

## **Proposed Resolution Plan for Tier 3 Recommendation 12.2**

### **Enhancements to Severe Accident Training for NRC Staff and Severe Accident Management Guidelines for Resident Inspectors**

#### **Background**

Near-Term Task Force Recommendation 12.2 recommended that the U.S. Nuclear Regulatory Commission (NRC) enhance staff training on severe accidents, including resident inspector training on severe accident management guidelines (SAMGs). In SECY-11-0137, "Prioritization of Recommended Actions to Be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11272A111), Recommendation 12.2 was prioritized as a Tier 3 activity because it was dependent on the resolution of Recommendation 8, now part of the Mitigation for Beyond-Design-Basis Events (MBDBE) rulemaking. The initial project plan 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 June 13, 2012 (ADAMS Accession No. ML12208A210), stated that the staff would assess the current level of NRC staff training conducted on severe accidents and SAMGs and consider future training enhancements.

As part of its initial plan, the NRC staff proposed both near- and long-term action items. The near-term activities included the following:

- Review the frequency of existing severe accident training courses.
- Update existing severe accident training to include Fukushima lessons learned.
- Revise NRC qualification program training requirements for severe accidents.
- Meet with stakeholders to more fully-inform training enhancements.

The long-term enhancements included the following:

- Enhance training based on the State-of-the-Art Reactor Consequence Analysis (SOARCA) study and follow-up research activities, the Level 3 probabilistic risk assessment (PRA) study, and longer-term Fukushima lessons learned initiatives.
- Revise NRC staff qualification training to include training on the Fukushima accident and SAMGs.
- Develop new training courses on severe accident progression, consequences, and SAMGs.
- Meet with internal stakeholders to more fully inform training enhancements.

## Current Status

Significant progress has been made in addressing this recommendation and additional training enhancements are planned. Current progress and planned activities associated with these items (both short- and long-term enhancements) are summarized below:

- Review the frequency of existing severe accident training courses: The NRC staff has evaluated the frequency of the different training courses associated with severe accidents in nuclear power plants. Such courses include PRA and reactor technology courses available for NRC staff. Given the demand for attendance and availability of resources, the current frequency of severe accident related courses was found to be adequate. These courses are often part of qualification programs that provide a further perspective on the subject matter and exposure to additional courses updated to include information on the Fukushima accident.
- Update existing NRC staff severe accident training to include Fukushima lessons learned: The NRC staff has generated and gathered significant information about the Fukushima accident and lessons learned. This information has been used to update existing severe accident training (e.g., R-800, "Perspectives on Reactor Safety") and to develop new courses to include lessons learned from the Fukushima accident, as described below.
- Revise NRC qualification program training requirements for severe accidents: The NRC staff reviewed existing qualification programs with requirements for training on severe accidents. The review found that some qualification programs should be improved to include study activities associated with the Fukushima accident. For example, in the case of NRC's Office of Nuclear Regulation (NRR) qualification program, the staff completed an enhancement to expand individual study activities associated with severe accidents to include references with information about the Fukushima accident and actions taken by the NRC staff to address the lessons learned. The staff is planning future revisions to other qualification programs, such as those used for reactor inspectors, to incorporate training on SAMGs.
- Enhance training based on the SOARCA study and follow-up research activities: Knowledge from SOARCA and follow-up activities has been used to enhance and develop new training courses on severe accident progression. Technical staff in this area will consider ongoing and future research work in SOARCA, and any future Fukushima lessons-learned insights that could generate additional training enhancements.
- Develop new training courses on severe accident progression, consequences, and SAMGs, as determined to be necessary: The NRC staff has been conducting numerous agency-wide seminars on the state-of-the-art understanding of severe accidents. To date, seven different severe accident progression seminars have been conducted and made available to NRC staff. Seminar topics have included severe accident-induced steam generator tube rupture; in-vessel melt progression and retention; steam explosions; direct containment heating; fission product release, transport, and

deposition; and a comparison of the Fukushima accident sequence with a state-of-the-art analysis model. These seminars are generally led by at least two experts (an in-house expert and an external expert) to offer diverse perspectives that may enable the NRC staff to better understand each severe accident phenomenon. The seminars began in March 2014 and are being conducted quarterly. Each future seminar will cover one severe-accident phenomenon (e.g., hydrogen combustion). Video recordings of the seminars have and will continue to be made available to NRC staff in iLearn for knowledge management purposes.

The NRC staff is currently reviewing options to incorporate SAMG training into the qualification program for NRC resident inspectors. When complete, this activity will better enable inspectors to oversee the implementation of SAMGs by licensees in the unlikely event of a severe accident. Other relevant subjects may be added to the course curriculum. The development of this new course has already been budgeted for and should not require additional resources. The course should be available to the NRC staff by the end of fiscal year (FY) 2016.

- Revise NRC qualification training to include training on SAMGs: As discussed above, the NRC staff is working to incorporate SAMG training in the appropriate qualification programs. Once the training is available, the staff plans to revise the NRC's inspector qualification program to incorporate training on SAMGs.
- Inform stakeholders of new training enhancements: Once the new SAMG training course is available, the staff will inform internal stakeholders, including the NRC's regional offices, of all training enhancements to ensure staff is aware of these tools.

## **Discussion**

The NRC staff has obtained substantial information on severe accidents, both through lessons learned from the Fukushima accident, research related to the accident, and previous studies. This information has been and will continue to be made available to the NRC staff via new and updated training tools. Research activities on severe accidents will continue to enhance understanding of severe accident phenomenology and will lead to additional insights and future knowledge management opportunities.

Based on completed and ongoing activities, the staff has achieved the objectives of Recommendation 12.2. Remaining activities include verifying that the new SAMG training course for the NRC staff is made available, updating the inspector qualification program to incorporate training on SAMGs, and generating a written communication with all training enhancements to share with the NRC staff. Because of progress already made on this recommendation and the fact that the remaining activities are well-underway using established NRC processes, the staff proposes that Recommendation 12.2 be closed.

## **Stakeholder Interaction**

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 does not plan to meet with ACRS or conduct additional stakeholder interactions specific to this recommendation.

As discussed above, NRC internal stakeholders will be notified of all training enhancements once the SAMG training is available.

### **Conclusion and Recommendation**

Based on progress made to date in enhancing training on severe accidents and SAMGs and the staff's plans to use well-established processes to make any necessary future enhancements, the staff proposes to close Recommendation 12.2.

### **Resources**

There are no resource implications associated with the closure of this recommendation. The staff will use existing processes to assess and implement future staff training initiatives resulting from Fukushima lessons-learned activities. The staff notes that \$100K in contract funds have been budgeted in FY 2016 to support severe accident training.