

**Risk Informed Activities  
Completed or Not Active**  
(FY2017 Update)

The following risk-informed activities were removed from the public website because they are no longer active:

**Risk Prioritization Initiatives (RPI)**

**Emergency Core-Cooling System (ECCS) Requirements: Redefinition of Loss-of-Coolant Accidents (LOCA)**

**Emergency Core Cooling System (ECCS) Requirements: Loss of Coolant Accident and Loss of Offsite Power (ECCS-LOCA/LOOP)**

**Risk-Informed In-service Inspection (ISI)**

**Standard Review Plan, Chapter 19.0 Severe Accidents (NUREG-0800)**

**Staff Review of NuScale Licensing Topical Report on Risk Significance Determination**

**Use of Risk Insights to Enhance Technical Reviews of Design Certification (DC) Applications**

**Revise the Fuel Cycle Oversight Program (RFCOP)**

**Enhance Regulatory Framework for Extended Storage and Transportation**

**Risk Management Regulatory Framework (RMRF)**

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Reactor Safety Arena

Operating Reactors

**Risk Prioritization Initiatives (RPI)**

Summary Description

In February 2013, the Commission approved [SRM-COMGEA-12-0001/COMWDM-12-0002](#), "Proposed Initiative to Improve Nuclear Safety and Regulatory Efficiency", to further explore the idea of enhancing nuclear safety and regulatory efficiency by applying PRA. This initiative could encourage the use and development of high quality, plant-specific PRA models by

allowing licensees to use qualitative and quantitative risk insight to propose a schedule for implementing regulatory actions on a plant-specific basis.

In October 2013, NEI began to develop a draft process as a potential way to address RPI for operating power reactors. The NEI's draft process consists of three main elements: (1) generic prioritization by an industry generic assessment expert team, (2) plant-specific prioritization by an integrated decision-making panel of licensee experts, and (3) issue aggregation for plant specific scheduling. The NRC staff provided comments on NEI's guidance. The guidance described the process at various stages using insights gained from tabletop exercises and discussions with stakeholders during public meetings.

Subsequently, the NRC staff informed the Commission about its observation of tabletop exercises of the NEI draft process in [COMSECY-14-0014](#). Afterwards, six licensees also participated in the industry-led demonstration pilots that were conducted between May and September of 2014 to exercise the draft guidance prioritizing plant-specific issues. Lastly, a public meeting in September 2014 was held to further exercise the process in the areas of security, emergency preparedness, and radiation protection.

Other information about the NRC staff's observations can be found in "Summary of the NRC Staff Observations on the Nuclear Energy Institute Demonstration Pilots for Prioritizing and Scheduling Implementation." In addition, NEI provided its summary and observations of the demonstration pilots in the "Nuclear Energy Institute, Report on Prioritization and Scheduling Pilot." The latest version of the NEI guidance was submitted to the NRC by letter dated November 14, 2014.

Based on insights and feedback obtained from the public and with experience gained during tabletop exercises and demonstration pilots, the staff presented four options to the Commission in [SECY-15-0050](#), "Cumulative Effects of Regulation Process Enhancements and Risk Prioritization Initiative: Response to Commission Direction and Recommendations" dated April 1, 2015. In the [SRM-SECY-15-0050](#) issued on August 25, 2015, the Commission did not approve separate RPI activities, but supported the consideration of risk insights in regulatory decision-making through existing agency processes.

FY 2015

In March 2015, the staff briefed ACRS with respect to a draft version of the Commission paper in which the staff presented options of RPI as a tool to reduce cumulative effects of regulation (CER). In its letter on this topic, ACRS agreed with the staff's recommendations and recommended that the staff should explicitly include risk information as an input to decisions and priorities for proposed regulatory actions regardless of the Commission's decisions about specific options or approaches in the SECY paper.

On April 1, 2015, the staff submitted SECY-15-0050, "Cumulative Effects of Regulation Process Enhancements and Risk Prioritization Initiative: Response to Commission Direction and Recommendations." This paper responds to the Commission's direction in SRM-COMSECY-14-0014, "Cumulative Effects of Regulation and Risk Prioritization Initiative: Update on Recent

Activities and Recommendations for Path Forward," dated July 18, 2014. This paper provided the Commission with four options of using RPI as a tool to reduce CER for operating reactor licensees.

The first option would have maintained the status quo. Option 2 would have augmented existing regulatory processes allowing licensees to request exemptions and changes to implementation schedules for existing regulatory commitments. This option would have allowed licensees to use a risk-informed prioritization methodology as a basis for such request. Option 3 would have allowed licensees to submit a risk-informed, plant-specific implementation plan when the NRC adopts a new rule. Option 4 would have established a voluntary process that enables licensees to make plant-specific, risk-informed changes to implementation schedules for certain regulatory issues without requesting prior NRC approval.

On May 19, 2015, the staff, along with an external panel, briefed the Commission on issues related to CER and RPI. The discussions included the staff's identified lessons learned, possible approaches for implementing the RPI, as well as licensee experiences with RPI pilot projects. In the SRM-SECY-15-0050 issued on August 25, 2015, the Commission did not approve the RPI options. However, the Commission stated that it supports consideration of risk insights in regulatory decision-making through existing agency processes. The staff is exploring the development of additional guidance to enhance licensees' ability to use risk information in existing agency processes such as Title 10 of the Code of Federal Regulations (10 CFR) 50.12, "Specific Exemptions." Additional FY2015 information is available.

FY 2016

No activity since 2015 based on Commission directive in [SRM-SECY-15-0050](#). Additional FY2016 information is [available](#).

Risk-Informed Basis

This initiative, discontinued since August 2015, intended to encourage the use and development of high quality, plant-specific PRA models by allowing licensees to use qualitative and quantitative risk insight to propose a schedule for implementing regulatory actions on a plant-specific basis.

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## **Emergency Core-Cooling System (ECCS) Requirements: Redefinition of Loss-of-Coolant Accidents (LOCA)**

Summary Description

As part of the staff's program to risk-inform the technical requirements of 10 CFR Part 50 (discussed under Option 3 from SECY-98-300), the staff identified 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems (ECCS) for Light-Water Nuclear Power Reactors", Appendix K to 10 CFR Part 50, "ECCS Evaluation Models," and General Design

Criteria (GDC) 35, "Emergency Core Cooling," of Appendix A to 10 CFR Part 50, as regulations that warranted revision.

The staff prepared a proposed rule (SECY-10-0161; ML102210460) containing ECCS evaluation requirements that could be used as an alternative to the current requirements in 10 CFR 50.46. The proposed rulemaking was designed to redefine the large-break LOCA (LBLOCA) requirements to provide a risk-informed alternative maximum break size. In 2012 the staff requested withdrawal of the 10 CFR 50.46a final rule from Commission consideration so that the staff could review the rule and ensure its compatibility with the ongoing regulatory framework activities under Recommendation 1 of the Fukushima Near-Term Task Force (NTTF) report. The Commission approved the staff's request in [SRM-SECY-10-0161](#).

In [SECY-16-0009](#), the NRC staff requested Commission approval to discontinue work on the 10 CFR 50.46a rulemaking. The reasons for the staff's request were that the licensees indicated that the rule, as proposed, would not provide them the benefits that were originally expected, and that the NRC has higher priority work. In [SRM-SECY-16-0009](#), the Commission approved discontinuing the 50.46a ECCS rulemaking. In addition, per Commission directive in SRM-SECY-16-0009, the NRC staff published a Federal Register notice (81 FR 69446) to inform the public that the rule is being discontinued. As a result of these actions, the 50.46a rule has not been issued and work on this effort has been discontinued.

FY 2015

No action in fiscal year (FY) 2015, as this item is on hold.

FY 2016

No activities were performed and the effort has been discontinued per Commission directive in [SRM-SECY-16-0009](#). Federal Register notice (81 FR 69446) published to inform the public that the rule is being discontinued.

Risk-Informed Basis

The proposed rule would have utilized risk insights, such as frequency of occurrence, to redefine the large-break LOCA (LBLOCA) requirements. The proposed rule relied heavily on risk insights to provide a risk-informed transition break size for analysis.

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## **Emergency Core Cooling System (ECCS) Requirements: Loss of Coolant Accident and Loss of Offsite Power (ECCS-LOCA/LOOP)**

Summary Description

The proposed rule would amend the Commission's regulations to eliminate, based upon appropriate risk considerations, the assumption of a coincident LOOP for postulated LBLOCAs

(low frequency) in General Design Criterion (GDC) 35. The proposed rule would provide a voluntary alternative to existing requirements in situations where specified acceptance criteria are satisfied, and also would address a petition for rulemaking submitted by Bob Christie (Performance Technology) (PRM-50-77). The staff's approach was to develop the technical basis for a LOOP-LOCA rule by reviewing the Boiling Water Reactor Owners Group (BWROG) topical report (TR), NEDO-33148, "Separation of Loss of Offsite Power from Large Break LOCA," dated April 27, 2004. In the March 31, 2003, a Staff Requirements Memorandum (SRM) directing the staff to go forward with a risk-informed rule decoupling LOOP from LOCA, the Commission stated that the rule should consider the risk impacts of a "delayed LOOP and possible double-sequencing of safety functions." During the review of the BWROG TR, the potential safety impact of a LOCA followed by a delayed LOOP became a major issue. Existing nuclear plants are designed to handle only the simultaneous LOCA and LOOP. The capability of many plants to successfully mitigate upsets causing a delayed LOOP has not been determined. In December 2007, in [COMSECY-07-0041](#), "Status of Staff Activities on Proposed Rule for Risk-Informed Decoupling of Assumed Loss-of-Offsite Power From Loss-of-Coolant Accident Analyses," the staff indicated its plans to reassess the need for a LOOP-LOCA rule after making final decisions on the BWROG TR and on the 10 CFR 50.46a risk-informed ECCS rule. In an SRM related to [SECY-07-0082](#) dated August 10, 2007, the Commission agreed with the staff's recommendation that completing the rulemaking should be assigned a medium priority. Prior to completing its review of the TR, the staff concluded that the approach could not be approved without evaluating an individual plant's capability to successfully cope with a delayed LOOP. By letter dated June 12, 2008, the BWROG withdrew the TR from further NRC review after concluding that continued development of the report was no longer cost effective, and if ultimately approved in the form desired by NRC staff, adoption by licensees would most likely be prohibitively expensive. In September 2009, [SECY-09-0140](#), "Rulemaking Related to Decoupling an Assumed Loss of Offsite Power from a Loss of Coolant Accident, 10 CFR part 50, Appendix A, General Design Criterion 35," provided options for completing the rulemaking and recommended the option to discontinue the rulemaking effort. The staff's recommendation was based on the lack of a fully developed regulatory basis and expenditures of staff time to develop one would not be expected to result in a quantifiable safety improvement. In the SRM related to [SECY-09-0140](#) dated July 12, 2010, the Commission directed the staff to defer the decision on the rulemaking effort until the 10 CFR 50.46a rule is implemented. In 2012 the staff requested withdrawal of the 10 CFR 50.46a final rule from Commission consideration. The Commission approved the staff's request in [SRM-SECY-10-0161](#). In response to the [SRM-SECY-13-0132](#), "Nuclear Regulatory Commission Staff Recommendation for the Disposition of Recommendation 1 of the Near-Term Task Force Report", the staff requested extension to this and other initiatives, across all NRC program areas, to evaluate the Risk Management Regulatory Framework (RMRF) approach recommended in NUREG-2150 as well as alternative approaches for achieving a risk-informed regulatory framework. The Commission, via [SRM-SECY-15-0168](#), directed the staff to: 1) maintain the existing regulatory framework for the nuclear power reactor safety program area, and 2) refrain from developing an overarching, agency-wide risk management policy statement. The proposed 50.46a rule was not subsequently issued and work on this effort has been discontinued. As a result, the staff has started engaging with the industry to determine the need for and interest in the rulemaking decoupling LOOP assumption from LBLOCA analysis.

FY 2015

No action in FY 2015, as this item is on hold. Additional FY2015 information is [available](#).

FY 2016

In July 2016, the NRC held a [public meeting](#) to provide an opportunity for external stakeholders and the NRC staff to exchange information on the need for a rulemaking action to risk-inform decoupling of assumed LOOP from the LOCA analysis. NRC staff will consider the comments provided during the public meeting and plans to hold additional meetings solicit stakeholder feedback on interest in the rulemaking. Additional FY2016 information is [available](#).

#### Risk-Informed Basis

Risk insights, such as relative likelihood occurrence, are used to determine the categorize break sizes and to decouple the assumption of a coincident LOOP from the analysis of postulated large break sized LOCA (low likelihood of occurrence events). Such breaks must also be mitigated but they may be analyzed with more realistic analytical methods and initial conditions without postulating the loss of offsite power or the worst case single failure.

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### **Risk-Informed In-service Inspection (ISI)**

#### Summary Description

Risk-informed ISI has been utilized by operating reactors. Risk-informed ISI programs focus resources on the most safety-significant systems and components. [RG 1.178](#), "An Approach For Plant-Specific Risk-Informed Decision-making – In-service Inspection of Piping," describes methods acceptable to the NRC staff for integrating insights from probabilistic risk assessment (PRA) techniques with traditional engineering analyses into ISI programs for piping, and addresses risk-informed approaches that are consistent with the basic elements identified in [RG 1.174](#). EPRI published a [topical report on risk-informed ISI procedures](#) that the NRC found acceptable for referencing in licensing applications.

FY 2016

The staff received the first new reactor risk-informed [ISI submittal](#) from VC Summer, Units 2 and 3 on August 12, 2016. A pre-submittal meeting was held on May 26, 2015. [Documents](#) were submitted for this meeting on May 17, 2016.

#### Risk-Informed Basis

Risk-informed ISI programs use risk-significant information to improve the effectiveness of inspection of pipe segments by focusing on the most safety-significant segments.

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## New Light-Water Reactors

### **Standard Review Plan, Chapter 19.0 Severe Accidents (NUREG-0800)**

#### Summary Description

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Chapter 19.0, "Severe Accidents," provides the staff guidance for the review of design certification and combined license application submittals related to PRA and severe accidents. This chapter will be updated to incorporate interim staff guidance, lessons learned from new reactor reviews and insights regarding small modular reactor designs.

#### FY 2015

The revision to Chapter 19, which is expected to be issued in the near future, will incorporate the following:

- a. Guidance previously contained in Interim Staff Guidance DC/COL-ISG-003, "Probabilistic Risk Assessment Information to Support Design Certification and Combined License Applications," concerning the review of PRA information and severe accident assessments submitted to support the DC and COL applications,
- b. Guidance previously contained in Interim Staff Guidance DC/COL-ISG-020, "Seismic Margin Analysis for New Reactors Based on Probabilistic Risk Assessment," concerning the review of information from the PRA-based seismic margin analysis (SMA) submitted in support of the DC and COL applications,
- c. Guidance previously contained in Interim Staff Guidance DI&C/COL-ISG-003, "Interim Staff Guidance on Review of New Reactor Digital Instrumentation and Control Probabilistic Risk Assessments," concerning the review of digital instrumentation and control system PRA models,
- d. Guidance on addressing modular designs if the applicant seeks approval for multiple modules, and
- e. Additional guidance for the review of the PRA information and severe-accident assessments developed during the NRC reviews of DC and COL applications completed after Revision 2 of SRP Section 19.0 was issued.

The next revision of this SRP which is currently under development, will include, as appropriate, DC/COL-ISG-028, "Assessing the Technical Adequacy of the Advanced Light-Water Reactor Probabilistic Risk Assessment for the Design Certification Application and Combined License Application."

#### FY 2016

This activity is complete and the [final Rev. 3 document](#) was published in 12/2015.

#### Risk-Informed Basis

This document provides guidance to the staff in conducting the risk and severe accident reviews of DC and COL applications.

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## Advanced Reactors

### Staff Review of NuScale Licensing Topical Report on Risk Significance Determination

#### Summary Description

In a July 30, 2015, letter, NuScale Power, LLC, submitted licensing topical report (LTR) TR 0515 13952 NP, Revision 0, "[Risk-Significance Determination](#)" to the U.S. Nuclear Regulatory Commission (NRC) staff for review and approval. The staff initiated a review of the LTR in October 2015. The LTR describes the methods NuScale has elected to identify candidate risk-significant structures, systems, and components (SSCs) using probabilistic risk assessment (PRA). This method involves using alternative metrics than those contained in [Regulatory Guide \(RG\) 1.200](#), "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk Informed Activities," for defining the term "significant." In the report, NuScale notes that the metrics for determining risk significance given in RG 1.200 are relative in nature and the specific values were established based on the collective results of PRAs performed for operating reactors in the 1990s and later (i.e., estimates of CDF and large early release frequency (LERF)). Based on design and analysis work performed to date, NuScale believes that, because of the simplicity and extensive use of passive design features in the NuScale design, its PRA will yield risk estimates that are several orders of magnitude lower than those of operating plants. Using the traditional metrics specified in RG 1.200 with a PRA that produces risk estimates several orders of magnitude lower than those of operating plants would likely result in identification of many components as risk significant that are not truly risk significant (i.e., components whose assumed failure would not increase CDF nor LRF significantly.) Such a result is counter to NRC policy (60 FR 42622) on use of PRA to help focus resources on the most truly safety significant issues. Therefore, to reflect reduced risk in its determination of risk significance, NuScale developed and proposed a method for determining risk significance based *absolute* risk metrics.

#### FY 2016

The staff completed its review of the LTR in 2016. On March 1, 2016, the staff discussed the findings from their review with the Advisory Committee on Reactor Safeguards (ACRS) subcommittee on Future Plant Designs. On April 21, 2016, the staff issued a draft safety evaluation of the [LTR](#). The staff discussed its draft safety evaluation report with the full ACRS during the 634th meeting of the ACRS held on May 5-6, 2016. On May 18, 2016, the ACRS issued a [letter](#) to the NRC Executive Director for Operations regarding its review of the LTR and the staff's draft Safety evaluation. The ACRS stated in their letter that: "The approach proposed by NuScale is reasonable provided that the CDF and LRF after completion of a comprehensive probabilistic risk assessment remain consistent with current estimates. However, if the CDF and LRF are found to be significantly higher than currently estimated and used in the topical report,

NuScale and the staff do not have a logical and consistent framework to adjust the quantitative risk significance criteria." The ACRS also included several recommendations pertaining to the general subject of methods for determining risk significance. The staff responded to the ACRS recommendations in a [letter](#) dated July 11, 2016. By [letter](#) dated July 13, 2016, the NRC issued a final safety evaluation report documenting the NRC staff conclusion that the LTR is acceptable for referencing in licensing applications for the NuScale small modular reactor design.

#### Risk-Informed Basis

The purpose of this activity is to assure that NuScale uses a technically acceptable criteria for determining the structures, systems and components in the NuScale design that are risk significant.

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### **Use of Risk Insights to Enhance Technical Reviews of Design Certification (DC) Applications**

#### Summary Description

In support of enhancing the reviews of design certification (DC) applications, the staff develops high-level risk insights based on the DC application information and shares that information with the technical review branches to help risk-inform their decision-making for each application. These risk insights are intended to help focus staff attention on those design features and assumptions that may significantly affect plant risk, and to allow for use of alternative review approaches on less risk-significant design aspects.

#### FY 2015

In 2015, Korea Hydro & Nuclear Power Company (KHNP) submitted its application for the Advanced Power Reactor (APR) 1400 new reactor design. The staff developed a risk insights document to support the staff's risk-informed review of the APR 1400 DC application. In addition, the staff developed a presentation package and conducted a series of briefings with all the technical branches involved with the APR 1400 DC review to communicate its risk insights.

#### FY 2016

The staff continued to use the risk insights document developed in FY2015 to support their ongoing review.

#### Risk-Informed Basis

The purpose of this activity is to integrate risk insights more fully into DC reviews and the formal certification decision-making process.

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## Materials Safety Arena

### Fuel Cycle

#### **Revise the Fuel Cycle Oversight Program (RFCOP)**

##### Summary Description

As directed by the Commission, staff was developing and evaluating approaches to use risk information to determine the significance of inspection findings at fuel cycle facilities.

##### FY 2015

The staff published its Cornerstone Document for public comment on July 11, 2015 (80 FR 33303). The staff [addressed](#) the comments received on the Cornerstone Document in August 2015.

##### FY 2016

This activity has been discontinued per Commission direction in [SRM-SECY-16-0005](#), its response to the staff's [Cornerstone SECY](#).

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## Waste Management Arena

### Spent Fuel Storage and Transportation

#### **Enhance Regulatory Framework for Extended Storage and Transportation**

##### Summary Description

Extended Storage and Transportation (EST) Regulatory Program Review responds to the Commission's direction in [SRM-COMSECY-10-0007](#) 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 of time.

##### FY 2015

The NRC staff identified and addressed potential technical and/or regulatory issues associated with the EST of spent nuclear fuel (SNF). The staff completed its evaluation of the Priority 1 and 2 technical issues identified in its report, "Identification and Prioritization of the Technical Information Needs (TIN) Affecting Potential Regulation of Extended Storage and Transportation of Spent Nuclear Fuel," hereinafter called the [TIN Report](#).

##### FY 2016

As described in [SECY-16-0067](#), this activity has been completed. The staff determined that aging issues will be addressed through the dry cask storage license renewal framework and the EST program can be closed with no adverse impact on safety, security, or environmental protection.

Risk-Informed Basis

Infrastructure development in support of risk-informed regulations.

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Cross-Cutting Activities

### **Risk Management Regulatory Framework (RMRF)**

Summary Description

[NUREG-2150](#), "A Proposed Risk Management Regulatory Framework," (RMRF) recommended that a risk management regulatory framework applicable to all NRC program areas be adopted by the NRC. The Chairman's [tasking memorandum](#) dated June 12, 2012, directed the staff to "Review NUREG-2150 and identify options and make recommendations, including the potential development of a Commission policy statement." The [Commission's SRM](#) dated May 19, 2014 on [SECY-13-0132](#) directed that the staff's paper providing recommendations with respect to NUREG-2150 also include "a description of any interrelationships of ongoing risk-informed initiatives to ensure the activities are well coordinated, and effectively planned and implemented."

FY 2015

The NRC staff requested public comments on draft white papers addressing RMRF issues on November 25, 2013 (78 FR 70354) and May 12, 2015 (80 FR 27191). The staff held public meetings on [June 5, 2013](#), [January 30, 2014](#), [May 27, 2015](#), and [July 29, 2015](#). The staff also met with the Reliability and Probabilistic Risk Assessment subcommittee of the ACRS on September 4, 2013, and February 20, and June 8, 2015. The staff will meet with the ACRS full committee in early November 2015 and the staff will update the Commission in a SECY paper in December 2015.

FY 2016

The staff submitted [SECY-15-0168](#) in December 2015 to seek Commission direction on RMRF related issues. In response to the SECY, the Commission, via a [SRM-SECY-15-0168](#), approved the staff's recommendations to: 1) maintain the existing regulatory framework for the nuclear power reactor safety program area, and 2) refrain from developing an overarching, agency-wide risk management policy statement. Additionally, the Commission also agreed with the staff's conclusions that a formal design-basis extension category of requirements should not be established, and a formal agency-wide definition and criteria for determining the adequacy of

defense in depth should not be developed. Based on the Commission's directive in the SRM no further work is expected to be performed on the RMRF.

### Risk-Informed Basis

The Task Force was chartered "to develop a strategic vision and options for adopting a more comprehensive and holistic risk-informed, performance-based regulatory approach for reactors, materials, waste, fuel cycle, and transportation that would continue to ensure the safe and secure use of nuclear material." The resulting framework included the following objective: "Manage the risks from the use of byproduct, source and special nuclear material through appropriate performance-based regulatory controls and oversight" and a corresponding "Risk Management Goal."