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

**Potential Enhancements to the Capability to Prevent or Mitigate Seismically-Induced Fires and Floods**

## 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) identified that seismically-induced fires have the potential to cause multiple failures of plant safety equipment and induce separate fires in multiple locations at the site. It has also been recognized that events such as pipe ruptures (and subsequent flooding) could cause problems in multiple locations simultaneously. Additionally, seismic events could degrade the capability of plant safety equipment intended to mitigate the effects of fires and floods. Although these issues have been examined to a certain extent in previous agency evaluations, Recommendation 3 of the NTTF's report concluded that the staff should evaluate potential enhancements to the capability to prevent or mitigate seismically-induced fires and floods (SIFFs).

In SECY-11-0137, "Prioritization of Recommended Actions to Be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011 (ADAMS Accession No. ML11272A111), the staff prioritized this recommendation as a Tier 3 activity since it required further staff study to support a regulatory action. In the staff requirements memorandum (SRM) to SECY-11-0137, the Commission agreed with the Tier 3 prioritization of Recommendation 3, but directed the staff to initiate the development of a probabilistic risk assessment (PRA) methodology to evaluate potential enhancements to the capability to prevent or mitigate SIFFs as part of Tier 1 activities. Tier 1 activities are those NTTF recommendations that should be worked on without unnecessary delay.

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 (ADAMS Accession No. ML12208A210), the staff provided a program plan to address the Tier 1 and Tier 3 portions of Recommendation 3. In that program plan, the staff developed a multistep process to gather additional information to inform future determinations on the need for regulatory action to address this recommendation.

In SECY-15-0059, "Seventh 6-Month Status Update on Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami," dated April 9, 2015 (ADAMS Accession No. ML15069A444), the staff provided the Commission with the most recent update on the status of work on this recommendation. In this update, the staff described the status of efforts on the Tier 1 activity to develop a PRA methodology and indicated that its goal is to complete a feasibility study by December 2015. The staff also provided a general estimate of the timeline for a further update of the Tier 3 evaluation plan, in consideration of information obtained from Tier 1 activities and PRA development activities.

Separate from the work described above on Recommendation 3, the Advisory Committee on Reactor Safeguards (ACRS) provided a related recommendation during its review of the NTTF report. In its letter entitled, "Initial ACRS Review of: (1) The NRC Near-Term Task Force Report on Fukushima and (2) Staff's Recommended Actions to be Taken Without Delay," dated October 13, 2011 (ADAMS Accession No. ML11284A136), the ACRS noted that integration of onsite emergency response capabilities envisioned by Recommendation 8 (related to strengthening and integrating onsite emergency response capabilities, such as emergency operating procedures (EOPs), severe accident management guidelines (SAMGs), and extreme damage mitigation guidelines (EDMGs)) should be expanded to include fire response procedures. In SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," dated February 17, 2012 (ADAMS Accession No. ML12039A103), the staff conducted an initial evaluation of the ACRS recommendation to integrate the fire response procedures into the licensee's onsite emergency response capabilities and determined that this recommendation would be best considered with the agency's Tier 3 actions associated with Recommendation 3. The staff provides a further analysis of the ACRS recommendation in this document.

**Current Status**

The staff has completed its assessment of these NTTF and ACRS recommendations and believes that additional enhancements to existing capabilities to prevent or mitigate SIFFs are not warranted. The rationale for this conclusion is discussed in further detail below.

With respect to the Tier 1 portion of this recommendation, the staff is working closely with Brookhaven National Laboratory (BNL) to finalize a feasibility study on the development of a PRA methodology for SIFFs. BNL has completed a draft version of the feasibility study, which the staff is currently reviewing for technical accuracy. The staff has also shared the draft study with subject matter experts (internal and external to NRC) and has solicited their comments. Once all of the comments are received, BNL will appropriately address them and finalize the document. The staff expects to have this report finalized by December 2015.

The staff will continue participating with standard development organizations and updating regulatory guidance documents on this subject as part of its routine activities. For example, the staff continues to work with the American Society of Mechanical Engineers (ASME) and the American Nuclear Society (ANS) Joint Committee on Nuclear Risk Management (JCNRM) to leverage external stakeholders' expertise and to better focus future method-development efforts. Following JCNRM approval of the incorporation of crosscutting issues in the ASME/ANS PRA standard, including concurrent initiating events such as SIFFs, implementation guidance was supplied to the PRA writing groups associated with affected parts of the standard. The staff will continue engaging ASME and ANS to support the development of detailed standards guidelines in this area. The staff plans to manage this activity through normal agency processes outside of Fukushima lessons-learned initiatives.

**Discussion**

It has been previously recognized that a seismic event at a nuclear power plant (NPP) could cause additional adverse impacts, such as fires or floods, which could result in multiple failures

of safety-related components in different locations and potentially degrade the capability of plant components intended to mitigate the effects of fires and floods. The staff identified SIFFs as a potential risk contributor during the resolution of Generic Safety Issue (GSI) 172, "Multiple System Responses Program." In NUREG/CR-5420, "Multiple System Responses Program – Identification of Concerns Related to a Number of Specific Regulatory Activities," dated October 1989 (ADAMS Accession No. ML072420007), the staff determined it needed additional information to assess the safety significance of the issue and it proceeded with issuing a generic letter pursuant to Paragraph 50.54(f) of Title 10 of the *Code of Federal Regulations* (10 CFR).

As part of the resolution plan for GSI-172, the staff issued Generic Letter 88-20, Supplement 4, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities," dated June 28, 1991 (ADAMS Accession No. ML031150485), requesting licensees to evaluate plant-specific vulnerabilities to severe accidents and report the results to the Commission. NUREG-1407, "Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities," issued June 1991 (ADAMS Accession No. ML063550238), provided guidance that SIFFs were to be considered as part of the IPEEE. The results of the IPEEE program were documented in NUREG-1742, "Perspectives Gained from the Individual Plant Examination of External Events (IPEEE) Program – Final Report," dated April 2002 (ADAMS Accession Nos. ML021270070 and ML021270122). As a result of the IPEEE program, most licensees identified a number of improvements to enhance the seismic ruggedness of their plants; however, the staff found that the level of effort, scope, and detail considered for SIFF events during IPEEE studies varied significantly among licensees. No further regulatory action was pursued by the NRC as a result of these activities. Because this issue was only examined to a limited extent as part of the IPEEE program, the NTTF recommended that the staff reevaluate this issue in light of updated analysis techniques and lessons learned from SIFF events that have occurred at NPPs.

To determine if regulatory action to require enhancements to existing capabilities to prevent or mitigate SIFFs is warranted, the staff developed a two phased approach, which was outlined in SECY-12-0095. The purpose of the first phase was to evaluate the feasibility of developing a PRA methodology suitable for identifying potential enhancements to the capability to prevent or mitigate SIFFs. During the first phase, the staff also monitored the progress of other related NTTF activities relevant to SIFFs, such as Recommendations 2.1, 2.3, and 4.2. The purpose of the second phase is to evaluate whether regulatory action is needed to prevent or mitigate a SIFF. As outlined in the original plan and as directed in the SRM for SECY-11-0137, the staff had intended to use the results of the Phase 1 activity to conduct the Phase 2 evaluation. However, as there has been significant progress and knowledge gained from related activities and because of challenges associated with the development of a PRA methodology, the staff has decided to proceed with the Phase 2 evaluation in this paper. The status of both of these phases is described below.

Feasibility Study

As directed by the Commission in the SRM for SECY-11-0137, the staff initiated the development of a PRA methodology to evaluate potential enhancements to the capability to prevent or mitigate SIFFs. The NRC defines a PRA as a systematic method for assessing risk by determining what can go wrong, how likely it is, and what its consequences might be. By developing a PRA for SIFFs, the staff could gather additional risk information to inform future decisions on whether regulatory action is needed in this area. Although there has been much

research and analysis on developing PRAs in general, as acknowledged by the staff in SECY-12-0025, there are no current state-of-practice PRA methods capable of supporting a quantitative assessment of SIFFs. Since the staff could not easily use an existing PRA tool to evaluate SIFFs, a contract was initiated with BNL to support a scoping study on the technical feasibility of developing a method (or a graded approach) for assessing SIFFs within a risk-informed framework.

BNL was tasked with generating a report with sufficient information about the feasibility of a PRA approach to assess risk from SIFFs, such that the information could be used to make informed decisions about the appropriate next steps to take. To gather the information needed to inform the feasibility of developing PRA tools, BNL and the staff conducted the following activities: surveyed available literature on SIFFs; organized a workshop on SIFFs that identified the challenges and potential approaches related to modeling the risk from these hazards (a summary of the workshop is available at ADAMS Accession No. ML14022A249); and solicited expert advice through three questionnaires to develop qualitative screening tools of these hazards. BNL recently completed a draft version of this feasibility study (ADAMS Accession No. ML15195A428) and proposed the development of a graded screening approach for SIFFs.

The feasibility study identified a number of key issues associated with the development of qualitative or quantitative PRA methods for SIFFs. Through the workshops and expert consultation, a number of unresolved technical issues have been identified that will need to be evaluated further in order to develop a PRA methodology. The staff expects that in order to fully develop the PRA methodology, a pilot application will be needed to test and refine the method. The staff's assessment of the draft feasibility study indicates that finalization of the PRA methodology for SIFFs will require additional time and resources. Furthermore, in addition to completing a pilot application, PRA assessment of SIFFs would require plant-specific seismic, fire, and flooding PRA models and the development of component seismic fragility data for fire and flooding. However, based on the information gathered thus far, the staff did not identify any information that indicates that SIFFs represents a significant safety issue. Therefore, the staff believes that the potential benefits of fully developing and piloting a PRA approach for SIFFs will not justify the costs of continuing this effort and, subject to Commission approval, the staff plans to close out the development of a PRA method to evaluate the risk of SIFFs through the issuance of the final feasibility study in December 2015.

Evaluation of SIFFs

As discussed above, the staff determined that there are no current state-of-practice PRA methods for evaluating the risk from SIFFs. However, the staff believes that the risk contribution from SIFFs is relatively small compared to that from seismic events alone. This conclusion is based on the existence of layers of protection, the robustness of plant mitigation capabilities, and response mechanisms that already exist or will be in place as a result of related NTTF activities. Additionally, it is expected that any activities to further prevent or mitigate SIFFs would only apply to a portion of the seismic hazard spectrum due to the available plant margins for lower-level seismic events and the difficulty in identifying cost-effective enhancements for higher-magnitude seismic events.

Separate from the development of a PRA method to assess the risks from SIFFs, the staff conducted a deterministic evaluation of SIFFs to decide whether regulatory action is needed on this issue and to complete the Tier 3 portion of Recommendation 3. The staff conducted a

deterministic evaluation due to the lack of readily available probabilistic risk information and the availability of sufficient information from related activities. To conduct this evaluation, the staff considered a variety of topics relevant to this issue. These topics include a review of recent regulatory activities pertaining to seismic, fire, and flooding events, as well as operating experience involving SIFFs, and actions taken in response to the Fukushima accident. Through the review of these materials, the staff believes that regulatory action is not needed to require enhancements to the existing capabilities of NPPs to prevent or mitigate SIFFs.

The staff considered the following factors in reaching its conclusion that no further action is needed on this issue:

- Robustness of fire protection programs, including fire protection defense-in-depth, under existing NRC requirements.

- Ability of NPP systems to prevent or mitigate internal flooding events under the NRC's existing regulatory requirements.

- Completion of seismic walkdowns conducted as part of NTTF Recommendation 2.3, which have led to the identification and correction of potential vulnerabilities from SIFF events.

- Implementation of a robust mitigation capability as part of NRC Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated August 29, 2012, and related rulemaking activities.

- A review of domestic and international operating experience, which did not identify any vulnerabilities that would warrant further regulatory actions.

These factors are discussed in more detail below.

One of the primary mechanisms of preventing seismically-induced fires from affecting reactor safety systems is the NRC's requirement for all NPP licensees to maintain a robust fire protection program. Through the concept of fire protection defense-in-depth, the NRC uses multiple layers of defense to protect the health and safety of the public from fires at nuclear power plants by (1) preventing fires, (2) detecting and suppressing fires that do occur, and (3) protecting the safe shutdown capability of the reactor in the event of an uncontrolled fire. Examples of features employed at NPPs for fire protection include fire barriers, fire detection systems, and fire suppression systems. In accordance with 10 CFR 50.48(a), each plant is required to have a fire protection plan outlining the fire protection program, installed fire protection systems, and the means to ensure the reactor can be safely shutdown in the event of a fire. The NRC regularly inspects how plants achieve and maintain the reactor's safe shutdown capability in the event of a fire. From early fire protection guidelines, such as Branch Technical Position APCSB 9.5.1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976," dated August 23, 1976 (ADAMS Accession No. ML07066048), to current guidance as discussed in Regulatory Guide 1.189, "Fire Protection for Nuclear Power Plants," issued October 2009 (ADAMS Accession No. ML092580550), the NRC has an expectation that fire protection capability would function following a safe-shutdown earthquake.

If a seismically-induced fire were to be initiated, the NRC has confidence that the NPP's fire protection program would protect the safety of the reactor.

Additionally, as an alternative to the requirements of 10 CFR 50.48(b), the NRC has allowed NPPs the opportunity to adopt, on a voluntary basis, National Fire Protection Association (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants" (accessible at http://www.nfpa.org). This initiative to transition to a risk-informed, performance-based fire protection program under 10 CFR 50.48(c) is part of an NRC effort to incorporate risk information into the agency's regulations and enhance safety. NFPA 805 describes the fundamental fire protection program elements and minimum design requirements for fire protection systems and features to satisfy the performance criteria. NFPA 805 focuses on reactor safety-oriented fire protection, adds appropriate flexibility, and provides a more detailed evaluation of safe-shutdown conditions in the event of a fire. Licensees transitioning to NFPA 805 perform a fire PRA. In developing their fire PRA, licensees perform a qualitative seismically-induced fire analysis, which may identify specific enhancements that would prevent or mitigate SIFFs. As of August 2015, a total of 20 NPP units have transitioned to NFPA 805, with an additional 26 NPP units expected to make the transition in the future.

Existing NRC regulations (e.g., Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities") require licensees to design and protect systems important to safety from the effects of internal flooding. As part of its routine review of operating experience, the NRC previously recognized that seismic failures of water carrying systems in a NPP could lead to the flooding of safety-related equipment rooms and ultimately lead to failure of the equipment in those rooms. On November 7, 2005, the NRC issued Information Notice (IN) 2005-30, "Safe Shutdown Potentially Challenged by Unanalyzed Internal Flooding Events and Inadequate Design" (ADAMS Accession No. ML052020249). The purpose of the IN was to alert NPP licensees to the importance of establishing and maintaining the plant flooding analysis and design, consistent with NRC requirements and principles of effective risk management, to ensure that internal flooding risk is effectively managed. As part of the NRC's normal baseline inspection program, NRC inspectors semiannually select one or two plant areas and inspect internal flood protection features for risk-significant structures, systems, and components, in accordance with Inspection Procedure 71111.06, "Flood Protection Measures" (ADAMS Accession No. ML083170651). Following the issuance of the IN discussed above, the staff developed an operating experience smart sample in this area to further support inspections of licensee flood protection measures. As a result of the smart sample evaluation, several site-specific issues were identified and resolved, but no generic implications were identified. Overall, existing NRC requirements and oversight programs provide the staff with assurance that NPP licensees have and maintain extensive internal flooding protection and response mechanisms that would prevent or mitigate the impact of a seismically-induced flooding event.

There is extensive information available on the causes of fires and floods resulting from seismic events, although much of that information is associated with nonnuclear effects. The main contributor to risk from a SIFF event at an NPP is for a seismic event to initiate a fire or flood that could lead to the failure of a safety-related system. There have been many studies on seismic, fire, and flooding impacts to safety-related systems, each examined independently, but there have been relatively few on the cumulative impacts of all three types of events. The studies that have examined SIFFs at NPPs have found that the risk from a SIFF is difficult to

quantify because of the lack of methods and data for assessing concurrent hazards. To ensure that potential risks from seismic events are appropriately addressed, the staff is currently taking action on NTTF Recommendation 2.1 to require sites with relatively higher seismic risk to conduct a seismic PRA. This PRA may identify systems or components that need to be upgraded to prevent detrimental effects. The staff believes that the risk of a SIFF would not be large enough to justify additional safety enhancements, based on the low frequency of an earthquake that can degrade various plant safety protection systems in addition to initiating a severe fire or internal flood, and the general seismic ruggedness of the NPPs.

Following the accident at Fukushima Dai-ichi, the NRC took a number of regulatory actions to enhance safety at NPPs, which the staff believes would also enhance the ability to protect against a SIFF event. For example, on March 12, 2012, the staff issued a request for information pursuant to 10 CFR 50.54(f), requesting that NPP licensees perform a detailed inspection, or "walkdown," of their currently installed seismic and flooding protection features. As part of these walkdowns, NPP licensees had to ensure that these features not only met current requirements, but also identify, correct, and report any degraded conditions. The industry developed—and the NRC endorsed—guidance documents Nuclear Energy Institute 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features," issued May 2012, and Electric Power Research Institute 1025286, "Seismic Walkdown Guidance," issued June 2012 (ADAMS Accession No. ML12188A031), to conduct these walkdowns. During the seismic walkdowns, NPP licensees specifically looked for equipment or systems that could have seismically-induced interactions leading to a fire or flood.

As noted in the seismic walkdown guidance, an example of a seismically-induced fire interaction could include situations where high voltage equipment has relative motion against an adjacent support structure with different foundations, which could lead to an electrical short and ultimately a fire. An example of a seismically-induced flooding interaction could include a situation where there is a long unsupported span of threaded fire protection piping, which could impact an adjacent structure and thus lead to failure of the pipe and flooding. All NPP licensees have completed these walkdowns, and the staff has conducted inspections of them using TI-2515/188, "Inspection of Near-Term Task Force Recommendation 2.3, Seismic Walkdowns," dated July 6, 2012 (ADAMS Accession No. ML12156A052), to independently verify that each licensee's seismic walkdown activities used NRC-endorsed methods. As part of these inspections, the staff did a select review of the licensee walkdowns to evaluate whether any potential SIFF vulnerabilities were identified and found that several site-specific issues were noted. All of the noted observations were entered into the licensee's corrective action program. No violations of regulatory requirements related to SIFFs were identified and NRC inspectors are following up on these corrective actions, if appropriate depending on the nature of the issue, as part of the normal baseline inspection program.

In addition to the post-Fukushima initiatives discussed above, on March 12, 2012, the staff issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12054A735), which requires all NPP licensees to develop, implement, and maintain guidance and strategies to maintain key safety functions, including core cooling, containment function, and spent fuel pool cooling, following an extreme external event which causes an extended loss of all alternating current power and a loss of normal access to the ultimate heat sink. The mitigation strategies being put in place in response to this order will ensure that licensees have diverse means of responding to extreme events, regardless of their origin, which will provide additional

protection against detrimental effects from SIFFs. The mitigation strategies are expected to use a combination of currently installed equipment (e.g., steam-powered pumps), additional portable equipment that is stored on-site, and equipment that can be flown or trucked in from off-site support centers. Additionally, the NRC and licensees are taking action to ensure that the mitigation strategies address the reevaluated flooding and seismic hazards being developed as part of NTTF Recommendation 2.1. Overall, NRC and licensee initiatives to address lessons learned from the Fukushima Dai-ichi accident have resulted in a substantial increase in NPP safety.

The NRC maintains an operating experience program to identify issues that have occurred at NPPs and which may have some relevance to currently operating reactors. A small number of events at NPPs across the world have involved SIFFs, none of which have occurred in the United States. For example, on July 16, 2007, a strong earthquake impacted the Kashiwazaki-Kariwa NPP in Japan. Following the earthquake, a small fire was initiated in a non-safety-related electrical transformer in the switchyard of Unit 3, which took approximately 2 hours to extinguish. A mission conducted by the International Atomic Energy Agency (ADAMS Accession No. ML13354A362) found that the operating plants were automatically shut down and that safety was maintained at all plants at the site, during and after the earthquake and fire. Additionally, following the same earthquake that impacted the Fukushima Dai-ichi site on March 11, 2011, the Onagawa NPP in Japan experienced a minor fire in a nonemergency switchgear cabinet. Due to difficulties in locating and accessing the source of the fire, it took approximately 8 hours to extinguish the fire. However, as with the event at the Kashiwazaki-Kariwa NPP, the plant continued to remain in a safe condition following the earthquake, tsunami, and fire. The staff also notes that the Mineral, Virginia earthquake on August 23, 2011, which exceeded the North Anna NPP's safe-shutdown earthquake, did not lead to any SIFF events nor any functional damage at that plant, as documented in "North Anna Power Station, Units 1 and 2 – Technical Evaluation of Restart Readiness Determination Plan," dated November 11, 2011 (ADAMS Accession No. ML11308B404). In summary, the staff's review of domestic and international operating experience did not identify any events that would support additional regulatory action in this area.

Fire and Flooding Response Procedures

As discussed above, during the ACRS review of the NTTF recommendations, documented in a letter entitled, "Initial ACRS Review of: (1) The NRC Near-Term Task Force Report on Fukushima and (2) Staff's Recommended Actions to Be Taken Without Delay," dated October 13, 2011 (ADAMS Accession No. ML11284A136), the ACRS recommended that NPP fire response procedures be integrated with the EOPs, SAMGs, and EDMGs. The main rationale for integrating these procedures is to better coordinate and integrate operator responses during challenging plant conditions. The ACRS subsequently expanded this recommendation to include flood response procedures in a letter dated April 22, 2015, "Draft SECY Paper, 'Proposed Rulemaking: Mitigation of Beyond-Design-Basis Events'" (ADAMS Accession No. ML15111A271).

The staff has determined that the integration of fire and flood response procedures with other response procedures would not provide a substantial increase to public health and safety. In reaching this conclusion, the NRC considered the following factors:

1. Fire response procedures are an integral part of a NPP fire protection plan. As stated in 10 CFR 50.48(a)(1), "This fire protection plan must: […] (iv) Outline the plans for fire protection, fire detection and suppression capability, and limitation of fire damage."

2. The NRC-required fire protection program is designed to function autonomously with other activities and is supported by a fire brigade that is manned in all modes of operation and is well-trained. Firefighting activities are led by personnel with knowledge of overall plant operations, including the equipment necessary for safe shutdown of the plant. These personnel communicate with the main control room to prioritize activities and ensure that they do not conflict.

3. Comprehensive firefighting strategies and implementing procedures have been developed for each area of the plant and fire brigade qualified individuals participate in drills on a quarterly basis to demonstrate proficiency with the use of these strategies and procedures in the context of concurrent use of other, nonintegrated procedures throughout the plant. Similar protocols are typically in place to respond to internal flooding events.

4. EOPs, EDMGs, FLEX Support Guidelines, and SAMGs account for equipment lost due to concurrent fires and floods (or other causes) during events by providing alternative methods to accomplish the functions the equipment was to have performed.

5. Licensee activities associated with fire and flood protection and response are subject to NRC oversight as part of the NRC's inspection program.

6. Existing fire and flood protection programs for nuclear power plants are robust, and licensees are further enhancing protection through, for example, the increased use of risk information and NFPA 805 implementation.

Summary of Staff's Assessment

As discussed above, the staff believes that regulatory requirements for enhancements to the existing capabilities to prevent or mitigate SIFFs are not justified. Given the broad regulatory activities pertaining to seismic, fire, and flooding events, operating experience involving SIFFs, and actions taken in response to the Fukushima accident, the staff's conclusion is that additional requirements are not needed to ensure continued safe operation of U.S. NPPs.

**Stakeholder Interactions**

As discussed above, the staff has interacted extensively with both internal and external stakeholders on the Tier 1 component of this recommendation (development of a PRA methodology).

The NRC staff provided the Fukushima subcommittee of the 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.

**Conclusion and Recommendation**

Based on the staff's assessment provided above, the staff proposes to close Recommendation 3. If the Commission approves this proposal, the staff intends to continue work to finalize the PRA feasibility study, with a goal of completing that study by the end of calendar year 2015. The staff will inform the Commission if any insights obtained as part of the completion of that study change the results of its assessment of Recommendation 3.

**Resources**

The staff estimates that approximately $30K and 0.2 full-time equivalent staff (FTE) is needed to complete the assessment of the PRA feasibility study, support public interactions, and participate in ACRS meetings. The resources are currently budgeted in fiscal year (FY) 2016 in the Operating Reactors Business Line, Licensing and Research Product Lines, Fukushima NTTF Product.

| Office | FY 2016 | |
|---|---|---|
| | FTE | Dollars, $K |
| RES | 0.1 | 30 |
| NRR | 0.1 | ----- |
| TOTAL | 0.2 | 30 |