

## Six-Month Status Update on Other Charter Activities

This is the U.S. Nuclear Regulatory Commission (NRC) staff's first 6-month periodic update on the review work conducted under the Charter in accordance with Staff Requirements Memorandum (SRM)-SECY-11-0117, "Charter for the Nuclear Regulatory Commission Steering Committee to Conduct a Longer-Term Review of the Events in Japan." This includes highlights of any potential policy issues that have arisen for Commission consideration and recommendations regarding the sunset of the Steering Committee, the Advisory Committee, and the Project Directorate.

### Accident Timeline

The staff continues to receive specific information on the sequence of events and the status of equipment throughout the accident at Fukushima Daiichi. Specific documented sources include the following:

- Nuclear Emergency Response Headquarters—Government of Japan, "Report of the Japanese Government to the IAEA Ministerial Conference on Nuclear Safety—The Accident at TEPCO's Fukushima Nuclear Power Stations," International Atomic Energy Agency (IAEA) Ministerial Conference on Nuclear Safety, Vienna, Austria, June 7, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11178A379)
- Institute of Nuclear Power Operations (INPO) 11-05, "Special Report on the Nuclear Accident at the Fukushima Daiichi Nuclear Power Station," Revision 0, issued November 2011 (ADAMS Accession No. ML11347A454)
- Executive Summary of the Interim Report, Investigation Committee on the Accidents at Fukushima Nuclear Power Stations of Tokyo Electric Power Company, December 26, 2011 (<http://icanps.go.jp/eng/111226ExecutiveSummary.pdf>)

These reports validate the staff's basic understanding of events as presented in the Near-Term Task Force (NTTF) report, dated July 12, 2011, report, and continue to support the staff's plan for regulatory action. The staff will continue to follow the development of a more detailed timeline of events to support these and longer-term actions.

As noted in SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011, the NRC and the U.S. Department of Energy signed a Fukushima Daiichi Accident Study addendum to its memorandum of understanding on Cooperative Nuclear Safety Research (ADAMS Accession No. ML111930010) in July 2011. This cooperative research program will, among other things, develop a detailed understanding of the accident progression of each reactor and spent fuel pool. The staff also continues to work with Federal counterparts, industry, and the international community, including the Government of Japan, to establish cooperative efforts to share and integrate specific information into a common understanding of the sequence of events at the Fukushima Daiichi facility.

### Ongoing Tier 1, 2, and 3 Regulatory Actions, Additional Issues, and Advisory Committee on Reactor Safeguards Recommendations

The staff continues work on Tier 1 and 2 regulatory actions in a manner that is consistent with the milestone schedule set forth in SECY-11-0137 and SRM-SECY-11-0124, "Staff Requirements-SECY-11-0124-Recommended Actions to be Taken without Delay from the Near-Term Task Force Report," as modified by this paper.

As described in Enclosure 3 of this paper, the staff developed a process for addressing additional issues that arise as a result of ongoing interactions with both domestic and international stakeholders, advisory committee recommendations, and internal staff deliberations. This process includes vetting documented issues by a screening group of agency senior-level scientists and engineers. This group makes recommendations to the Steering Committee on whether each issue is valid and has a nexus to the Fukushima Dai-ichi accident, or should be dispositioned with no additional action or some other NRC process, such as the generic issues resolution process.

#### *NTTF Recommendation 4.1*

##### *Station Blackout (SBO) regulatory actions (Tier 1)*

The staff has developed an Advanced Notice of Proposed Rulemaking (ANPR) soliciting external stakeholder input regarding regulatory activities for SBO mitigation. The ANPR is currently in concurrence with the review and approval effort occurring in parallel with this SECY paper. It is expected that the EDO will sign and issue this ANPR in the near term. The staff plans to hold a category 3 public meeting during the ANPR comment period. The meeting is not intended for the NRC to receive comments and instead is for the NRC to discuss the ANPR with external stakeholders to inform stakeholder views on SBO mitigation and thereby support stakeholders providing written feedback in response to the ANPR.

#### *NTTF Recommendation 7.2, 7.3, 7.4, 7.5*

##### *Rulemaking to provide reliable spent fuel pool instrumentation and makeup capabilities (Tier 2)*

This rulemaking will follow the staff's issuance of the proposed order that requires reliable instrumentation in spent fuel pools. The staff is budgeting resources and assessing the availability of staff with the necessary skills to develop a technical basis for a rulemaking that may begin in late calendar year 2012.

#### *NTTF Recommendation 8*

##### *Integration of Onsite Emergency Response Processes, Procedures, Training and Exercises (Tier 1)*

The development of the NTTF Recommendation 8 ANPR is underway. The working group is planning to hold public meetings to obtain stakeholder input on the proposed rulemaking strategies.

### Comparison of Japanese and U.S. Requirements for Station Blackout

Upon review of Japan's ministerial orders and guides, the staff concludes that Japanese regulations require nuclear power plants to be designed such that safe shutdown of the reactor can be ensured in case of a short-term station blackout. The staff also finds that the regulatory expectations for station blackout mitigation are similar between the two countries.

### Recommendation 1

In an SRM on SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated August 19, 2011, the Commission directed that NTTF Recommendation 1 should be pursued independent of any activities associated with the review of the other Task Force recommendations. To implement this direction, the staff established a working group to develop a comprehensive set of options for the Commission, including resource estimates, and the staff's recommendation. This activity is currently scheduled to be completed in February 2013 and will be coordinated with a number of ongoing staff activities related to defense in depth and regulatory framework, including the following:

- the Chairman's Risk-Informed Regulations Task Force
- updates to Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," to address defense in depth
- technology-neutral framework approach—NUREG-1860, "Feasibility Study for a Risk-Informed and Performance-Based Regulatory Structure for Future Plant Licensing"

### Improving Communication with Stakeholders

The staff's efforts to improve communication with stakeholders are summarized in SECY-12-0010, "Engagement of Stakeholders Regarding the Events in Japan," which includes a description of the staff's progress and further recommendations on developing a chronology of events suitable for the general public, and to consulting with individual public citizens on the readability of the NTTF report.

### Policy Issues

Additional policy issues identified by the staff are addressed in the body of this paper. This includes the staff's plans to submit to the Commission in July 2012 a notation vote paper that addresses operability of containment vents under severe accident conditions, the addition of filters to containment vents, and the addition of vents in areas outside the reactor building.

### Plans to Sunset Longer Term Review Organization

In SRM-SECY-11-0117, the Commission specified that the longer term review will conclude when all longer term evaluations have been completed and regulatory actions identified and those regulatory actions have been referred to the NRC line organization for action using existing processes (e.g., the rulemaking process). Within the rubric of SECY-11-0137, the staff anticipates that completion of longer term evaluations will be marked by the completion of the staff's evaluation of the schedule and milestones, resources and critical skill sets, and implementation challenges related to addressing the Tier 3 recommendations. A Commission paper on Tier 3 recommendations is due to the Commission in early July 2012. The staff will provide more detailed plans for sunseting the longer term review organization in its paper on Tier 3 recommendations.

### National Academy of Sciences Study

The Conference Report on the Consolidated Appropriations Act, 2012 (Public Law 112-74) directs the NRC to transfer \$2,000,000 to the National Academy of Sciences (NAS) to fund an NAS study of the lessons learned from the events at the Fukushima nuclear plant. The project plan and budget for this study have been finalized and the funds have been transferred to NAS. The staff is working closely with NAS in anticipation of the study starting in the near term.

### Full-scale Seismic and Kinetic Impact Tests

The Senate Report<sup>1</sup> on a draft version of Public Law 112-74 includes the following direction to NRC:

The Committee is concerned that risks to public health and safety exist due to a lack of understanding how critical nuclear energy infrastructure, particularly storage ponds and containers for spent nuclear fuel and waste, will respond to a catastrophic earthquake or kinetic impact event. The Committee directs the Nuclear Regulatory Commission [NRC] to develop protocols for the use of existing domestic seismic testing facilities, including the National Science Foundation's National Earthquake Engineering Simulation [NEES] program, to conduct tests on full-scale specimens of critical nuclear infrastructure, in order to validate related computer models and inform subsequent mitigation strategies. The NRC shall collaborate with NEES to submit a related plan and proposed budget to the Committee by January 23, 2012.

The Senate Report was completed on September 7, 2011, over 3 months before the President signed Public Law 112-74 on December 23, 2011. Therefore, the staff is in discussions with Senate staff regarding a revised schedule for the plan and proposed budget related to this action.

### Resource Estimate and Schedule for Probabilistic Risk Analysis Methodology on Seismically Induced Fires and Floods

#### *Background*

As described in the NTF Report, seismically induced fires have the potential to cause multiple failures of safety-related systems and induce separate fires in multiple locations at the site. Additionally, it has been recognized that events such as pipe ruptures (and subsequent flooding) could cause such problems in multiple locations simultaneously. Although these issues have been examined to a limited degree in the Generic Issues Program and Generic Letter (GL) 88-20, Supplement 5, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities," the NTF concluded that the staff should reevaluate the potential for common-mode failures of plant safety equipment as the result of seismically induced fires and floods. Although this recommendation (NTF Recommendation 3) was categorized as a Tier 3 item (identified for long-term evaluation), SRM-SECY-11-0137 directed the staff to initiate a probabilistic risk assessment (PRA) methodology to evaluate potential enhancements to the capability to prevent or mitigate seismically induced fires and floods as part of Tier 1 activities. Furthermore, the staff was asked to include a discussion of the resource

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<sup>1</sup> S. Rep. No. 112-75 (Sep. 7, 2011)

estimate and schedule to develop the PRA methodology in the next 6-month status update to the Commission, as required by SRM-SECY-11-0117.

*Staff Recommendation*

The staff recognizes that the development of a PRA methodology to address seismically induced fires and floods represents a complex challenge. The scope of this effort is expected to cover seismically induced fires internal to the nuclear power plant, internal seismically induced floods (e.g., piping and tank ruptures), external seismically induced floods (e.g., upstream dam failures), and seismically induced losses of heat sink (e.g., downstream dam failures). There are significant challenges associated with this effort including, but not limited to the following:

- hazard definition and characterization
  - quantification of seismically induced fire ignition
  - quantification of site-specific seismically induced flooding frequencies
  - treatment of uncertainties
- modeling concurrent and subsequent initiating events
- treatment of systems interactions
- human reliability analysis applicability to seismically induced hazards
- multiunit risk considerations

The staff intends to engage in a variety of preplanning activities over the next four months in order to lay a foundation for the development of a more detailed and complete plan to address seismically induced fires and floods. Specific preplanning activities include the following:

1. Define specific objectives of the methodology:
  - a. the purpose of the method (e.g., screening and/or detailed analysis)
  - b. the anticipated scope of the method (e.g., operational modes, inclusion/exclusion of spent fuel pools)
  - c. potential risk criteria to be used in terms of assessing enhancements to the capability to prevent or mitigate seismically induced fires and floods
  - d. intended users (NRC staff and/or industry)
2. Identify internal and external stakeholders and assess their level of needed involvement for the development of the PRA methodology.
3. To the extent practical, gather relevant information, including nuclear power plant operating experience, general seismic experience, international data, and academic research.
4. As practical, coordinate planning activities with other initiatives, such as:
  - a. post-Fukushima request for information letters (under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.54(f))

- b. other related research activities, including generic issue resolution and standardized plant analysis risk
  - c. external hazard model development
5. Estimate resources required to develop the detailed project plan (contract and full-time equivalent (FTE) staff).
  6. Formulate a schedule for developing the project plan.

The result of this effort will be documented in an initial preplan that will provide a framework for the development of a more detailed project plan to address seismically induced fires and floods.

### *Challenges*

The NRC staff is currently working on a number of issues that would need to be integrated into the development of this PRA methodology. For example, the staff is addressing several generic issues related to this topic, including the following:

- GI-199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants"

Additionally, the issuance of 10 CFR 50.54(f) letters presented in this paper and subsequent licensee responses should be considered in the development of the PRA methodology. In particular, the response to NTTF Recommendations 2.1 and 2.3 have the potential to provide additional insights into seismic and flooding hazard characterization which, in turn, may affect both the methodology and the input information to correctly assess potential enhancements to the capability to mitigate such events. It is also recognized that the manner in which licensees respond to these 10 CFR 50.54(f) letters may have implications for the implementation of the PRA methodology (e.g., use of seismic margins analysis or seismic PRA).

There are very few members of the staff with the requisite knowledge, skills, and abilities in seismic, fire, and flooding PRA to efficiently perform the above pre-planning activities. These staff members are currently engaged in other high priority work supporting post-Fukushima activities and development of agency PRA models for external hazards and fire. Consequently, the amount of staff resources that can be applied to the pre-planning effort for the development of a PRA method for seismically induced fires and floods are limited. This will reduce the level of detail and technical depth that the staff can include in the initial pre-plan.

### *Resources*

The staff anticipates that it would have approximately 0.1 FTE available over the next four months to develop an initial pre-plan to support the later formulation of a detailed project plan for the development of a PRA methodology to address seismically induced fires and floods. No contract resources are anticipated for this preplanning effort.

### *Deliverables*

1. Initial pre-plan document that will provide a framework for the development of a more detailed project plan

*Schedule*

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|----|--|-----------|
| 1. | Complete the initial pre-plan:           | June 2012 |
| 2. | Provide status in next SECY paper update | July 2012 |