Risk Informed Activities
Completed - Not Active - Replaced with Existing Website
(FY 2023 Update)

The following risk-informed activity text was removed from the public website:

Operating Reactors Sub-Arena, Risk-Website refers to existing website
Risk-Informed Reviews of Instrumentation and Control (I&C) Systems and Components: Integrating Risk Insights into the Digital I&C Regulatory Framework

Operating Reactors Sub-Arena, Risk-Website refers to existing website
Risk-Informed Adversary Timeline Calculations

Operating Reactors Sub-Arena, Risk-Website refers to existing website
Ensure Force-on-Force (FoF) Scenarios Are Realistic and Reasonable

Fuel Cycle Sub-Arena
ANS Standard 57.11, "Integrated Safety Assessments for Fuel Cycle Facilities"

Fuel Cycle Sub-Arena
Rulemaking for Reprocessing Facilities

Cross Cutting Sub-Arena
Consolidated Decommissioning Guidance (NUREG-1757)

Spent Fuel Storage and Transportation Sub-Arena
Methodology for Defining Authorized Shielding-Related Specifications of Spent Fuel Storage System Contents

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Operating Reactors Sub-Arena, Risk-Website refers to existing website

Risk-Informed Reviews of Instrumentation and Control (I&C) Systems and Components: Integrating Risk Insights into the Digital I&C Regulatory Framework

Summary Description

The objective of this research is to provide support in developing the technical basis for integrating risk insights into the regulatory framework for DI&C systems and components by: (1) assessing the technical feasibility of risk-informed approaches and gaps associated with further integrating risk

insights into regulatory reviews for DI&C systems, and (2) develop recommendations to enhance the use of risk insights within the existing risk-informed regulatory framework for DI&C systems.

Previous Fiscal Years

FY 2020

A technical letter report detailing the results of the technical feasibility of risk-informed approaches and gaps assessment is being finalized and is expected to be made available in late 2020.

FY 2021

The objective of this research was to provide support in developing the technical basis for integrating risk insights into the regulatory framework for DI&C systems and components by: (1) assessing the technical feasibility of risk-informed approaches and gaps associated with further integrating risk insights into regulatory reviews for DI&C systems, and (2) develop recommendations to enhance the use of risk insights within the existing risk-informed regulatory framework for DI&C systems. A report titled “Assessment of Technical Feasibility of Risk-Informed Approaches and Gaps Associated with Further Integrating Risk Insights into Regulatory Reviews for Digital I&C Systems and Components” was produced. The report can be found in ADAMS (Accession No.: ML20296A259).

FY 2022

No update

Operating Reactors Sub-Arena, Risk-Website refers to existing website

Risk-Informed Adversary Timeline Calculations

Summary Description

See FY 2019.

Previous Fiscal Years

FY 2019

The NRC staff began the development of a more risk-informed process to increase attack timeline realism by incorporating delays based on active and passive features of a physical protection program. This is anticipated to be accomplished through review and approval of an industry proposal, which is expected to be received in Q3 of FY 2020.

FY 2020

The NRC staff began the development of a more risk-informed process to increase attack timeline realism by incorporating delays based on active and passive features of a physical protection program. This is anticipated to be accomplished through review and approval of an industry proposal, which is expected to be received in Q1/Q2 of FY 2021.

FY 2021

An industry proposal was submitted on July 9, 2021. The NRC staff conducted an initial review and Identified the methodology used to incorporate passive physical protection program features had value; however, the methodology used to calculate the impact of active delay features associated with security force response needs to be substantiated with a technical justification. Staff plans to continue to engage industry representatives in Q1 FY 2022 on the next steps.

FY 2022

Industry representatives submitted a revised process to the NRC in Q1 FY2022. Following staff review and discussions, NRC staff noted that the proposed process did not require NRC staff endorsement. Based on that conclusion, industry representatives withdrew the request for NRC review and conducted training sessions with industry representatives to encourage standardized implementation of the timeline determination process.

FY 2023

No Update. This item is complete.

Operating Reactors Sub-Arena, Risk-Website refers to existing website

Technical Assistance for Integration of Risk-Informed Performance Based Approach to Seismic Safety of Nuclear Facilities

Summary Description

The objective of this research is to develop a Risk-Informed Performance Based approach to seismic evaluation consisted with the proposed approach in the Licensing Modernization Project (LMP). This approach has been documented in the draft report, "A Proposed Alternative Risk-Informed and Performance-Based Regulatory Framework for Seismic Safety at NRC Regulated Facilities" (ML20106F035), and was presented to industry and stakeholders in the workshop, "Enhancing Risk-Informed and Performance-Based Seismic Safety for Advanced Non-Light Water Reactors," which was held virtually on September 2-3, 2020.

Previous Fiscal Years

FY 2020

The final version of the report, "A Proposed Alternative Risk-Informed and Performance-Based Regulatory Framework for Seismic Safety at NRC Regulated Facilities," will be completed and is expected to be published by the end of CY2020.

FY 2021

This activity is completed as described in “Feasibility Study on a Potential “Consequence-Based Seismic Design Approach for Nuclear Facilities”, ML21113A066.

Operating Reactors Sub-Arena, Risk-Website refers to existing website

Ensure Force-on-Force (FoF) Scenarios Are Realistic and Reasonable

Summary Description

The NRC staff adjusted internal office processes to incorporate threat assessment information into the exercise scenario development process. This includes: increasing management attention to the exercise scenarios; increasing the use of intelligence analysis to benchmark tactics used by the mock adversary force; and inventorying tactics, techniques and procedures used during previous FOF exercises, categorizing based on complexity for use as a management tool during the scenario evaluation process.

Previous Fiscal Years

FY 2018

In FY2019, the staff intends to take a number of initiatives on this topic. As directed in SRM-SECY-17-0100, the staff will develop and implement a revised Force-on-Force inspection process, using risk-informed insights during the evaluation of internal and external stakeholder recommendations for proposed improvements. In the process, the staff will evaluate alternatives for the FoF program mock adversary force. Finally, the staff anticipates endorsing an industry-initiated FoF exercise controller guidance document.

FY 2019

NSIR staff submitted COMSECY-19-0006, which presented options for the implementation of a revised Force-on-Force inspection process, using risk-informed insights based on the evaluation of internal and external stakeholder recommendations for proposed improvements.

In addition, in FY 2019, NSIR staff began the development of a scoring system to be used in the development of FoF exercise scenarios. The system will ensure the appropriate level of insider knowledge is used during scenario development and that scenarios realistically consider the threat environment. This scoring system will include a benchmarking with U.S. Department of Energy (DOE) staff to incorporate lessons learned and best practices from DOE's use of a scoring system. The staff intends to begin using the scoring system in Q2 of FY 2020.

FY 2020

The NRC staff is adjusting its internal office processes to incorporate threat assessment information into the exercise scenario development process. This includes: increasing management attention to the exercise scenarios; increasing the use of intelligence analysis to benchmark tactics used by the mock adversary force; developing a scoring system, which considers the level of insider knowledge applied, to help ensure that exercises scenarios are consistently reasonable and realistically consider the threat environment; and inventorying tactics, techniques and procedures used during

previous FOF exercises, categorizing based on complexity for use as a management tool during the scenario evaluation process.

FY 2021

The NRC staff initiated a pilot program for a scoring system for the related to exercise scenarios to determine credibility and applicability across the industry. The staff plans to make adjustments as necessary in its development to normalize the scoring, given the site-specific capabilities of the licensees.

FY 2022

The NRC staff completed a pilot program and assessment of a scoring system related to exercise scenarios to determine credibility and applicability across the industry. The staff made adjustments as necessary in its development to normalize the scoring, given the site-specific capabilities of the licensees. Conclusions and recommendations from the previous pilot, and assessments, are currently being evaluated.

FY 2023

The NRC staff completed an evaluation of a revised scoring system used in scenario development. The data points that were evaluated contained elements that were consistent across the scenarios developed for exercises. Staff concluded that no further action with the scoring system was required and accordingly, sunsetted the program.

Fuel Cycle Sub-Arena, Risk-Website refers to existing website

ANS Standard 57.11, "Integrated Safety Assessments for Fuel Cycle Facilities"

Summary Description

In SECY-12-0091, "Completeness and Quality of Integrated Safety Analyses," the staff recommended to the Commission that the staff request the American Nuclear Society (ANS) to develop an integrated safety analysis (ISA) standard. This standard would provide guidance on performing a complete, high-quality ISA. In addition to approving the staff's recommendation, the Commission instructed the staff to abstain from revising NUREG-1520, "Standard Review Plan for Fuel Cycle Facilities License Applications," in the areas related to the ISA standard until the standard's issuance. These areas include elements of risk analysis such as common cause failure, human error, and accident sequence screening.

In 2013, the ANS established a working group under the Nonreactor Nuclear Facilities Committee (NRNF) for proposed standard 57.11, "Integrated Safety Assessments for Fuel Cycle Facilities." The working group consists of representatives from the industry, Department of Energy (DOE), and the Nuclear Regulatory Commission (NRC). The staff actively participated in the initial drafts of the

standard until 2015 when the staff reduced its participation in standards development as part of Project AIM.

The issuance of the standard is a high priority activity based on the tasks included in the Westinghouse Lessons Learned Action Plan. Specifically, the action plan included a high-priority task to evaluate the license review process. The staff recommended revising NUREG-1520 to address the risk-related findings of the Westinghouse Lessons Learned Report. The staff elevated the priority of issuing the ISA standard because of the standard's influence on the staff's ability to revise NUREG-1520.

Previous Fiscal Years

FY 2017

The staff engaged the NRNF Committee Chair and ANS 57.11 Working Group Chair to move forward on the standard.

- The ANS 57.11 Working Group Chair submitted a revised draft to the working group for review and comment.
- The staff provided its comments, primarily recommending that the working group restructure the standard to provide a more systematic framework for the technical elements and supporting requirements needed to achieve a robust ISA.

FY 2018

The staff continues to participate in activities to facilitate the issuance of the standard.

- The staff participated in a working group meeting to restructure and revise the draft standard.
- The Working Group Chair submitted the revised version to the entire working group with the goal of presenting it to the NRNF Committee at the November 2018 ANS meeting.

FY 2019

This potential ANS Standard provides guidance for performing integrated safety analyses (ISAs), which are used to demonstrate the hazards associated with special nuclear material processing (to public and workers) do not exceed the risk-informed performance requirements of 10 CFR 70, Subpart H.

The staff continues to participate in activities to facilitate the completion and issuance of the standard so that the NRC can endorse the standard with appropriate qualifications and clarifications. The working group's resolution of the comments received from the NRNF Committee is expected to be completed by the end of the 2019 calendar year; with resubmission to the NRNF Committee in early 2020.

FY 2020

This potential ANS Standard provides guidance for performing integrated safety analyses (ISAs), which are used to demonstrate the hazards associated with special nuclear material processing (to public and workers) meet the risk-informed performance requirements of 10 CFR 70, Subpart H.

The staff continues to participate in activities to facilitate the completion and issuance of the standard so that the NRC can endorse the standard with appropriate qualifications and clarifications. The working group (previously led by a DOE representative) is pursuing the identification of an individual to lead the effort to completion, which will involve the final resolution of outstanding comments received from the ANS Non-Reactor Nuclear Facility Committee (NRNFC) followed by resubmission to the NRNFC. Recognizing the potential for continued delays in issuance, especially if a new lead is not identified, the staff has developed alternative approaches to move forward in enhancing staff review guidance in this area.

FY 2021

The staff continues to participate in activities to facilitate the completion and issuance of the standard. After issuance, the NRC can endorse the standard with appropriate qualifications and clarifications. The ANS 57.11 working group has selected a new chairperson who is actively seeking to resolve outstanding comments received from the ANS Non-Reactor Nuclear Facility Committee (NRNFC). However, because there is still the potential for continued delays in issuance, if necessary, the staff is prepared to move forward with alternative approaches to enhancing staff review guidance.

FY 2022

No Update

FY 2023

The staff is no longer working on this standard.

TOP | RETURN TO LIST

Fuel Cycle Sub-Arena, Risk-Website refers to existing website

Rulemaking for Reprocessing Facilities

Summary Description

In SRM-SECY-13-0093, the Commission approved development of a reprocessing-specific rule in a new 10 CFR Part 7X. In the SRM the Commission also directed that the continued development of the regulatory framework for reprocessing be limited in scope, for the time being, to the resolution of "Safety and Risk Assessment Methodologies and Considerations for a Reprocessing Facility."

The purpose of this activity is to develop the foundation for the potential regulatory framework for reprocessing to enable a risk-informed licensing and oversight process by:

- Evaluating methods for hazards and risk evaluations that can be implemented for aqueous and electrochemical reprocessing facilities;
- Identifying performance requirements for a risk-informed regulatory framework; and

- Obtaining peer review and public comments on the safety and risk assessment methodologies.

Previous Fiscal Years

FY 2015

Process flow diagrams and facility descriptions were developed for a conceptual aqueous reprocessing facility, with associated event and fault trees for a hypothetical red-oil explosion. Preliminary best-estimate source term analyses were calculated and indicated a potential dose reduction of orders of magnitude, compared to the existing conservative approaches.

FY 2016

Mindful of limiting the scope of work as directed in SRM-SECY-13-0093, event and fault trees were developed for a hypothetical loss of cooling (LOC) accident to a concentrated high level waste storage tank. Preliminary quantification of the accident sequence was carried out using generic failure and probability data. Items Relied On For Safety (IROFS) were identified for both the hypothetical red-oil explosion and LOC accident sequences.

FY 2017

Work on the fuel reprocessing regulatory framework related to assessing the application of quantitative risk analysis (identified as Gap 5 in SECY-13-0093) was delayed during FY 2017 because of other higher priority activities.

FY 2018

Work on the fuel reprocessing regulatory framework continued to be delayed during FY 2018 because of other higher priority activities. In FY 2019, the staff plans to seek stakeholder input on continuing or discontinuing the effort on developing the regulatory framework and development of a reprocessing-specific rule. Specific details on current rulemaking activities are provided in the NRC's centralized rulemaking tracking and reporting system at NRC Rules and Petitions.

FY 2019

Work on the fuel reprocessing regulatory framework continued to be delayed during FY 2019 because of other higher priority activities. A decision on continuing or discontinuing this activity is expected in FY 2020 based on commercial interest and cost associated with any proposed action. Specific details on current rulemaking activities are provided in the NRC's centralized rulemaking tracking and reporting system at NRC Rules and Petitions.

FY 2020

Work on the fuel reprocessing regulatory framework continued to be on hold during FY 2020. On March 4, 2020, the NRC staff held a Category 3 public meeting, to discuss the status of the spent fuel reprocessing rulemaking, which focuses on spent fuel from light water reactors. The purpose of the meeting was to provide stakeholders an opportunity to provide their opinion on the need for the rulemaking, and to seek information from industry regarding interest in constructing, operating and licensing a spent fuel reprocessing facility (ADAMS Accession No. ML20077K144). A decision on continuing or discontinuing this activity is expected in FY 2021, taking into consideration of

stakeholder feedback obtained during the March 4th public meeting, commercial interest in reprocessing activities, and cost associated with any proposed action. Specific details on current rulemaking activities are provided in the NRC's centralized rulemaking tracking and reporting system at NRC Rules and Petitions.

FY 2021

The rulemaking was discontinued due to limited interest expressed or expected from industry to submit an application for any type of facility involving reprocessing technologies in the near-term. Considering the cost to complete the rulemaking, the NRC concluded that it was not warranted. Federal Register Notice 86 FR 40764 (July 29, 2021).

FY 2022

Discontinued

Byproduct Materials Sub-Arena, Risk-Website refers to existing website

Inspection Manual Chapter 2800, "Materials Inspection Program"

Summary Description

The completed revision to IMC 2800 in FY 2017 allowed the addition of more flexible and logical extensions to the time between inspections, i.e., inspection intervals for material licensees. This revision included: (1) increasing the current 25 percent buffer to 50 percent for inspection timeliness; (2) extending the initial inspection period if licensees are not in possession of material; and (3) allowing extensions of inspection intervals based on good performance on a case-by-case basis.

Previous Fiscal Years

FY 2016

The staff started efforts to review and update IMC 2800 per Commission direction in SRM-SECY-16-009.

FY 2017

On September 19, 2017, the revised IMC 2800 was issued.

FY 2018

In FY2018, staff restarted efforts to assess and potentially adjust inspection frequencies for many types of material licenses based on historical risk-informed information, enforcement data, and inspection staff expertise. The flexibility and logical extensions to the inspection intervals of material

licenses is not expected to have an adverse impact on the health and safety of the public, and the NRC's ability to plan and conduct inspection activities will continue to be consistent with the NRC's mission, values, and the principles of good regulation including a risk-informed and performance-based oversight process.

FY 2019

Materials inspections continue to be risk-informed. Staff has drafted a complete revision to IMC 2800 to further risk-inform overall inspection guidance using material risk insights and previous inspection performance data. The staff is working on additional changes to several other materials IMCs and Inspection Procedures to further risk-inform and modernize the materials inspection program.

FY 2020

On March 2, 2020, staff issued a major revision to Inspection Manual Chapter (IMC) 2800, "Materials Inspection Program" (ADAMS Accession No. ML20062A002). This revision enhanced coordination and communication among the NRC regional offices and the regional offices and the Agreement States, revised the documentation of materials inspections, allowed flexibility for in-office reviews, and incorporated reciprocity inspection information from IMC 1220. These changes further risk-informed the materials inspection program. Also, in FY2020, staff started revising other inspection manual chapters and procedures to implement modern risk-informed approaches to the materials inspection program. These changes will enhance the inspection program and incorporate new risk and performance insights into the program. Additionally, staff are incorporating strategies to address low safety-significant issues in the materials inspection program, processes, and procedures and potentially adjusting inspection frequencies for several types of materials licensees (see associated cross-cutting topic "Consideration of Safety Significance in Addressing NMSS Licensing Basis and Potential Violation Questions").

FY 2021

Staff is currently updating implementing inspection procedures to further risk inform the inspection guidance provided for nuclear materials inspections

FY 2022

To further risk-inform nuclear materials inspection guidance, staff revised 10 inspection procedures in FY 2022. The revised procedures incorporate distinct risk modules specific to the modality being inspected. These inspection procedures used to have the same common focus elements regardless of the material use and modality. While those focus elements still represent important radiation protection and safety elements, the staff recognized that the risk profile for each modality could be different and therefore deserved the development of distinct risk modules per procedure. As part of incorporating more risk insights into our oversight program, staff divided the inspection guidance among risk modules, which focus the inspector’s attention to the areas of a licensee’s safety program that have the greatest potential to impact public health and safety and security. The risk modules that carry the highest risk components should always be reviewed in an inspection. Additional inspection elements that carry less risk can be found as an Appendix to these inspection procedures. These additional elements are not required to be reviewed every time as part of a risk-informed inspection approach but may be reviewed if the additional elements are related to safety issues identified in the risk-modules, or if multiple violations were identified through review of the applicable risk-modules.

Cross Cutting

Consolidated Decommissioning Guidance (NUREG-1757)

FY 2021

This guidance is being revised to enhance the risk informed, performance- based approach to the demonstration of compliance. The staff completed the development of responses to public comments. In addition, the staff updated the models and codes used for risk and dose assessment reviews in support of the risk-informed approach. The final NUREG-1757, Volume 2, Revision 2 is expected to be issued in the summer 2022 timeframe.

FY 2022

No update.

FY 2023

The final guidance has been issued. Interim supplemental staff guidance on decommissioning has recently been issued that is supplemental to NUREG 1757. For more information, please see Decommissioning webpage.

Spent Fuel Storage and Transportation Sub-Arena, Risk-website reviews to existing website

Methodology for Defining Authorized Shielding-Related Specifications of Spent Fuel Storage System Contents

Summary Description
Holders of, and applicants for, certificates of compliance for spent fuel dry storage systems must provide the specifications of the spent fuel to be stored in their storage systems' designs per 10 CFR 72.236(a). Those specifications that are significant are included in the contents specifications in the conditions and technical specifications (TS) of the designs' certificates of compliance (CoC). For the systems' shielding and radiation protection design, these specifications include the maximum burnup, minimum enrichment, and minimum cooling time, among others. The shielding and radiation protection analyses use demonstrate that the systems' shielding design is sufficient to meet the requirements in 10 CFR 72.104 and 10 CFR 72.106 per 10 CFR 72.236(d). With the increasing complexities of the contents specifications proposed as authorized system contents, the CoC's TS describing the authorized contents have become voluminous, with many pages dedicated to defining

the authorized combinations of maximum burnup, minimum cooling time, and minimum enrichment. Review of applications with such numerous contents specifications has also become burdensome.

Thus, the goal of this activity is to provide a means for defining authorized storage system contents by a method of evaluation (MOE) for identifying spent fuel contents as authorized for storage in the storage system. A storage system CoC that uses an appropriately defined MOE for determining authorized contents and which general licensees using the system must follow, could then meet 10 CFR 72.236(a) through incorporation of the MOE in lieu of providing detailed and numerous values for the contents specifications in the CoC and TS. The shielding and radiation protection analyses for the storage system, in its safety analysis report, could then use a radiation source term(s) that is representative of the authorized contents that the MOE would define, to show compliance with 10 CFR 72.236(d).

Previous Fiscal Years

FY 2020

The staff explored an MOE approach for spent fuel dry storage system shielding design certification applications under 10 CFR Part 72. This approach was a new concept in FY 2020 to enhance risk-informed review approaches using an MOE to define authorized contents, for shielding purposes, for spent fuel dry storage systems. During FY 2020, the staff conducted public meetings with NEI where this new approach was discussed. The MOE approach seeks to meet the spent fuel specification requirements in 10 CFR 72.236(a) and the shielding performance goals as specified in 10 CFR 72.236(d) using an approved methodology rather than an explicit definition of the contents of the storage system.

FY 2021

In public interactions in late FY 2020, a storage system CoC holder was identified to prepare and submit a topical report to pilot development and review of an MOE for defining authorized spent fuel contents. An initial topical report was submitted in early FY 2021. Based on staff review of the initial report and interactions between the staff and the CoC holder, the CoC holder revised the topical report and submitted it for review in mid FY 2021. The staff is in process of review, having accepted the topical for review after an acceptance review. The staff plans to complete its review in FY 2022, issuing any needed requests for additional information and engaging in any needed public interactions with the CoC holder. The staff will issue a safety evaluation report upon conclusion of the review.

FY 2022

The staff is in process of reviewing the topical report and will issue any needed requests for additional information and engage in any needed public interactions with the design’s certificates of compliance holder.

FY 2023

This task has been completed.

Thermal Evaluation Model Topical Report

Summary Description

Capitalizing on the Division of Fuel Management's efforts to enhance the spent fuel storage licensing process over the last several years, on November 8, 2019, NEI submitted a white paper containing sixteen recommendations to explore further enhancements related to dry storage performance safety margin. The goal of the white paper is to leverage industry experience with loading and maintenance of dry cask spent nuclear fuel storage systems to identify improvements to the regulatory framework for licensing these systems. The staff has held eight workshops during this fiscal year to align on the recommendations, develop implementations plans, and status implementation efforts. In general, the white paper, and more importantly, the staff's leadership on this initiative align well with the agency's direction to become a modern risk-informed regulator, especially as the staff develops plans to further risk-inform its approach to spent fuel storage licensing. The staff has made great progress in implementing changes that address several of the of the sixteen recommendations in the white paper.

In addition to the method of evaluation (MOE) topical report, other initiatives related to the overall effort identified in this website include: Regulatory Framework for Spent Fuel Storage and Transportation and the Risk Tool for Spent Fuel Dry Cask Storage.

Previous Fiscal Years

FY 2020

In FY 2020, the staff has been reviewing the Holtec Thermal Evaluation Topical Report (TR). This review implements an approach that reduces numerous reviews of analysis calculations by the staff during licensing actions and, instead includes a generic approval (topical report, Quality Model) for the bulk of the steps required to complete numerical modeling calculations. The process of implementing the TR in our reviews will incorporate all regulatory tools at our disposal and will achieve efficiencies in licensing reviews that have incorporated risk insights.

FY 2021

On September 14, 2021, staff issued a final safety evaluation report for the first topical report related to Holtec's spent fuel storage systems. The topical report involves a generic and risk-informed approach on heat load zone configurations. This approach, when adopted for a given Holtec design, will reduce the number of future license amendments. (ADAMS Accession No. ML21125A186).

FY 2022

Completed