POLICY ISSUE
INFORMATION

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FOR: The Commissioners

FROM: William D. Travers
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SUBJECT: UPDATE OF THE RISK-INFORMED REGULATION IMPLEMENTATION PLAN

PURPOSE:

To present the Commission with an updated and revised version of the Risk-Informed Regulation Implementation Plan (RIRIP), in accordance with a Staff Requirements Memorandum (SRM) dated January 4, 2001.

BACKGROUND:

In a January 2000 memorandum to the Commission, the staff outlined a strategy for implementing risk-informed regulation. The strategy evolved into the initial version of the Risk-Informed Regulation Implementation Plan (RIRIP), which the staff gave to the Commission in March 2000. The Commission reviewed the plan and, after a briefing by the staff in March, directed the staff in April 2000 to include in the next update of the implementation plan an internal communications plan, staff training requirements, and a discussion of internal and external factors that may impede risk-informed regulation. The first complete version of the implementation plan was issued in October 2000.

In an SRM dated January 4, 2001, the Commission requested that the staff provide a more detailed communication plan to better highlight the agency's goal of improving public confidence, prioritize activities, identify necessary resources and tools, address how performance-based regulatory approaches will be integrated into the process of risk-informing regulations, and identify critical-path activities and those that have crosscutting dimensions.

In response to the SRM, the December 2001 update of the RIRIP, specifically Part 2, included expanded arena chapters that describe the staff's progress in prioritizing the various implementation activities and identifying the necessary tools, critical-path activities, and activities that have crosscutting dimensions. The arena chapters also describe arena-specific activities related to communication with both internal and external stakeholders. This update of the RIRIP includes updates and additions to the activity descriptions. Additionally, the effort to develop risk-informed and/or performance-based safeguards requirements has been put on hold pending the completion of the top-to-bottom review of safeguards and security and has also been removed from the RIRIP.

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DISCUSSION:

The RIRIP discusses the agency's actions to risk-inform its regulatory activities and specifically describes each of the activities identified as supporting the goals and objectives of the agency's Strategic Plan and the Probabilistic Risk Analysis Policy Statement.

The RIRIP has two parts. Part 1 provides a general discussion of the document's relationship to the Probabilistic Risk Assessment (PRA) Policy Statement and the Strategic Plan. It also discusses deterministic and other elements for consideration in the process of risk-informing and provides guidance for selecting appropriate "candidates" for risk-informing. Part 2 describes the staff's ongoing risk-informed regulation activities in the Reactor Safety arena and the Materials and Waste Safety arenas.

Attachment 1 describes the agency's risk-informing accomplishments since the last update. Key risk-informing activities to be conducted at the agency over the next six months, along with a brief background of each, are described in the paragraphs below.

Reactor Safety Arena

1. 10 CFR 50.69 (Special Treatment Requirements): On September 30, 2002, the staff submitted a proposed rule package (SECY-02-0176) that included a draft regulatory guide (DG-1121). The draft regulatory guide provided staff comments on and clarifications of the industry-proposed implementation guidance contained in draft Revision C of Nuclear Energy Institute (NEI) 00-04 (10 CFR 50.69 System, Structure, and Component (SSC) Categorization Guideline). The Commission issued a SRM dated March 28, 2003, which directed the staff to publish the proposed 10 CFR 50.69 for public comment. The proposed 10 CFR 50.59 was subsequently published for a 75-day comment period on May 16, 2003, and later extended by thirty days. The staff continues to work with the industry and other stakeholders on NEI 00-04 implementation guidance.

2. Coherence Program: The staff is formulating a proposed process for a risk-informed coherence effort that provides the guidelines and criteria for translating the Commission's high-level guidance into specific activities. However, in order to address reactor safety risk-informed rulemaking priorities identified in the staff requirements memorandum on COMSECY-03-0029, the staff redirected FY 2004 resources from the coherence program. This prioritization was supported by the industry during the August 2003 PRA steering committee meeting. The staff is re-evaluating future activities in this area.

3. Creating a Risk-Informed Environment: The second phase of the program is underway. The staff publishes a monthly electronic newsletter entitled "Risk eBusiness" on risk-informed activities and initiated a series of "brown bag" seminars to provide an open forum for employees to discuss risk-informed activities in a casual setting. The seminars provide opportunities for employees to learn about risk-informed activities, share information and expertise, express concerns, and ask questions. In addition, the staff is collecting information through focus group discussions and interviews regarding techniques and practices being used by various managers and supervisors in NRR to help their staff become more involved in risk-informed activities.

4. Option 3 (Risk-Informing Part 50)

   - Hydrogen Control Requirements (10 CFR 50.44): This rulemaking was initiated as a risk-informed examination of the requirements in the existing rule. Based on the examination, some requirements will be revised (e.g., the requirement for hydrogen recombiners would be removed), while most requirements in the existing rule will be retained. The Final Rule to change 10 CFR 50.44 was sent to the Commission for approval on July 24, 2003.

   - Emergency Core Cooling System (ECCS) Acceptance Criteria (10 CFR 50.46): In response to the Commission SRM of March 31, 2003, the staff will do the technical work necessary for estimating loss-of-coolant accident frequencies to be used in the rulemaking to risk-inform ECCS requirements. The staff currently plans to complete this effort by the end of the calendar year. In addition, the staff will develop proposed rules to implement the Commission's direction to provide a risk-informed alternative maximum break size and to relax the current requirements for consideration of a coincident loss of offsite power (LOOP). The staff plans to continue stakeholder interaction on these topics, including discussion on pilot plant efforts, such as the BWROG proposal regarding coincident LOOP.

5. The staff worked with the National Fire Protection Association (NFPA) to develop an alternative performance-based risk-informed fire protection standard for nuclear power plants. This standard, NFPA-805, was issued in April 2001. The staff published a proposed rule on November 1, 2002. A final rule is expected to be published in February 2004. The staff is working with the industry to develop implementing guidance for NFPA 805 that will be endorsed by the NRC in a regulatory guide.

6. The staff continues to work on the risk-informed technical specification initiatives. The safety evaluations (SEs) for Initiative 1, Technical Specification Actions End State Modifications, have been completed for the CEOG and BWROG topical reports. On January 23, 2003, the CEOG submitted proposed changes to the CE Standard Technical Specifications (STS), with some deviations from the staff's SE. The staff is evaluating the submittal to determine if the deviations are acceptable. Initiative 3, Modification of Mode Restraint Requirements, was completed via the Consolidated Line Item Improvement Process (CLIIP). The Federal Register notice announcing the availability of the proposed STS changes was published on April 4, 2003, and will be provided to NEI to propose STS changes. An SE was completed for the CEOG submittal for Initiative 6, Modification of LCO 3.0.3, Actions and Completion Times, on June 4, 2003. On Initiative 4b, Risk-informed allowed outage times, NEI provided a draft Risk Management Guide and the CEOG single-system pilot proposal, TSTF-424, on January 21, 2003. The NRC staff has commenced the review process for the Risk Management Guide and TSTF-424 submittals, and milestones are being determined.

7. On July 18, 2003, the staff issued SECY-03-0122, "Status Report on Draft Regulatory Guide, DG-1122". The staff is working closely with professional societies (ASME and ANS) in developing PRA standards. The staff is also interacting frequently with stakeholders to solicit their input and has developed DG-1122 and SRP Chapter 19.1. It is

the staff's intent to issue the regulatory guide for trial use and test the guide in one or more pilot applications. The staff intends to issue the guide in fall of 2003 after ASME issues the addendum to the ASME standard. However, if ASME delays issuing its addendum, the staff intends to move forward and issue the guide.

8. The Office of Nuclear Regulatory Research forwarded a draft NUREG report, "Technical Basis for Revision of the Pressurized Thermal Shock (PTS) Screening Criteria in the PTS Rule (10 CFR 50.61)," to NRR in December 2002. This report documents the results of a multiyear study reevaluating the technical basis of 10 CFR 50.61. The staff is currently updating that report with more detailed documentation of the analyses and results. The updated report will be peer-reviewed, further updated to include comments from the peer review group, and published as a final NUREG report containing RES' suggested rulemaking options and recommendations for NRR's potential use in rulemaking. The draft results from this project confirm the widely held belief within the NRC and industry that the calculations which provide the basis for the current PTS rule (10 CFR 50.61) contain significant, unnecessary conservatisms. These new results will allow several plants to continue to operate many years beyond the end of their lifetime, as it would be determined by the present rule.

9. The staff has created a data handbook for probabilistic risk assessments. The data handbook defines methods and tools for data analysis used in risk assessments. The handbook was created to support documents such as the ASME "Standard For Probabilistic Risk Assessment For Nuclear Power Plant Applications" (ASME RA-S-2002) by providing a compendium of good practices that a PRA analyst can use to generate the parameter distributions required for quantifying PRA models. The handbook was sent out for comment in February 2003. The staff completed the handbook and it was published in September 2003.

10. The staff is revising NUREG/CR-6595, "An Approach for Estimating Frequencies of Various Containment Failure Modes and Bypass Events," which describes an approach for estimating large early release frequency (LERF). RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-informed Decisions on Plant Specific Changes to the Licensing Basis" revision 1, dated November 2002, references this report as providing a simple screening method for assessing LERF. NUREG/CR-6595 currently includes some considerations for low-power and shutdown (LPSD) operation, but does not include a simplified Level 2 analysis focusing specifically on LPSD. The objective of the revision is to include a simplified Level 2 probabilistic safety analysis (PSA) specifically for LPSD conditions, similar to that presented for full-power operations. This analysis should be adequate to produce an estimate of LPSD risk in terms of radionuclide release frequency when coupled to a more detailed Level 1 analysis. The staff will perform a literature search to identify containment failure modes and mechanisms unique to shutdown, develop LPSD Level 2 simplified event trees and guidance, test and modify the trees and guidance, and coordinate the effort on the LPSD PSA standard with the American Nuclear Society. The currently used full-power LERF modeling approaches in the NUREG will also be updated. The draft report has been issued for public comment.

11. The staff is developing a method which will allow determination of the frequency of containment bypass events due to steam generator (SG) tube failures at any PWR. This study utilizes materials and thermal-hydraulic analyses that have been underway for several years. The results from analyses of tube failures are now being incorporated into a risk-informed framework; the results from analyses of other materials that could fail before the SG tubes, thereby preventing tube failures and the resulting containment bypass (e.g., hot leg and surge line failures), will be incorporated into the risk-informed framework when they become available. Initially, the staff will determine the frequency of tube and other material failures resulting from postulated severe accidents. Later the staff will also consider steam generator tube ruptures resulting from non-severe-accident initiators (e.g., main steamline breaks). This method will allow a more realistic determination of the frequency of containment bypass events due to severe-accident-induced steam generator tube failures. These determinations are intended to confirm that existing requirements and guidance effectively limit the risk due to containment bypass events.

12. Through coordination with EPRI, the staff is developing risk-informed methods to estimate fire risk. These methods will be based on requantification studies that will develop insights and guidance for fire risk analysis (FRA). The staff expects to complete work on the two PWR pilots by mid-CY04 and select a BWR pilot for future studies.

Waste Safety and Materials Safety Arenas

1. In support of the Commission's policies on risk-informing the regulatory process and performance goals, the staff is working to develop probabilistic risk assessment methods and quantify the risk of dry storage of spent nuclear fuel. These studies (Phases I and II) are intended to accomplish the following objectives: (a) provide methods to quantify the risks of dry cask storage of spent nuclear fuel, (b) provide insights to decisionmaking and improving 10 CFR Part 72 regulatory activities, and (c) provide analytic tools that can be used to implement future waste safety goals and risk-informed regulatory activities.

   Phase I: In February 2003, Research completed a draft pilot PRA on dry cask storage with a specific design. The draft report is under peer review and the staff plans to discuss this study with the joint ACRS/ACNW subcommittee in October 2003. Research plans to publish the final pilot PRA in 2004.

   Phase II: Additional studies are being identified to broaden the application of the pilot PRA and develop additional PRA tools and risk-insights.

2. The NRC is amending its licensing requirements in 10 CFR Part 72 for dry storage of spent nuclear fuel, high-level radioactive waste, and power reactor greater than Class C (GTCC) waste in an independent spent fuel storage installation (ISFSI) or in a U.S. Department of Energy (DOE) monitored retrievable storage (MRS) installation. This rule amendment will update the seismic siting and design criteria, including geologic, seismic, and earthquake engineering considerations. The amendments will make the NRC regulations that govern certain ISFSIs and MRSs more compatible with the 1996 amendments that addressed uncertainties in seismic hazard analysis for nuclear power plants. The amendments will allow certain ISFSI or MRS license applicants to use a design earthquake level commensurate with the risk associated with an ISFSI or MRS. The final rule was sent to the Commission on July 11, 2003 (SECY-01-0068).

3. During the Phase I work completed in FY 2001, the Office of Nuclear Material Safety and Safeguards (NMSS) Risk Task Group (RTG) concluded that quantitative risk guidelines could be useful in risk-informing certain applications within the Materials and Waste areas. Consequently, the staff is working on developing applicable risk guidelines and a risk-informed decisionmaking process for NMSS. The utility of this decision process and the associated risk guidelines will be tested and revised as needed through a series of pilot studies in FYs 2003 and 2004.

4. In response to the NMSS performance goals in the Strategic Plan, NMSS implemented a project to consolidate and update the policies and guidance of its decommissioning program. The project involves review and consolidation of existing NMSS decommissioning guidance documents, decommissioning technical assistance requests, decommissioning licensing conditions, and decommissioning generic communications issued over the past several years. The goal was to produce consolidated NMSS decommissioning guidance that allows the NRC staff to evaluate information submitted by licensees in a timely, efficient, and consistent manner that protects public health and safety. The end result is a streamlined multivolume NUREG grouped into decommissioning functional categories. Further ease of use will be realized by making this a Web-based document. The updated, consolidated guidance will be provided to all users, both NRC and licensee, in hard-copy and/or electronic media. Since each group will have access to the same guidance, the guidance is expected to result in more complete license documents and to expedite the approval process for both applicants and reviewers. As a result, this project is expected to improve the overall decommissioning process. The final product will consists of a three-volume NUREG series (NUREG-1757). Volume 1 (decommissioning process) was issued as final guidance in September 2002. In September 2003 the staff issued Revision 1 to Volume 1, as well as Volume 2 (characterization, survey, and determination of radiological criteria), and Volume 3 (financial assurance, record keeping, and timeliness) as final guidance documents.

5. The staff will complete the final report documenting the High-Level Waste Risk Insights Initiative. The risk insights final report will include a risk insights baseline, which will provide an overall perspective for evaluating the risk significance of repository issues and systems down to the subsystem level. The final report will also include references to quantitative analyses that support the baseline. The final report will discuss the application of risk terminology in the high-level waste program and describe a methodology for maintaining and updating the risk insights baseline. The final report will provide guidance to the staff for using risk insights during issue resolution and in implementing a risk-informed review of a license application as prescribed in the Yucca Mountain Review Plan.

6. The staff will continue to refine its high-level waste Total-system Performance Assessment (TPA) computer model by testing and implementing TPA version 5.0, making the model more realistic and improving the staff's ability to use the TPA code effectively during the potential regulatory review. The staff plans to conduct an iterative performance assessment to (a) test proposed uses of the TPA code to support the implementation of the regulatory framework and (b) develop new risk information and update existing risk information.

7. RES has initiated a feasibility/scoping study to identify and develop simple methods of incorporating human factors and estimating human reliability for the wide range of situations and activities encountered and performed by NMSS licensees. This study is on track to be completed by the end of December 2003. On the basis of this study, RES plans to develop HRA methods and tools for both the materials and waste applications.

RIRIP Content and Organization:

Part 1 of the RIRIP (Attachment 2) describes the plan's relationship to the PRA Policy Statement and its relevance to the NRC's Strategic Plan. Part 1 also discusses certain key features of the traditional deterministic approach that should be preserved in establishing risk-informed regulatory programs, since risk information will be used to complement the traditional approach. In addition, Part 1 provides draft guidance that the staff has used for selecting candidate requirements, practices, and processes to risk-inform.

To complete the plan, Part 2 of the RIRIP describes the staff's risk-informed regulation activities, with chapters addressing the nuclear Reactor Safety arena and the nuclear Materials and Waste Safety arenas. Each chapter is organized around the Strategic Plan strategies that are relevant to risk-informed regulation in the given arena. In addition, each chapter describes the implementation activities for each strategy and identifies significant milestones and training and communications considerations for each activity. Relationships among implementation activities are described and critical-path items are identified. Gantt charts for some of the implementation activities are also provided to illustrate the relationships among tasks within activities.

RESOURCES:

In response to the Commission's direction regarding the October 2000 version of the RIRIP, the plan lists the priority rating of each risk-informed regulation implementation activity. These priorities were determined through the Planning, Budgeting and Performance Management (PBPM) process. As part of the FY 2005 PBPM process, the program offices developed a common prioritization methodology which was utilized to produce a prioritized listing of planned activities by arena (reactor, materials, and waste) for the offices. This prioritized listing will continue to be used to inform both arena-level resource budgets and re-programming, as necessary. As with other staff activities, changes to the resources allocated to implementation activities for risk-informed regulation will continue to be made consistent with the PBPM process to reflect changes to the agency's budget and priorities.

Over the past few years, the staff has made significant progress toward risk-informing its regulatory activities. Attachment 1 to this Commission paper summarizes the staff's recent significant accomplishments. While the staff has made considerable progress, work remains to be done. Using the Probabilistic Risk Assessment (PRA) Policy Statement and the NRC's Strategic Plan as a foundation, the RIRIP describes activities that are planned and underway and the interrelationships among the activities.

COORDINATION

The Office of the Chief Financial Officer has reviewed this paper for resource implications and has no objections. The Office of the General Counsel has also reviewed this paper and has no legal objections.

/RA/

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Attachments: 1. Table of Accomplishments
2. Risk-Informed Regulation Implementation Plan

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