

## **Proposed Resolution Plan for Tier 3 Recommendation 2.2**

### **Periodic Reconfirmation of External Hazards**

#### **Background**

As described in SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated December 23, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11186A950), the U.S. Nuclear Regulatory Commission's (NRC's) Near-Term Task Force (NTTF) Recommendation 2.2 suggested that the NRC should initiate a rulemaking to require licensees to confirm seismic and flooding hazards every 10 years and address any new and significant information including, if necessary, updating the design basis for structures, systems, and components important to safety to protect against the updated hazards. In their evaluation supporting this recommendation, the NTTF stated: "As seismic knowledge continues to increase, new seismic hazard data and models will be produced... Similar to seismic hazards, new flooding hazard data and models will be produced from time to time. Thus, there would be a continuing benefit to having operating reactors reevaluate the implications of updated flooding [and seismic] hazards at appropriate intervals." This recommendation stems from recognition that as the state of knowledge with regard to external hazards evolves, there is benefit in incorporating this new information into the models used to assess these hazards and evaluating whether there are any changes significant enough to warrant additional regulatory action. In SECY-11-0137, "Prioritization of Recommended Actions to Be Taken in Response to Fukushima Lessons Learned," dated October 5, 2011 (ADAMS Accession No. ML11272A111), the staff prioritized Recommendation 2.2 as a Tier 3 item because it is associated with Recommendation 2.1, a Tier 1 item requiring licensees to reevaluate the flooding and seismic hazards at their sites using present-day methodologies and guidance. In the staff requirements memorandum for SECY-11-0137, dated December 15, 2011 (ADAMS Accession No. ML113490055), the Commission agreed with the Tier 3 prioritization of Recommendation 2.2.

The initial program plan for this recommendation was detailed in SECY-12-0095, "Tier 3 Program Plans and 6-Month Status Update in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami," dated July 13, 2012, Enclosure 3, "Program Plans for Tier 3 Recommendations" (ADAMS Accession No. ML12208A210). The original program plan defined the initial pre-rulemaking activities necessary to position the agency for a future rulemaking to implement NTTF Recommendation 2.2. In the initial program plan, the staff indicated that as it gains experience from the implementation of Recommendation 2.1 and knowledge from the pre-rulemaking activities, it would develop a complete rulemaking plan for Recommendation 2.2.

Section 402 of Division B of the Consolidated Appropriations Act, 2012 (Public Law (Pub. L.) 112-74, signed into law on December 23, 2011), requires the NRC to have licensees reevaluate external hazards against applicable NRC requirements and guidance. More specifically, this section provides:

The Nuclear Regulatory Commission shall require reactor licensees to re-evaluate the seismic, tsunami, flooding, and other external hazards at their sites against current applicable Commission requirements and guidance for such

licensees as expeditiously as possible, and thereafter when appropriate, as determined by the Commission, and require each licensee to respond to the Commission that the design basis for each reactor meets the requirements of its license, current applicable Commission requirements and guidance for such license. Based upon the evaluations conducted pursuant to this section and other information it deems relevant, the Commission shall require licensees to update the design basis for each reactor, if necessary.

In SECY-12-0095, the staff discussed that this language indicates that other external hazards, such as those caused by meteorological effects, should be included in the periodic updates that would be required once Recommendation 2.2 is implemented.

### **Current Status**

The NRC staff has made significant progress on the Tier 1 seismic and flooding reevaluations. These reviews have provided the staff with important insight on the need for a rule to require licensees to periodically confirm their external hazards. It is the staff's view that the NRC's current regulatory framework is sufficient to effectively consider the implications of new external hazard information on plant safety. While the staff's assessment did not identify the need for a new rule, the staff has determined that enhancing its current processes would improve the staff's efficiency in identifying and assessing new information related to external hazards. These enhancements would allow the staff to be more proactive in identifying potentially meaningful changes in our understanding of how external hazards affect plant safety and to be more efficient in identifying any necessary changes. The remainder of this section summarizes how external hazards are assessed under the current NRC regulatory framework to provide context for the staff's proposed plan to resolve Recommendation 2.2.

The NRC has long recognized the importance of protection of NRC-licensed facilities from natural phenomena as a means to prevent core damage and to ensure containment and spent fuel pool integrity. Several requirements were established addressing natural phenomena in 1971 with General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena," of Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." GDC 2 requires, in part, that structures, systems, and components (SSCs) important to safety be designed to withstand the effects of natural phenomena such as earthquakes, floods, tsunamis, and seiches, without loss of capability to perform their safety functions. GDC 2 also requires that design bases for these SSCs reflect (1) appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding region, with sufficient margin for the limited accuracy and quantity of the historical data and the period of time in which the data have been accumulated; (2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena; and (3) the importance of the safety functions to be performed. Through its initial licensing process, the NRC's regulatory structure ensures that plants are thoroughly and comprehensively reviewed prior to allowing operation to begin.

Following initial licensing, the NRC has historically evaluated external hazard information as it has been identified and taken actions to update guidance or to impose regulations, as needed, consistent with the regulatory processes in 10 CFR 50.54(f) and 10 CFR 50.109. Further, the

NRC monitors plant performance and operating experience on a daily basis through its oversight program, and this program provides a mechanism for NRC to identify new information and refer it to the appropriate regulatory process for consideration. There are a variety of ways that the NRC maintains cognizance of developments in the area of natural hazards. For example:

- Operating experience: There have been a number of natural events that have affected nuclear sites around the world. These events include tsunamis, flooding, high winds, and seismic events. In some cases, a plant's design basis was exceeded during these events. The NRC and industry routinely conduct investigations to identify the lessons learned from these events. In addition to the Fukushima event, recent examples have included the 2004 Sumatran tsunami; ground motions experienced at Japan's Kashiwazaki-Kariwa site during a large earthquake in 2007; the 2011 Mineral, Virginia earthquake; and recent flooding at Fort Calhoun.
- Research: The NRC and industry (through the Electric Power Research Institute) have worked cooperatively on projects to assess the impact on plant safety of the latest understanding of certain natural phenomenon hazards, analytical advances, and evaluation tools. In addition, joint projects with other U.S. Federal Agencies, such as the Department of Energy (DOE), United States Geological Survey, and the National Oceanic and Atmospheric Administration, have enabled the NRC to monitor and cooperatively assess new information.

The evaluations completed in response to information obtained from these sources has led to new requirements, updated regulatory guidance, generic communications, and plant-specific actions to address identified issues.

NRC's regulatory framework provides for licensee review of new hazard information and, as necessary, consideration and resolution of new information in a variety of ways, including the following:

- Formal corrective action programs under 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action"
- Operability determinations as described in NRC Regulatory Issue Summary 2005-20, "Revision to NRC Inspection Manual Part 9900 Technical Guidance, 'Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety,'" Revision 1, dated April 16, 2008
- 10 CFR 50.59, "Changes, Tests and Experiments"
- 10 CFR 50.9(b), "Completeness and Accuracy of Information"
- RG 1.33, "Quality Assurance Program Requirements (Operation)," Revision 2, issued February 1978 (ADAMS Accession No. ML003739995)
- RG 1.181, "Content of the Updated Final Safety Analysis Report in Accordance with 10 CFR 50.71(e)," issued September 1999 (ADAMS Accession No. ML14346A207).

A number of studies conducted after the Fukushima accident included recommendations that further emphasize the importance of assessing new information. For example, Finding 3.1 of the National Academies of Science report, "Lessons Learned from the Fukushima Nuclear Accident for Improving Safety of U.S. Nuclear Plants," states: "The overarching lesson learned

from the Fukushima Dai-ichi accident is that nuclear plant licensees and their regulators must actively seek out and act on new information about hazards that have the potential to affect the safety of nuclear plants.”

## **Discussion**

As discussed above, the NRC and its licensees continually evaluate new information as it becomes available to assess its potential impact on risk and overall plant safety. However, while the staff finds that current practices are generally effective, the staff has identified ways to enhance existing processes to facilitate a more proactive and systematic assessment of new information related to external hazards, consistent with the recommendations of the NNTF and the National Academies of Science.

The NRC’s current practice generally involves initiating a hazard reassessment either after the occurrence of a major event that challenges a plant’s design basis or after receipt of information determined to have the potential to significantly impact plant safety. The staff’s suggested approach takes into account the strengths of the current NRC processes and strives to achieve additional efficiencies through implementing an approach that the staff believes will result in a more predictable, proactive, and stable process that will not place unnecessary burden on NRC licensees and will lead to greater efficiency and effectiveness in the current process for identifying and evaluating new information.

The NRC staff has examined possible alternatives for adopting the approach described above, including the use of rulemaking and the enhancement of current internal programs. As discussed below, as part of its assessment, the staff has concluded that rulemaking is not necessary to address the intent of this recommendation. Instead, the staff has found that enhancing current processes to more proactively identify and more efficiently review information related to natural hazards is the preferred alternative.

### *Need for Rulemaking to Address Recommendation 2.2*

The original intent of NNTF Recommendation 2.2 was to initiate a rulemaking to require licensees to confirm seismic and flooding hazards every 10 years and address any new and significant information. As previously described, this confirmation would also include other natural hazards.

Under the initial project plan for Recommendation 2.2, rulemaking would depend on insights gained from the ongoing seismic and flooding reevaluations. The NRC had planned to start the rulemaking process when sufficient insights were gained from the seismic and flooding reevaluations. However, no significant work has been initiated on that rulemaking to date.

The current regulatory framework is described above. As discussed above, if a new natural external hazard or a significant change is discovered which may impact the previously determined design basis hazard analysis, the NRC has existing regulatory processes to ensure licensees address the new information that could affect the plant. These existing processes provide reasonable assurance that any new hazard information that is discovered will be properly evaluated. However, these processes do not involve proactively seeking out new information and have not always resulted in efficient, predictable, and transparent resolution of new information related to external hazards.

Given these considerations, the NRC staff believes that any changes that would be made through a proposed rulemaking for Recommendation 2.2 are not necessary to address the intent of this recommendation. Rather, the staff believes that Recommendation 2.2 could be addressed more effectively and effectively through enhancements to current practices, as described below.

#### *Staff's Proposed Approach – Enhancement of Current Internal Programs*

As discussed above, current NRC processes assess information when it is identified, but there is no existing NRC process that actively seeks to determine if there is new hazard information available. As such, there is a potential for delays in the identification of new information. Moreover, when new information is identified, there is the potential that the information could be evaluated in isolation, rather than through a methodical evaluation of the cumulative effect of new data, models, and methods that accrue over time. In addition, because existing hazard models are not routinely updated with new information, additional resources and time are required to update those methods and models when new information is identified. This may lead to challenges with regulatory predictability and efficiency, particularly if there is a need to evaluate new information quickly following a significant event.

In order to address these issues, as part of the staff's proposed approach for resolving Recommendation 2.2, the NRC staff proposes to leverage and enhance existing NRC processes and programs to ensure that information related to external hazards is proactively and routinely evaluated in a systematic manner. The staff would continue to assess the impact of any new and significant information on the safety of NRC-licensed facilities at the time that information is known to the agency, but the staff also proposes to enhance existing processes and develop associated staff procedures to ensure that all new hazard information has been proactively and routinely aggregated by the NRC. These procedures will also provide guidance for determining the significance of the totality of all the new hazard information. The enhanced internal process will leverage and augment existing programs and agreements with domestic and international organizations. The details of this enhancement, including which process will be used to obtain information and the process for screening the information to determine its significance, are still under development. If the Commission approves the staff's proposal, the specific enhancements will be identified and completed by the end of calendar year 2016.

To the degree possible, the NRC will partner with other Federal agencies and industry to systematically evaluate new data, models, and methods, and assess their impact on currently-licensed facilities. As other Federal agencies are developing processes for routinely updating external hazard information, enhancement of current NRC processes will better enable the NRC to have influence and access to this information. Partnering with other Federal agencies will increase consistency across the government and permit an overall cost saving to the NRC and the Federal government. Should the ongoing assessment by the NRC staff identify information that might potentially impact plant licensing bases, the new information would be provided as an input to the appropriate program for consideration (e.g., the Generic Issues Program).

If licensees are required to evaluate an external study under any of the regulatory processes discussed above, the procedure will provide a path forward for appropriate licensee response. Part of this process will provide for development and routine updating of the models maintained by the NRC staff so that the staff is prepared to assess the significance of new information

received. The institutionalization of this procedure will benefit from the experience gained through various activities associated with Recommendation 2.1. For example, the staff was able to rapidly assess the Recommendation 2.1 seismic hazard reevaluations for all of the central and eastern United States reactor sites due to the availability of recently developed regional seismic models, which were jointly developed by the NRC, industry, and the DOE for new reactor siting. The development of these models was fortuitous, because flooding and seismic hazard models are not routinely updated under existing processes. Based on this experience, the staff believes it is important to maintain these models in a cooperative fashion with industry and other Federal agencies, to enable the implementation of an expedient and timely hazard reevaluation of NRC-licensed facilities. Most significantly, this approach will provide a more systematic and proactive approach, consistent with Finding 3.1 of the National Academies of Science report. It will also further enhance NRC partnerships with other Federal agencies and external stakeholders.

Processes for incorporating new information into NRC regulatory processes and screening new information for significance already largely exist, and the staff would build off these current processes to ensure the routine aggregation of new external hazards information received over time is institutionalized at the NRC in order to gain efficiency and minimize resource implications. The staff notes that while there will be some resource implications associated with this approach, both in initial development of the program and on a recurring basis, the staff believes that the following benefits outweigh the associated costs:

- New hazard information would be proactively sought and addressed.
- A systematic process would be in place that will allow NRC staff to identify new hazard information and conduct the appropriate evaluations.
- To the extent possible, the new program will leverage existing NRC processes to achieve the objectives in an efficient manner.
- There will be no burden on licensees unless the NRC identifies an actual safety-significant change in hazard information.
- The process will minimize ad hoc reactive responses with the resultant strain on resources, improving timeliness and efficiency.
- The systematic nature of the process will ensure transparency and consistency in dealing with new hazard information.
- The process will leverage existing regulatory processes, existing research programs, and cooperation with other Federal agencies.
- The process will strengthen the NRC's predictability and consistency as a regulator.

In summary, the staff's assessment has concluded that Recommendation 2.2 should be addressed through the enhancement of internal processes that establishes a routine, proactive, and systematic program for identifying and evaluating new information related to external hazards.

## **Stakeholder Interactions**

The NRC staff provided the Fukushima subcommittee of the Advisory Committee on Reactor Safeguards (ACRS) an overview of the staff's plans to resolving the open Tier 2 and 3 recommendations during a meeting held on October 6, 2015. A similar meeting is planned with the ACRS full committee on November 5, 2015. In addition, the staff provided an overview of its proposed resolution plans for all the open Tier 2 and 3 recommendations during a Category 2 public meeting held on October 20, 2015.

The staff intends to discuss the results of this review and development of the program discussed above with industry and public stakeholders. The NRC staff will also conduct a focused briefing for the ACRS, if desired, as the process is developed. The NRC staff will inform the Commission if the recommendation discussed above changes based on additional analysis or as a result of stakeholder interactions.

## **Conclusion and Recommendation**

In summary, the NRC staff has evaluated the need to take action to routinely evaluate new information related to natural external hazards and address any new and significant information, as recommended by the NTF in Recommendation 2.2. The staff believes that the use of rulemaking to address this recommendation, as originally discussed in Recommendation 2.2, is not necessary. Rather, the staff proposes to develop a method to leverage and enhance existing NRC processes and programs to ensure that information related to external hazards is proactively and routinely evaluated in a systematic manner. If the Commission approves the staff's proposal, the staff anticipates completing the development of enhanced processes and programs before the end of calendar year 2016.

## **Resources**

The resources associated with this effort have not been budgeted for fiscal year (FY) 2016. This shortfall in FY 2016 will be funded by reallocating resources from within the Operating Reactors Business Line. As discussed above, additional resources will be needed beyond FY 2016 for the NRC to (1) strengthen and enhance its cooperative efforts with other Federal agencies and stakeholders, and (2) perform, if necessary, staff evaluations of new information to assess its significance to plant safety. Resource needs beyond FY 2016 will be identified as part of the SECY paper that describes the staff's enhanced processes and associated procedures. Additional resources may also be necessary in subsequent years if the staff identifies the need for a regulatory action, such as a plant-specific backfit. The staff expects these issues would be addressed through the planning, budget, and performance management process.

Office	FY 2016	
	FTE	Dollars, \$K
NRR	0.35	-----
NRO	0.35	-----
RES	0.5	-----
OGC	0.05	-----
TOTAL	1.25	-----