefits, costs, value, and other limitations of implementing RIPB enhancements to the regulatory framework (e.g., new rules and guidance)

Previous risk studies have been developed for storage and transportation, and other studies are currently in various phases of progress, such as a spent fuel transportation risk assessment, a SNF criticality risk assessment, and severe transportation accident fire studies. As part of the initial gap assessment, the staff will review these studies for any useful risk insights that may be applied to the activities described in Sections 2 and 3 of this project plan. A core group of staff experienced in RIPB approaches used across the agency will steer the identification and implementation of major risk-informed enhancements. The core group will also include staff with experience in licensing and inspection of storage and transportation casks.

The RIPB implementation for the near-term regulatory process improvements will likely focus on improving guidance and regulatory processes (e.g., standard review plans, regulatory guides, and inspection procedures) with existing information or assessment that can be developed relatively quickly. Potential modifications to the existing 10 CFR Parts 71, 72, 73 and 74 regulatory frameworks would be examined for opportunities to enhance them with RIPB approaches, but significant risk-informed modifications to 10 CFR Parts 71, 72, 73, or 74 rules are not expected given the shorter timeframe for near-term process improvements.

The RIPB implementation for EST will focus on research, guidance, regulatory processes, and potential rule changes. Ongoing activities such as the spent fuel transportation risk assessment, SNF criticality risk assessment, and severe transportation accident fire studies will be integrated into the risk-informing strategies as appropriate. The staff will initiate other long-lead risk assessments early, to the extent practical considering the relationship of the assessments to parallel research activities identified in the Section 3 objectives. The staff will also coordinate with other agency activities that may yield risk insights for spent fuel storage, such as the potential work by RES on a new site Level 3 probabilistic risk assessment (SRM-M100218, "Briefing on Research Programs, Performance, and Future Plans," dated March 19, 2010; ML100780578).

## 4.2 Promoting Domestic Standards Development

### Objectives

- Identify existing codes and standards that support the regulatory framework and perform gap assessment of revisions or new codes to support EST.
- Develop a plan for engaging consensus committees to encourage and support enhancement of domestic codes and standards.

- Participate on committees and support codes and standards development activities.
- Incorporate domestic codes and standards into regulatory frameworks as appropriate.

### Summary

The goal of this strategy is to promote and facilitate enhancement of voluntary national codes and standards to support EST. The NRC cannot direct the development or enhancement of voluntary consensus standards, but can implement a strategy for developing a participatory influence on codes and standards development in order to support EST. The staff will (1) assess the suite of existing codes and standards that underpin the current safety basis for storage and transportation, (2) identify potential gaps in the application of those codes and standards to EST, and (3) actively engage, support, and collaborate with responsible consensus codes and standards committees to update appropriate codes and standards, as needed.

### Discussion

The National Technology Transfer and Advancement Act of 1995 (Pub. L. No. 104-113) requires all Federal agencies to (1) consult with voluntary consensus standards bodies, (2) participate with voluntary consensus bodies in the development of consensus standards when such participation is in the public interest, compatible with agency missions, authorities, priorities and budget resources, and (3) use consensus standards as a means to carry out an agency's policy objectives or activities unless such use is inconsistent with applicable law or is impractical. The Office of Management and Budget has also issued Circular Number A-119, "Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities. Although the NRC takes the position that the circular is not binding, the agency voluntarily follows its guidance.

The staff has historically participated with industry consensus standards organizations. In the areas of spent fuel storage and transportation, enhanced participation on both domestic and international codes and/or standards committees is another part of this strategy to promote and influence activities. As research and regulatory enhancements are developed, staff participation in working groups addressing industry consensus codes and standards offers an opportunity to inform the development of codes and standards to appropriately address issues associated with EST. The NRC will support development of EST-related codes, and to the extent practical incorporate into the regulatory framework enhancements discussed in Section 3 of this project plan.

## 4.3 Promoting International Cooperation

### Objectives

- Engage the International Atomic Energy Agency (IAEA), Nuclear Energy Agency (NEA), and foreign competent authorities to collectively survey existing regulatory frameworks, international standards, and guidelines associated with interim storage and EST.
- Develop plans and international working groups to address common EST technical gaps and regulatory challenges and share research.

- Consider incorporation of international standards and research into regulatory frameworks, as appropriate.

### Summary

The goal of this strategy is to promote and develop international cooperation activities for addressing technical challenges related to interim and extended management of spent fuel that are shared among nuclear countries. The first phase of the strategy includes engaging IAEA and foreign competent counterparts to collectively survey existing regulatory frameworks, international standards, and guidelines associated with interim and extended storage and transportation. The staff will examine the potential benefits of enhancing international standards or guidelines for interim and EST for use or adoption by the NRC. The staff will also engage foreign counterparts in identifying technical gaps and regulatory challenges of common interest that are associated with storage and transportation of SNF. Subsequent activities would include the development of plans and international working groups for addressing these common technical gaps and regulatory challenges. These gaps and challenges may be addressed through cooperation on shared international research and other activities such as safety guideline development.

The staff will also leverage the international experience gained from the NRC's participation in the Multinational Design Evaluation Program (MDEP) activities for new reactors. To the extent practical, the staff will work with international counterparts to develop a plan for applying similar philosophies, such as identifying commonalities in regulatory practices and harmonizing safety principles for interim and extended storage and transportation. At this time, the staff does not envision that the EST activities will result in the development of a new organization modeled after the Organization for Economic Development (OECD) – NEA MDEP activities. However, the staff will pursue working with our international counterparts to address EST, working within the existing IAEA and international fora.

The staff will also closely coordinate with other Federal organizations, such as the U.S. Department of Transportation (DOT) and DOE, which have roles in the international community for storage and transportation issues. The current NRC and DOT cooperation with IAEA, in maintaining a consensus on international transportation standards (i.e., TS-R-1), serves as a model for effective cooperation in addressing technical and regulatory challenges among nations. The NRC will support development of international standards related to EST and, to the extent practical, incorporate them into the regulatory framework enhancements discussed in Section 3 of this project plan.

### Discussion

The staff routinely engages international counterparts in various areas such as international research, government regulatory groups, and foreign utilities. NRC senior managers participate on IAEA standing committees, including IAEA's Commission on Safety Standards (CSS), and IAEA's nuclear, waste, radiation safety, and transportation Safety Standards Committees. The staff will coordinate plans and use these opportunities to express its views on cross-cutting issues in this area, and to facilitate future international cooperation on interim and EST challenges.

The staff's communication plan for this effort, discussed in Section 4.5, will maintain an active listing of the staff's upcoming interactions with international stakeholders. Some international initiatives are already underway. As the staff completes the gap assessments and implements this project plan, it may identify other areas for international cooperation. Currently, the staff plans to continue discussions with regulatory representatives of several countries with mature spent fuel management programs, to maintain awareness of their programs and possibly share technical data or participate in their programs for EST.

The staff will also leverage the Spent Fuel Performance and Research (SPAR) cooperative research program to foster support for required technical studies. The NRC will continue to provide leadership within the international community and leverage the results of its programs where possible. Additional opportunities for promoting cooperation include participation on IAEA task groups and other international programs. The staff will participate in IAEA technical meetings, consultancies, coordinated research projects, and other meetings involving EST. The staff will also encourage research cooperation to the extent practical.

The staff notes that national competent authorities generally adopt and apply IAEA transportation standards in their domestic regulatory oversight of transportation (e.g., IAEA Safety Series No. TS-R-1, "Regulations for the Safety Transport of Radioactive Material"). This is important to ensure efficient commerce of radioactive materials between nations. An attempt to harmonize storage standards may be difficult given the interests and current practices of various nations. However, the staff will first focus on examining broader safety principles for EST, including addressing associated technical gaps. MDEP focuses primarily on the development and alignment of standards, through international working groups, for nuclear components related to the design and construction of new reactor plants. The staff will assess lessons from this cooperative interaction and apply similar philosophies to improve alignment on safety principles between international competent authorities. The staff will support development of international standards related to EST and, to the extent practical, consider incorporation into the regulatory framework enhancements discussed in Section 3 of this plan.

#### 4.4 State-of-the-Art Technology Incentives

##### Objectives

- Perform licensing experience review of recent design approvals representing state-of-the-art technologies for EST.
- Engage industry and other stakeholders in obtaining insights on emergent technologies and perceived challenges to future certification and licensing of new technologies.
- Incorporate incentives to adopt state-of-the-art technologies into regulatory processes as appropriate.

##### Summary

The goal of this strategy is to encourage adoption of state-of-the-art technologies for storage and transportation, in an RIPB manner, by incentivizing the use of these technologies through regulatory processes. The staff will implement this strategy in several phases. The first phase will be to perform a licensing experience review of recent design approvals (e.g., within the last

5 years) that represent state-of-the-art technologies for storage and transportation. Some of these recent design approvals represent first-of-a-kind designs with a multiyear review cycle. The licensing experience review will identify process and regulatory barriers encountered during the design review that could be mitigated to streamline the approval process, as one potential incentive to industry stakeholders. The staff will give stakeholders the opportunity to provide feedback on successes and challenges with past reviews. The staff will also actively solicit industry insights on emergent technologies and perceived challenges to future certification and licensing of these new technologies. The staff will examine other methods for process incentives such as preapplication topical reviews and approvals, license review schedules and priorities for new technologies, standardization of analytical methods or design features, and implementation of new RIPB approaches for safety, licensing, and inspection decisionmaking. The staff will incorporate incentives, to the extent practical, into regulatory framework enhancements discussed in Section 3 of this project plan.

### Discussion

Vendors of spent fuel storage and transportation casks and packages continue to submit innovative designs to support emerging customer needs. These designs include new materials (including materials not endorsed by the American Society of Mechanical Engineers Code) and innovative structural designs. These new designs often place increased performance demands on systems in terms of increased fuel assembly capacities, heat loads, and fissile mass. While applicants continue to develop state-of-the-art methods for structural, burnup credit (criticality), and heat transfer analyses, the baseline storage and transportation experimental data used to validate analytical methods remain relatively unchanged. These factors often result in a more in-depth audit review by the staff to ensure the analyses submitted by the vendor are technically sound in demonstrating that safety performance criteria will be satisfied. The current rigor of NRC analyses and regulatory practices for new state-of-the-art technology approvals may sometimes be viewed as hampering technology development. However, the staff must ensure adequate protection of public health and safety for these future designs which are often supported by little operational experience. The staff will explore methods to encourage adoption of state-of-the-art technologies for storage and transportation, by possibly incentivizing the use of these technologies through the NRC's regulatory processes, while maintaining an appropriate balance in achieving the agency's safety and security goals.

### 4.5 Stakeholder Participation

#### Objectives

- Develop a communication plan to ensure that the EST regulatory program review is conducted in a transparent, participatory, and collaborative manner with NRC stakeholders and other interested parties.
- Engage States, local governments, federally recognized tribes, and other interested parties.
- Coordinate with DOT, DOE, the Department of Homeland Security, and other Federal agencies.
- Engage industry and public interest groups.

- Engage international counterparts.
- Conduct public workshops and other meetings on program activities.
- Provide opportunities for public comment on key regulatory products.

### Summary

The staff will develop a communication plan for implementing the project plan. The communication plan will identify key messages and meetings and expected outcomes with key stakeholders, States, tribes, Federal agencies, and other interested parties. The staff will seek stakeholder participation and collaboration to incorporate insights during implementation of the project plan, and development of regulatory products and decisions, as appropriate. To facilitate effective communication with stakeholders and other interested parties, the staff will identify key audiences for feedback, develop appropriate communication tools to ensure effective dissemination of information, and offer opportunities that encourage interested parties to provide feedback on evolving issues. These audiences will include members of the public, industry, State governments, federally-recognized tribes, Federal agencies, Congress and staff, and public interest groups. However, for security-related activities involving Safeguards Information or Classified Information, the NRC will only allow participation by appropriately cleared stakeholders who have a “need to know.” The staff will also maintain and leverage existing networks that have been established for the spent fuel transportation and storage regulatory programs.

### **5.0 Schedule and Resource Management**

The Division of Spent Fuel Storage and Transportation in NMSS will lead implementation of this project plan in coordination with other NRC Offices and Regions. An interoffice working group will be established to implement the project plan and facilitate coordination among NRC offices with shared responsibilities. The projected resources in FY10 and FY 2011 needed to implement the project plan are shown in Table 5-1. The projected resources beyond FY 2011 are dependent, in part, on the outcomes of initial gap assessments and stakeholder participation. Projected resources required to implement the project plan in FY 2012 are pre-decisional and are discussed separately in Enclosure 2 (Official Use Only). The staff will address these projected resource needs through the normal budgeting processes, pending Commission approval of this project plan. Appendix B lists the projected schedules of major activities in each area. The staff will revise NMSS and division-level operating plans to incorporate these activities, as appropriate. Additionally, the staff will establish performance measures to ensure the achievement of the desired outcomes of project plan implementation. Preliminary performance measures are listed in Table 5-2. During project plan implementation, the staff will refine and develop specific performance measures in each area, as needed.

The staff notes that the schedules and resources are premised on continuing initiatives that are already underway in FY 2010, and implementing many activities at the start of FY 2011. Implementation is contingent on the recruitment, transfer, and training of staff with appropriate skill sets in FY 2010 and FY 2011. The project plan and schedule will also be assessed periodically to determine the need for revisions based on potential resource limitations, significant developments and findings of gap assessments and reviews, stakeholder participation, changes in industry EST plans, changes in national policy on EST issues, or any

future direction by the Commission. The staff will provide updates of progress and any significant changes to the project plan at the annual NMSS Program Briefs for the Commission.

**Table 5-1. Budgeted and Projected Resource Requirements**

Office	FY 2010 Budget <sup>a</sup>			FY 2011 Request <sup>b</sup>			FY 2012 Request <sup>c</sup>		
	FTE	\$K	Total	FTE	\$K	Total	FTE	\$K	Total
<b>NMSS<sup>d</sup></b>	2.0	1,150	1,452	18.5	2,500	5,290	-	-	-
<b>RES</b>	-	-	-	1.1	900	1,066	-	-	-
<b>FSME</b>	-	-	-	0.9	0	136	-	-	-
<b>NSIR</b>	-	-	-	0.0	0	0	-	-	-
<b>Regions</b>	-	-	-	0.6	0	90	-	-	-
<b>TOTAL</b>	<b>2.0</b>	<b>1,150</b>	<b>1,452</b>	<b>21.1</b>	<b>3,400</b>	<b>6,582</b>	<b>-</b>	<b>-</b>	<b>-</b>

**Table 5-2. Performance Measures**

Measures	Types of Metrics
Progress and Timeliness	<ul style="list-style-type: none"> <li>The percentage of objectives that exceed milestone dates, within NRC control, for completion and the average delay time</li> <li>The timeliness of advance notice for public meetings regarding program review activities</li> </ul>
Resources	<ul style="list-style-type: none"> <li>The resource utilization rate and earned value, versus that projected for implementing the project plan.</li> </ul>
Stakeholder Participation	<ul style="list-style-type: none"> <li>Survey results from stakeholders and other interested parties regarding NRC openness and value-added of interactions</li> <li>Stakeholder input and perspectives on the effectiveness of interactions and on the adequacy of the opportunities to participate in the program review</li> </ul>

<sup>a</sup> Includes resources approved as part of the FY 2010 Reprogramming Request.

<sup>b</sup> Includes resources requested in the FY 2011 President's Budget plus a \$900K shortfall for research activities that has been requested on the FY 2011 Shortfall List during the formulation of the FY 2012 budget.

<sup>c</sup> Projected resources required to implement the plan in FY 2012 are pre-decisional and are discussed separately.

<sup>d</sup> Includes projected FTE for other offices to provide support and lead individual tasks within the project plan in FY 2011. However, projected resources for these offices are expected to be minor (e.g., less than 0.5 FTE/FY).

## **Appendix A –Potential Policy Issues**

In Staff Requirements Memorandum (SRM)-COMDEK-09-0001, “Revisiting the Paradigm for Spent Fuel Storage and Transportation,” dated February 18, 2010, the Commission directed the staff to identify “potential policy issues” related to the project plan describing the staff’s efforts to thoroughly review the regulatory programs for extended storage and transportation (EST). In developing the project plan, the staff has identified four issues with potential policy implications. The staff has not yet fully examined these issues and, therefore, is not providing policy options or recommendations at this time.

The staff will further examine the four issues described below as part of the initial gap assessment and review activities specified in the project plan. The project plan includes activities to thoroughly examine these issues and provide policy recommendations to the Commission, as warranted.

### **1. Cask Certification by 10 CFR Part 72 Rulemaking**

To satisfy the requirements of the Nuclear Waste Policy Act of 1982 (NWPA), the staff currently uses the direct-final rulemaking process to add new casks and cask amendment to the approved list in 10 CFR Part 72. This initially was a preferred approach, in part, because it was expected that a limited number of dry cask systems would be needed and independent spent fuel storage installation (ISFSI) licensees could select generic systems that satisfied their needs. However, the commercial desire for higher-capacity designs, and a trend towards customizing designs for specific sites have led to a steady progression of applications for new cask designs and cask amendment requests. The direct-final rule process adds about six months to the licensing action after the staff completes its work on the safety evaluation report for approval. The number and significance of public comments have generally diminished over time to the point that the staff questions whether the current rulemaking process is the best approach for providing public participation and approving casks in an efficient and effective manner, given the amount of extended time and resources in the process. The certificate amendment approval process has also lengthened over time, in part, because applicants have been submitting larger and more complex amendment requests to mitigate the delays in rulemakings for more discrete amendments. The staff will further examine this issue, as part of the license process review in Section 2.1, and identify any policy issues for consideration by the Commission, as appropriate.

### **2. Storage and Transportation Compatibility and Integration**

Typically, NRC receives applications for storage cask designs well before the applicants request that the same design be certified for SNF transportation. Commonly, the reactor licensees have a relatively immediate need to store fuel onsite to maintain full-core offload capability. While many designs in the current generation of cask technologies are intended for use in both storage and transport, some vintage storage designs have been approved only for use in storage, and have been loaded with SNF. These casks may not be certifiable for transport under 10 CFR Part 71, and their contents may therefore need to be repackaged into new casks. Further, current storage casks that are designed for transportation use are being loaded with high-burnup SNF. Given issues with high burnup cladding integrity (see item 3 below) there are uncertainties if the SNF will be transportable in its current loaded configuration. As the staff implements the project plan, it will evaluate efficiencies that may be gained in the current licensing process, including approaches in enhancing compatibility and integration of storage

and transportation review procedures and regulatory requirements. The staff will further examine this issue, as part of the license process review in Section 2.1, and identify any policy issues for consideration by the Commission, as appropriate.

### **3. Spent Nuclear Fuel Long-Term Cladding Integrity**

The NRC generally requires cladding integrity to be maintained during interim dry storage to ensure that the primary fission product barrier is maintained for the backend fuel cycle. This is an important safety requirement because the cladding (1) provides defense-in-depth as the primary fission product barrier, (2) provides geometry control for criticality safety during transportation, and (3) provides added confidence that fuel can be safely handled after spent fuel storage, and remains in a usable condition, regardless of ultimate disposition. The staff believes the cladding integrity requirements should be preserved in EST to the extent practical. However, the staff recognizes that the uncertainty associated with maintaining cladding integrity in both extended wet storage and dry storage modes, and subsequent transportation, may require consideration of new mitigating solutions. Such industry or regulatory solutions might include requirements to move fuel from wet pool storage modes into dry cask storage casks at certain time intervals, dry storage and transportation burnup limits, “canning” of high-burnup SNF within current dry storage cask technologies, new packaging technologies to safeguard against future cladding failures, new internal monitoring systems to periodically assess internal environment and fuel cladding conditions, and/or new technologies to safely repackage fuel on-site prior to transportation (e.g., dry transfer). The staff will further examine this issue as part of the safety program review efforts in Section 3.1, and identify any policy issues for consideration by the Commission, as appropriate.

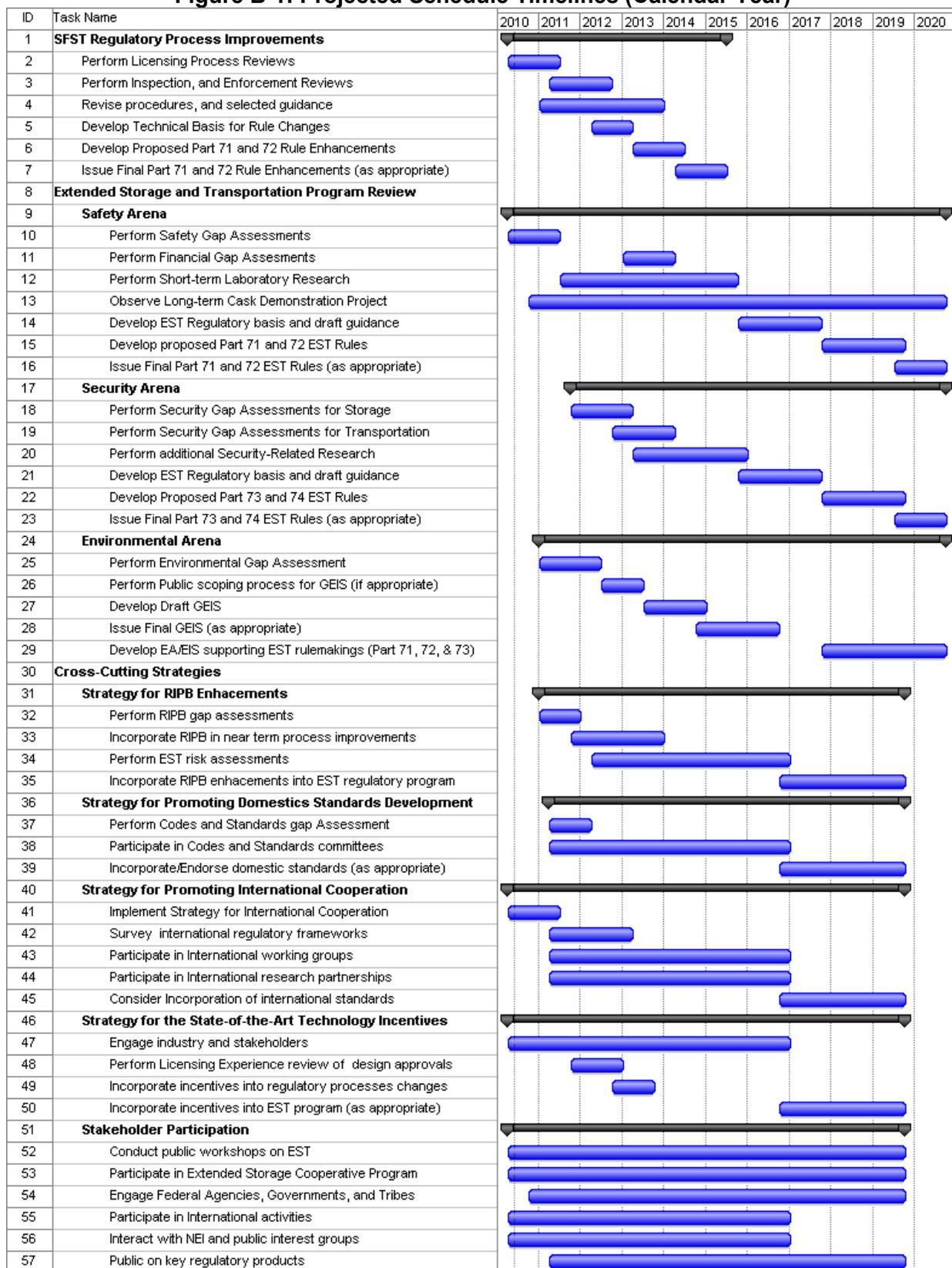
### **4. Financial Qualifications and Assurance**

The current regulatory structure for financial assurance and qualification for ISFSI licenses is founded on the premise that dry cask storage is an interim operation, and that the U.S. Department of Energy (DOE) would provide for long-term spent fuel management, including bearing the costs of shipping the spent fuel from reactor sites to the permanent repository. Therefore, it was not incumbent upon ISFSI licensees to demonstrate financial assurance for these activities. However, DOE has not accepted SNF from licensees. As a result, some licensees have taken legal actions to seek compensation from DOE, including damages for the additional costs incurred by ISFSI operations. The future national policy on spent fuel disposition is uncertain, and it is unclear whether judicial settlements, legislative actions, or other types of agreements will result in DOE, for example, funding the costs associated with ISFSI operations for extended onsite storage of fuel. In the interim, the staff may need to consider how the licensees will finance operational expenses for uncertain lengths of extended storage time. These expenses could include extended storage operations, security personnel, monitoring, possible inspection and repackaging operations, and decommissioning. The staff will further examine this issue as part of the safety program review efforts in Section 3.1, and identify any policy issues for consideration by the Commission, as appropriate.

## **Appendix B – Projected Schedules**

Figure B-1 and Table B-1 describe the projected schedules for the project plan. The projected completion of many activities in fiscal year 2012, and afterwards, is dependent on the results of initial gap assessments and reviews described in each area. Therefore, the projected schedules in latter phases will be adjusted based on the outcomes of the assessments. In addition, future Commission direction, stakeholder participation, or changes in the national policy of spent fuel management may require schedule changes as well.

**Figure B-1: Projected Schedule Timelines (Calendar Year)**



**Table B-1: Projected Schedules (Fiscal Year)**

<b>Review Area</b>	<b>Start</b>	<b>Finish</b>
<b>2.1 and 2.2 SNF Storage and Transportation Regulatory Process Improvements</b>	<b>3QFY10</b>	<b>3QFY15</b>
Perform Licensing Process Reviews	3QFY10	3QFY11
Perform Inspection, and Enforcement Reviews	3QFY11	4QFY12
Revise procedures, and selected guidance	2QFY11	1QFY14
Develop Regulatory Basis and Draft Guidance	3QFY12	2QFY13
Develop Proposed Part 71 and 72 Rule Enhancements	3QFY13	3QFY14
Issue Final Part 71 and 72 Rules (as appropriate)	3QFY14	3QFY15
<b>3.1 EST Program Review (Safety Area)</b>	<b>3QFY10</b>	<b>4QFY20</b>
Perform Safety Gap Assessments	3QFY10	3QFY11
Perform Financial Qualification/Assurance Gap Assessment	2QFY13	2QFY14
Perform Short-Term Laboratory Research	4QFY11	4QFY15
Implement Long-Term Cask Demonstration Planning and Testing	1QFY11	4QFY20
Develop EST Regulatory Basis and Draft Guidance	1QFY16	4QFY17
Develop Proposed Part 71 and 72 EST Rules	1QFY18	4QFY19
Issue Final Part 71 and 72 EST Rules (as appropriate)	4QFY19	4QFY20
<b>3.2 EST Program Review (Security Area)</b>	<b>1QFY12</b>	<b>4QFY20</b>
Perform Security Gap Assessments for Storage	1QFY12	2QFY13
Perform Security Gap Assessments for Transportation	1QFY13	2QFY14
Perform Additional Security-Related Research	3QFY13	1QFY16
Develop EST Regulatory Basis and Draft Guidance	1QFY16	4QFY17
Develop Proposed Part 73 and 74 EST Rules	1QFY18	4QFY19
Issue Final Part 73 and 74 EST Rules (as appropriate)	4QFY19	4QFY20
<b>3.3 EST Program Review (Environmental Area)</b>	<b>1QFY11</b>	<b>4QFY20</b>
Perform Environmental Gap Assessment	2QFY11	3QFY12
Perform Public scoping process for GEIS (as appropriate)	4QFY12	3QFY13
Develop Draft GEIS for Various EST Scenarios	4QFY13	1QFY15
Issue Final GEIS (as appropriate)	1QFY15	4QFY16
Develop EA/EIS supporting EST rulemakings (Parts 71, 72, 73, & 74)	1QFY18	4QFY20
<b>4.1 Risk-Informed and Performance-Based Enhancements</b>	<b>2QFY11</b>	<b>4QFY19</b>
Perform RIPB gap assessments	2QFY11	1QFY12

<b>Review Area</b>	<b>Start</b>	<b>Finish</b>
Incorporate RIPB near term process improvements	1QFY12	1QFY14
Perform EST risk assessments	3QFY12	1QFY17
Incorporate RIPB enhancements into EST program (as appropriate)	1QFY17	4QFY19
<b>4.2 Promoting Domestic Standards Development</b>	<b>2QFY11</b>	<b>4QFY19</b>
Perform Codes and Standards gap assessment	3QFY11	2QFY12
Participate in codes and standards committees	3QFY11	1QFY17
Incorporate domestic standards into EST Program (as appropriate)	1QFY17	4QFY19
<b>4.3 Promoting International Cooperation</b>	<b>3QFY10</b>	<b>4QFY19</b>
Implement Strategy for International Cooperation	3QFY10	3QFY11
Survey international regulatory frameworks	3QFY11	2QFY13
Participate on International EST working groups	3QFY11	1QFY17
Participate in International EST research partnerships	3QFY11	1QFY17
Consider Incorporation of international standards (as appropriate)	1QFY17	4QFY19
<b>4.4 State-of-the-Art Incentives</b>	<b>3QFY10</b>	<b>4QFY19</b>
Engage industry and stakeholders	3QFY10	1QFY17
Perform licensing experience review of past approvals	1QFY12	1QFY13
Incorporate incentives into regulatory processes changes	1QFY13	4QFY13
Incorporate incentives into EST program (as appropriate)	1QFY17	4QFY19
<b>4.5 Stakeholder Participation</b>	<b>3QFY10</b>	<b>4QFY19</b>
Conduct Public workshops on EST	3QFY10	4QFY19
Participate in Extended Storage Collaboration Program	3QFY10	4QFY19
Engage Federal Agencies, State and Local Governments, and Tribes	1QFY11	4QFY19
Participate in International activities	3QFY10	1QFY17
Interact with NEI and public interest groups	3QFY10	1QFY17
Public comment on key regulatory products	3QFY11	4QFY19