Part 2: Risk-Informed Regulation Implementation Activities

Chapter 3. Nuclear Waste Safety Arena

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Performance Goal: Maintain safety, protection of the environment, and the common defense and security.

Performance Goal: Make the NRC activities and decisions more effective, efficient, and realistic.

Performance Goal: Reduce unnecessary regulatory burden on stakeholders.

Strategy 1: *We will continue developing a regulatory framework to increase our focus on safety, including the incremental use of risk-informed and, where appropriate, less prescriptive performance-based regulatory approaches to maintain safety.*

Implementation Activity MS 1-1: Continue to develop improved risk assessment methods and data for calculating risk in support of risk-informed regulatory decision-making by studying spent nuclear fuel cask responses to severe transportation accidents.

On February 17, 2000, the staff sent SECY-00-0042 to the Commission. The paper informs the Commission of the roles of past and present spent nuclear fuel transportation risk studies. SECY-00-0042 discusses NRC's continuing efforts in conducting spent fuel transportation risk studies, the contribution of each to the Commission's transportation safety program, and plans for future communication with the public on spent fuel transport risk.

The staff has completed three transportation risk studies. The first two studies are documented in "Final Environmental Statement on Transportation by Air and Other Modes" (NUREG-0170), and "Shipping Container Response to Severe Accidents" (NUREG/CR-4829). The third study, initiated in 1996, was a reexamination of the risks associated with the shipment of spent reactor fuel by truck and rail. The third study was initiated because: (1) many spent fuel shipments are expected in the future; (2) such shipments will be to facilities along routes and in casks not specifically examined by previous studies; and (3) the risks associated with such shipments can be estimated using new data and improved methods of analysis. The staff completed this reexamination study and published NUREG/CR-6672, "Reexamination of Spent Fuel Shipment Risk Estimates," in March 2000.

A fourth study, referred to as the "Package Performance Study," was initiated in 1999. This study will focus on spent nuclear fuel cask responses to severe transportation accidents. Several public meetings to solicit stakeholder input on the scope of the study have been held, using a public-participation approach. A World Wide Web site has been established to facilitate interactions on the project. Ongoing public interactions throughout this project will help ensure that public concerns are effectively identified and understood.

Milestones:

Evaluate comments on issues report . . . . . FY 2001
Revise issues and options report . . . . . FY 2001
Identify selected options for testing and analysis . . . . . FY 2001
Develop test and analysis plan . . . . . FY 2001/2002
Implement test and analysis plan . . . . . FY 2002/2004

Assignment:

NMSS/SFPO and RES

Performance Goal: Maintain safety, protection of the environment, and the common defense and security.

Performance Goal: Make the NRC activities and decisions more effective, efficient, and realistic.

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Strategy 1: *We will continue developing a regulatory framework to increase our focus on safety, including the incremental use of risk-informed and, where appropriate, less prescriptive performance-based regulatory approaches to maintain safety.*

Implementation Activity MS 1-2: Continue to develop improved risk assessment methods and data for calculating risk in support of risk-informed regulatory decision-making by conducting a spent fuel storage cask probabilistic risk assessment (PRA).

NMSS has initiated a spent fuel dry storage cask PRA in cooperation with the Office of Research (RES). Risk insights from the study will be used to support the staff's decision-making activities and implementing programs involving dry cask storage.

Milestones:

NMSS:
Define project scope . . . . . June 2000
Identify accident initiating events . . . . . August 2000
Issue draft report on screening analyses . . . . . May 2001

RES:
Provide results of dry cask preliminary screening assessment . . . . . May 2001
Provide draft report of PRA on dry cask storage . . . . . December 2002
Issue report for public comment on dry cask risk assessment . . . . . April 2003
Issue final report on dry cask risk assessment . . . . . September 2003

Assignment:

NMSS/SFPO and RES

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Implementation Activity MS 1-3: Incorporate risk information into the regulatory framework in the review of a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain.

The staff completed and provided the final Yucca Mountain risk-informed, performance-based rulemaking package (Part 63) to the Commission in March 2000. Revision 1 of the Yucca Mountain Review Plan (YMRP) was completed and provided to the Commission in September 2000. The YMRP provides guidance to staff on implementing the risk-informed, performance-based regulations of Part 63, to assure that reviews are risk-informed and the proper level of effort is focused on areas important to the findings.

The staff has prepared and provided comments to the Commission on the U.S. Department of Energy's (DOE's) Draft Environmental Impact Statement for a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. The comments should enhance the DOE application for a license for a repository.

Milestones:

Issue Final 10 CFR Part 63 . . . . . contingent on Commission SRM
Issue NUREG containing the Yucca Mountain
Review Plan, Rev. 1 . . . . . contingent on Commission SRM
Provide staff comments to Commission on DOE's
Site Recommendation Considerations Report . . . . . May 2001
Public release of staff comments on DOE's Site
Recommendation Considerations Report . . . . . contingent on Commission decision

Assignment:

NMSS/DWM

Performance Goal: Maintain safety, protection of the environment, and the common defense and security.

Performance Goal: Make the NRC activities and decisions more effective, efficient, and realistic.

Performance Goal: Reduce unnecessary regulatory burden on stakeholders.

Strategy 1: *We will continue developing a regulatory framework to increase our focus on safety, including the incremental use of risk-informed and, where appropriate, less prescriptive performance-based regulatory approaches to maintain safety.*

Implementation Activity MS 1-4: Incorporate risk information into the regulatory framework in the analysis of "Geological and Seismological Characteristics for Siting and Design of Dry Cask Independent Spent Fuel Storage Installations," 10 CFR Part 72.

In 1997, the Commission amended 10 CFR Parts 50 and 100 of its regulations to update the criteria used in decisions regarding nuclear power plant (NPP) siting, including geologic, seismic, and earthquake engineering considerations for future NPPs. Part 100 as amended in 1997 placed a new 10 CFR 100.23 section in the regulations to allow the options of using a probabilistic seismic-hazard methodology as part of the geologic and seismic siting criteria. A conforming change to 10 CFR 72.102 is proposed, which will allow new dry-cask ISFSI licensees to take advantage of the Part 100 amendments, specifically Part 100.23. In addition, the proposed rule would provide a risk-informed graded approach to seismic design of ISFSI structures, systems, and components.

Milestones:

Final technical basis . . . . . October 2000
Revised rulemaking plan . . . . . December 2000
Complete draft regulatory guide . . . . . December 2000
Proposed rule package . . . . . To be determined
Final rule package . . . . . To be determined

Assignment:

NMSS/SFPO

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Strategy 1: *We will continue developing a regulatory framework to increase our focus on safety, including the incremental use of risk-informed and, where appropriate, less prescriptive performance-based regulatory approaches to maintain safety.*

Implementation Activity MS 1-5 : Revise regulations applicable to reactors undergoing decommissioning to remove unnecessary burden, and to consider the difference in risk for permanently shutdown reactors compared with operating reactors.

NPPs undergoing decommissioning are subject to many of the same regulations as operating nuclear reactors. Some of the requirements are not justified based on the lower risk presented by a permanently shutdown and defueled reactor, as compared to an operating reactor. The staff has actions underway to make regulatory changes, related to NPP decommissioning, that will reduce the number of licensing actions and exemption requests that need to be submitted by the licensee, and processed by NRC. These changes will be made in a manner that reduces the regulatory burden on licensees commensurate with risk. Further, the staff is considering changes that clarify the requirements to provide predictability, and enhance public confidence based on an increased understanding of what is required during decommissioning. In undertaking these actions, we will maintain the safety of plants undergoing decommissioning by basing the regulatory changes on a technical risk study conducted by the staff.

During a Commission meeting in March of 1999, the Commission directed the staff to determine if a risk-informed methodology could be applied to decommissioning regulations to address the extent to which a zirconium fire needs to be considered for spent fuel storage in the spent fuel pool. In addition, the Commission noted that an integrated approach to decommissioning rulemaking could result in more consistent, predictable regulations. The staff responded with SECY-99-168, dated June 30, 1999, which provided a strategy for decommissioning regulatory improvements. In accordance with the plan outlined in SECY-99-168, the staff has been pursuing three major tasks.

(1) The staff is finalizing a technical study on the risk posed by spent fuel storage in the spent fuel pool of an NPP undergoing decommissioning. A draft report was issued on February 15, 2000. Issuance of a final report is pending, awaiting completion of a response to issues raised by stakeholders and the Advisory Committee on Reactor Safeguards on the draft report.

(2) Based on the results of the spent fuel pool accident risk study, the staff has been developing an integrated rulemaking plan in the regulatory areas of emergency planning; insurance; safeguards; staffing and training; and backfit. On June 28, 2000, the staff provided the integrated rulemaking plan to the Commission (SECY-00-0145). The rulemaking plan is based on risk to the extent provided by the staff's technical risk

study. However, the rulemaking plan also has prescriptive requirements that lead to regulatory clarity and confidence that are not strictly risk-informed.

(3) The staff is also conducting a broader-based review of decommissioning regulations for NPPs and planning to make further recommendations to the Commission on what additional rulemaking activities may be needed.

The staff will continue to work with stakeholders to identify additional regulatory improvements that can be made for decommissioning NPPs.

Milestones:

Rulemaking plan to Commission (SECY-00-145) . . . . . June 2000 (C)
Risk study to Commission . . . . . October 2000
Plan for additional decommissioning regulatory improvements . . . . . January 2001
Publish proposed integrated rule 2001
Publish final integrated rule 2002
Other decommissioning rulemaking . . . . . To be determined

Assignment:

NRR

Performance Goal: Maintain safety, protection of the environment, and the common defense and security.

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Performance Goal: Reduce unnecessary regulatory burden on stakeholders.

Strategy 1: *We will continue to improve the regulatory framework to increase our focus on safety and safeguards, including incremental use of risk-informed, and where appropriate, less prescriptive performance-based regulatory approaches to maintain safety.*

Implementation Activity MS 1-6: Incorporate risk information into the review of an independent spent fuel storage installation on the Reservation of the Skull Valley Band of Goshute Indians, within the boundaries of Tooele County, Utah.

The staff has completed the Safety Evaluation Report (SER) for the Private Fuel Storage L.L.C. (PFS) facility, an ISFSI that will be located on the Reservation of the Skull Valley Band of Goshute Indians, within the boundaries of Tooele County, Utah. The PFS facility is designed to store up to 40,000 MTU of spent nuclear fuel in dry storage casks.

The SER includes an examination of potential hazards from the crashes of both civilian and military aircraft flying in the vicinity of the facility. Data connected with aircraft activities at Salt Lake City International Airport, at nearby military facilities, and at nearby municipal airports, were collected and analyzed. Also examined were the potential hazards associated with jettisoned ordnance carried onboard a military aircraft about to crash in Skull Valley. Crash probabilities for aircraft and ordnance were estimated on the basis of several elements that determine the overall likelihood that each specific type of aircraft operation may lead to an impact (or overpressurization) at the proposed facility. These include measures that reflect: traffic density (e.g., flights per year); crash rate (e.g., crashes per mile, crashes per unit area per unit time); and effective target area, as well as specific parameters pertaining to specific aircraft under consideration (e.g., avoidance probability for F-16s, or the probability of on-board live ordnance being present). Other factors, such as human errors in aircraft design, fabrication, or maintenance, were inherently taken into account through the use of historically established crash-rate data.

Based on the information and analysis provided by the applicant, the staff concluded that the cumulative probability of a civilian or military aircraft crashing at, or affecting the facility, is below the threshold probability criterion of 10^{-6} per year. Therefore, there is reasonable assurance that civilian or military air crashes would not pose a hazard to the PFS facility. The staff included these risk insights in the PFS SER, which provides the staff's technical findings to support a future licensing recommendation.

Milestones:

Complete SER . . . . . September 2000 (C)
Licensing recommendation to Commission . . . . . September 2001

Assignment:

NMSS/SFPO

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Implementation Activity MS 1-7: Incorporate risk information into the decommissioning regulatory framework.

In September 2000, the staff finalized the NMSS Decommissioning Standard Review Plan (SRP), which incorporated a risk-informed, iterative approach. This approach will allow staff to evaluate information submitted by a licensee in a timely and efficient manner, and ensure protection of public health and safety. The staff plans to update the SRP in FY2002, based on lessons learned from the application of the SRP to licensing activities during the next 2 years.

NMSS is also reviewing all decommissioning policy and guidance documents for:

1) Efficiency, use of a streamlined approach, and user-friendliness of the processes described in the documents; and

2) The use of risk-informed, performance-based (RIPB) techniques, or risk-informed, less-prescriptive techniques, in the processes described in the documents.

The goal of this activity is to apply RIPB techniques to NMSS' decommissioning process as much as possible. For this, NMSS will use the guidance and experience developed through: (1) the “Business Project Redesign” policy and guidance review and consolidation process for byproduct material licensing (NUREG-1556 series); (2) the experience gained with risk-informing the dose modeling guidance while working on the NMSS Decommissioning SRP (NUREG-1727); and, (3) the ongoing evaluation of new and different approaches to the decommissioning review process that was stipulated in the SRM on decommissioning non-reactor facilities (DSI-9).

Milestones:

Consolidate/update of NMSS decommissioning policy and guidance
- Identify documents for review . . . . . December 2000
- Establish criteria for review . . . . . March 2001

Issue revision to Decommissioning SRP . . . . . FY 2002

Assignment:
NMSS/DWM

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Strategy 4: *We will keep pace with the national high-level waste management program. We will apply the regulatory framework to pre-licensing reviews and consultations with DOE to resolve the issues most important to repository safety and prepare for addressing a licensing decision within the statutory time period.*

Implementation Activity MS 4-1: Identify those issues most important to repository safety.

The staff will identify those issues most important to repository safety. Staff will accomplish the goal via review of DOE total-system performance assessments, review of supporting documentation, and independent technical analysis. The product of the analysis will be a quantitative and qualitative summary of the issues most important to repository safety.

Milestones:

Issue Consolidated Issue Resolution Status Report . . . . . September 2001

Assignment:

NMSS/DWM

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Implementation Activity MS 4-2: Resolve key technical issues identified as being greater contributors to risk.

The issues identified through Strategy 4, Implementation Activity 1, will be supplied to staff involved in pre-licensing reviews and consultations with DOE to focus effort on resolving issues most important to repository safety. All key technical issues previously identified in the high-level waste project will receive adequate review to ensure safety and protection of the environment. However, key technical issues identified as being greater contributors to risk in Strategy 4, Implementation Activity 1, will receive a more thorough evaluation of: (1) data and model justification; (2) data uncertainty; (3) model uncertainty; (4) model support; and (5) integration.

Milestones:

Conduct public meetings with DOE on regulatory technical issues and paths to closure . . . . . March 2001
Issue Consolidated Issue Resolution Status Report . . . . . September 2001

Assignment:

NMSS/DWM