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ADJUDICATIONS STAFF

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June 18, 2012

Ms. Annette L. Vietti-Cook
Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attn: Rulemakings and Adjudications Staff

Subject: Docket ID NRC-2012-031; 10 CFR Part 50 and 52, Onsite Emergency Response Capabilities; Advance Notice of Proposed Rulemaking (77 Fed. Reg. 23161)

Project Number: 689

Dear Ms. Vietti-Cook:

On behalf of the commercial nuclear energy industry, the Nuclear Energy Institute (NEI)¹ submits comments on the subject advance notice of proposed rulemaking (ANPR) regarding onsite emergency response capabilities. The industry has decades of experience in this subject, and has established substantial capability for severe accident mitigation, as well as its integration with the overall emergency response structure. We welcome the opportunity to respond to this ANPR.

The ANPR seeks information to inform a potential rulemaking or other regulatory action relative to establishing regulatory controls for onsite emergency response capabilities. In response to the accident at Fukushima Daiichi, the NRC is seeking information relative to severe accident management guidelines (SAMGs) and their integration with other elements of the onsite emergency response capability. These guidelines were developed and implemented by the industry in the 1990s and provide guidance for addressing a beyond-design-basis accident involving core damage. Following the events of September 11, 2001, the industry developed extensive damage mitigation guidelines (EDMGs) to address loss of large areas due to fire or explosion. In the subject ANPR, the NRC seeks information relative to transitions from emergency operating procedures (EOPs) to SAMGs or EDMGs, command and control responsibility, qualification and training of personnel,

¹NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all utilities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

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standardization, documentation and maintenance, technical bases, and incorporation of Fukushima lessons learned. The ANPR also provides questions relative to integration of this effort with other post-Fukushima regulatory activities. Attachment 1 provides responses to the ANPR questions.

Despite a lack of a formal regulatory structure, the industry has developed considerable infrastructure and capability with respect to severe accident management. The NRC has also devoted considerable research and attention to this subject and has maintained awareness and involvement in the industry efforts. The overall industry structure involves EPRI, the reactor vendor owners groups (OG) and the individual plants. EPRI has responsibility for developing the Technical Basis Report (TBR), which provides the fundamental scientific understanding of severe accident phenomenology and its translation into "candidate high-level actions" to mitigate the accident progression. The OGs use the TBR to develop NSSS-specific severe accident guidelines taking into account NSSS reactor and containment design features. Each plant then uses the OG guidelines to develop plant-unique severe accident guidance. Transitions from EOPs to SAMGs or EDMGs, and command and control, are addressed in the overall site emergency response plan. The industry, through the OGs, has developed documents describing SAMG Guiding Principles, and SAMG Training and Drills. These documents are provided as Attachments 2 and 3, respectively, with the intent of providing the NRC with a better understanding of current industry practices.

A major industry effort is currently underway to update the TBR, and the OG Severe Accident Guidelines, to address insights from the accident at Fukushima, as well as to incorporate additional improvements and refinements. Further efforts are underway to improve the standardization of the three PWR SAMGs. Additionally, given the post-Fukushima significance of SAMGs, efforts are underway in the U.S. to assess and improve training, qualification, integration, command and control, and ensure transitions from or into EOPs or EDMGs are clear. With regard to transitions, implementation of the diverse and flexible coping strategies (FLEX) will result in new procedures and interfaces with EOPs and will affect SAMGs to a smaller degree. Discussion of pertinent FLEX procedural guidance is excerpted from NEI 12-06 and provided as Attachment 4.

The industry proposes that the NRC develop a high-level rule specifying necessary attributes of onsite emergency preparedness, and the industry would concurrently develop guidance for NRC consideration under the Regulatory Guide accompanying the rule. Attachment 5 provides example high-level rule language. We are prepared to begin associated guidance development in short order, and we believe the draft NRC Regulatory Guide should be published concurrent with the proposed rule. Elements of existing industry guidance, including the following, would be pertinent as starting points for industry guidance development:

1. NUMARC 91-04, Revision 1, Severe Accident Issue Closure Guidelines
2. NEI 12-01, Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities
3. NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide

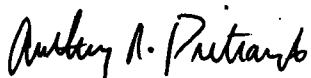
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With regard to resource and timeline estimates for meeting any new regulatory requirements, Attachment 1 primarily provides information with respect to ongoing industry activities to strengthen SAMGs. If these activities are essentially codified by the final rule, these estimates provide some indication of implementation resources. Should the NRC establish significant new expectations, such as applicability of 10 CFR Part 50, Appendix B, expected resource impacts would be far greater.

The industry looks forward to a productive engagement with the NRC as this rulemaking proceeds. We recognize that public engagements on the rulemaking will not occur until the end of 2012. In that regard, we propose conducting public meetings during 2012 to provide the NRC information on existing industry practices, technical bases improvements, and other elements that would inform the NRC's deliberation. We recognize that these meetings would be informational and not to discuss the rulemaking activity.

We look forward to being involved in the public process regarding this important rulemaking. As noted earlier, detailed responses to each of the questions posed in the ANPR are contained in Attachment 1. If you have any questions regarding these comments, please contact me or Biff Bradley (202.739.8083; reb@nei.org).

Sincerely,



Anthony R. Pietrangelo

Attachments

c: Mr. Jack McHale, NRR/DIRS/IOLB, NRC
Mr. Robert Beall, NRR/DPR/PRB, NRC
Mr. Timothy A. Reed, NRR/DPR/PRB, NRC

Response to NRC ANPR questions on Onsite Emergency Response

Regulatory Approach

1. What is the preferred regulatory approach to addressing NTTF Recommendation 8?

For example:

- a. Should the NRC develop a new rule, or could the requirements that would provide for a more strengthened and integrated response capability be accomplished by a method other than a rulemaking? Provide a discussion that supports your position.

Response: Given that the NRC has already determined, using a systematic regulatory process, that orders were not necessary for this element of the post-Fukushima regulatory response, we believe rulemaking would be the most appropriate approach should the NRC determine the need for regulatory requirements in this area. There is also a longer-term effort by the NRC under NTTF Recommendation 1 to establish a more consistent regulatory structure. In this regard, it is important that new requirements developed in this area are consistent and coherent with other post-Fukushima regulatory actions (station blackout rulemaking, FLEX implementation, emergency preparedness). In responding to this ANPR, we have referenced these other activities where appropriate. A common accident management rulemaking may be desirable to ensure consistency and coherency and would address the longer-term effort by the NRC under NTTF recommendation 1 to establish a more consistent regulatory structure.

- b. If a new rule is developed, what type of supporting document would be most effective for providing guidance on the new requirements? Provide a discussion that supports your position.

Response: We believe that a high-level rule should be developed along with an accompanying Regulatory Guide. Concurrent with the development of the new rule and Regulatory Guide, the industry would develop a guidance document to facilitate implementation of new requirements. The Regulatory Guide could provide an acceptable approach for meeting the rule by referencing the industry guidance document and noting any NRC objections or clarifications with respect to addressing the final rule. This proposed approach is similar to that used for the development of other rules such as the maintenance rule and has proven to be effective. We recommend that both the proposed rule and the associated Regulatory Guide and industry guidance document be made available for public comment at the same time.

The industry has thirty years of experience with the development and implementation of severe accident management guidance. We believe an industry guidance document can be produced delineating appropriate practices for establishment and maintenance of severe accident management guidance, user training and qualification, command and control responsibilities, and integration with other procedures and guidance. We believe NUMARC 91-04 provides an appropriate

starting point for this industry guidance, recognizing that revisions and additions would be necessary.

Accident Mitigating Procedures

2. The NTTF recommendation for emergency response procedures stressed that the EOP guidelines should be revised to establish effective transitions between EOPs, SAMGs, and EDMGs in an effort to promote a more integrated approach to onsite emergency response.

The NRC is interested in stakeholder opinions on the best course of action for revising and maintaining these procedures to accomplish this objective.

For example:

- a. Should the SAMGs be standardized throughout the industry? If so, describe how the procedures should be developed, and discuss what level of regulatory review would be appropriate.

Should there be two sets of standard SAMGs, one applicable to pressurized water reactors (PWRs) and one applicable to boiling water reactors (BWRs), or should SAMGs be developed for the various plant designs in a manner similar to EOPs? Provide a discussion that supports your position.

Response: All owners group severe accident management guidelines (SAMG) are founded on the SAMG Technical Basis Document (TBR), developed by EPRI, which provides the technical and scientific foundation for the development of SAMGs by the Nuclear Steam Supply System (NSSS) Owners Groups. This ensures a consistent basis for all SAMGs across the industry. The TBR is publicly available through EPRI and is currently undergoing revision to address insights from Fukushima. Updated SAMGs will then be developed by translating the TBR insights into strategies and actions appropriate for each reactor type. Each plant will then use the generic SAMGs to develop a plant-specific SAMG based on specific features and capabilities for the plant. Currently, each NSSS type (Westinghouse, General Electric, Babcock and Wilcox, Combustion Engineering) has produced a unique SAMG for their NSSS design. However, the PWR Owners Group (PWROG) is currently in the process of producing a single PWR SAMG that will address all three PWR NSSS designs. We believe this approach provides a strong technical foundation and proper involvement of NSSS and plant experts in developing the SAMGs, and we do not believe that any changes to the approach are needed.

With regard to the concept of a single SAMG for BWRs and PWRs beyond the technical foundation that already exists in the TBR, there are significant technical differences in reactor design that would substantially detract from the capability to develop a combined PWR/BWR SAMG. The major differences include the linkage between the reactor vessel and the different containment designs, the fission product boundary challenges, the primary coolant system components and layout and criticality concerns. This leads to differences in overall strategies and their priorities, different interfaces with the EOPs, and different involvement of the plant operators in the SAMG process.

- b. What is the best approach to ensure that procedural guidance for beyond design basis events is based on sound science, coherent, and integrated? What is the most effective strategy for linking the EOPs with the SAMGs and EDMGs?

Response: As discussed above, the EPRI TBR, in conjunction with many other source documents such as NUREGs, provides a sound scientific foundation, and this is supplemented in application by insights from the plant PRA and other plant-specific information. There are currently well defined transitions from the EOPs, which are focused on preventing core damage, to the SAMGs, which are focused on protecting fission-product boundaries once it is determined that core damage cannot be prevented. Coherence is achieved through NSSS development of NSSS-generic Emergency Procedure Guidelines and NSSS-generic SAMGs, which are used by individual plants in developing plant-specific EOPs and SAMGs.

As part of the implementation of 10 CFR 50.54(hh)(2), all U.S. plants established strategies and capabilities for dealing with large-area fires and explosions. These were embodied in "Extensive Damage Mitigation Guidelines (EDMGs)." Initially, the EDMGs were standalone strategies and did not always interface or integrate with EOPs and SAMGs. The industry recognized this limitation and began an effort to better coordinate EDMG strategies with the EOPs and SAMGs. These changes will further enhance plant capability to arrest and mitigate fuel damage scenarios and will be completed in conjunction with the ongoing SAMG updates. Order EA 12-049 will also lead to changes in the EOPs in order to extend plant coping times beyond the previous requirements of 10 CFR 50.63. These enhancements will go into effect consistent with the plant-specific FLEX implementation schedules and will provide a significant reduction in the likelihood of fuel damage scenarios.

As part of the post-Fukushima response, the industry is developing strategies to provide enhanced mitigation and coping capability in the event of a beyond-design-basis accident. NEI 12-06, Revision B1, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, describes how these strategies will be integrated with the existing structure of procedures and severe accident management guidance. Section 11.4 and Figure 11-1 of NEI 12-06 depict the proposed procedural hierarchy for FLEX implementation and the relationship of the SAMGs and EDMGs. These portions of NEI 12-06 are provided as Attachment 4 of the overall ANPR response. Note that FLEX implementation does not directly affect the existing approach for command and control, but augments it with additional guidance and strategies. Also, transitions to the SAMG will also be retained in the EOPs, as the EOPs will be the controlling document and the FLEX Support Guidelines will support the EOPs.

Should the transition from EOPs to SAMGs be based on key safety functions, or should the SAMGs be developed in a manner that addresses a series of events that are beyond a plant's design basis? Provide a discussion that supports your position.

Response: A transition from an EOP to a SAMG should be symptom-based, i.e., based upon control room receipt of specific parameter values that directly indicate incipient core damage. The transition is clear and is reinforced through training. This symptom-based approach, which is independent of the initiating event, is currently used by the industry and should be maintained. The EDMGs were designed to respond to a specific type of beyond-design-basis event that is readily defined and

easily recognized; this approach should be retained, but as mentioned above, the capabilities of the EDMGs are being integrated into EOPs and SAMGs, as appropriate.

- c. The NTTF Recommendation 8 strongly advised that the plant owners' groups should undertake revision of the accident mitigating procedures to avoid having each licensee develop its own approach. Is this the best course of action?

Response: Yes, the PWROG and BWROG will continue their role of developing EOPs and SAMGs. Attachment 2 to the overall ANPR response provides for information a "SAMG Guiding Principles" document developed jointly by the PWROG and BWROG.

What additional scenarios or accident plans should be considered for addition to SAMG technical guidelines as a result of the lessons learned in Japan? Provide a discussion that supports your position.

Response: A team of technical experts was formed by EPRI to consider revisions to the TBR based on lessons learned from Fukushima and insights from severe-accident research and analysis conducted since the original TBR was published. This effort involves industry experts in severe accident phenomena, many of whom were peer reviewers of the NRC's SOARCA report, as well as SAMG and EOP experts. Scenarios, high-level action plans and discussion of phenomena are being added to the TBR, and ultimately to the SAMGs, to address injection of salt or brackish water, use of FLEX and 10 CFR 50.54(hh) equipment, spent fuel pool cooling, hydrogen generation (including via radiolysis) and control, implications for multi-unit events, low power and shutdown operations, additional considerations for containment and reactor/auxiliary building venting, and extended station blackout conditions. In each of these areas, insights gained from Fukushima, research and analysis results, and feedback from severe-accident exercises at operating plants have identified changes that can improve, update and augment the existing TBR.

- d. In the SRM for SECY-11-0137, the Commission directed the NRC staff to consider the November 2011 INPO report, INPO-11-005, in the development of the technical bases for Recommendation 8. How should this document be used by industry in developing SAMGs and the NRC in developing any proposed regulatory changes? Provide a discussion that supports your position.

Response: The industry is using this document, in conjunction with other information, to support enhancement of the EPRI TBR and enhancements to the generic Owners Group SAMGs. The NRC's use of these industry documents to develop regulatory changes would be dependent upon the nature of the final rule. We envision the rule to address maintenance, training and use of the SAMGs, rather than their underlying technical basis, so it is not clear what the regulatory use for the INPO report would involve with respect to the rule itself. The industry believes it would be valuable to undertake dialogue with the NRC through public meetings to discuss the proposed technical enhancements, such that the NRC can establish confidence in the technical work that has been performed to incorporate lessons learned from Fukushima. This activity could occur in parallel with the rule development phase.

- e. Should there be a requirement for the SAMGs and EDMGs to be maintained as controlled procedures in accordance with licensee quality assurance programs? Provide a discussion that supports your position.

Response: If a high-level rule is developed by the NRC, and its implementation relies on endorsement of industry guidance, appropriate controls for accident management capabilities will be included in the industry document. SAMGs are intentionally developed as symptom-based guidelines and are not procedures. We do not believe all elements of traditional licensee quality assurance programs would necessarily be applicable to SAMGs and EDMGs.

- f. Should the SAMGs and EDMGs be added to the "Administrative Controls" section of licensee technical specifications? Provide a discussion that supports your position.

Response: If rulemaking proceeds, this would be potentially redundant. If the NRC determines to use an approach other than rulemaking, then inclusion in the Administrative Controls of technical specifications could be a means to establish regulatory controls; however, we do not believe this is an appropriate location for beyond-design-basis regulatory controls

- g. In a letter dated October 13, 2011 (ML11284A136), the Advisory Committee on Reactor Safeguards (ACRS) recommended that Recommendation 8 be expanded to include fire response procedures. In their letter, ACRS stated that some plant-specific fire response procedures can direct operators to perform actions that may be inconsistent with the EOPs, and that experience has shown that parallel execution of fire response procedures, abnormal operating procedures, and EOPs can be difficult and complex. Should efforts to integrate the EOPs, SAMGs, and EDMGs include fire response procedures? Are there other procedures that should be included in the scope of this work? Provide a discussion that supports your position.

Response: The full text of the relevant portion of the ACRS letter is as follows:

NTTF Recommendation 8 and the corresponding staff recommended actions to be taken without delay include integration of the Emergency Operating Procedures (EOPs), the Severe Accident Management Guidelines (SAMGs), and the Extensive Damage Mitigation Guidelines (EDMGs). In our view, these efforts to integrate the onsite emergency response capabilities should be expanded to include the plant fire response procedures. These procedures provide operator guidance for coping with fires that are beyond a plant's original design basis. Some plant-specific fire response procedures instruct operators to manually de-energize major electrical buses and realign fluid systems in configurations that may not be consistent with the guidance or expectations in the EOPs. Experience from actual fire events has shown that parallel execution of fire procedures, Abnormal Operating Procedures (AOPs), and EOPs can be difficult and can introduce operational complexity. Therefore, these procedures should also be included in the comprehensive efforts to better coordinate and integrate operator responses during challenging plant conditions.

We believe inclusion of fire response procedures into this potential rulemaking effort is not appropriate. First, there is no nexus to the Fukushima accident, and the NRC has stated their objective that associated regulatory efforts should be limited to that context. There are other ongoing efforts, such as 10 CFR 50.48(c), to improve fire protection and decrease reliance on self-induced station blackout, or other approaches that may be inconsistent with EOPs, and these efforts will be continued by the NRC independent of this rulemaking activity. There are many permutations of fire initiators and conditions, and the intent is to retain SAMGs as symptom-based guidance, not event-based procedural response. As symptom-based guidance, SAMGs are able to address a variety of potential concurrent plant conditions, including the effects of a fire. Finally, inclusion of fire response procedures would inordinately protract this activity, due to the complications that would entail from the variation and complexity of fire response procedures.

- h. What level of effort, in terms of time and financial commitment, will be required by the industry to upgrade the accident mitigating procedures? If possible, please include estimated milestones and PWR/BWR cost estimates.

Response: The following table depicts costs for current ongoing activities by the industry to provide SAMG enhancements in the near-term post-Fukushima time frame. This includes: efforts under the direction of EPRI to provide an updated SAM technical basis based on the currently documented knowledge of the Fukushima accident; efforts by the each of the Owners Groups to update the current generic SAMG documents based on the updated EPRI Technical Basis Report (TBR); and efforts at each plant to update the plant-specific SAMG based on the Owners Group products. This includes the additional effort by the PWROG to develop a single PWROG SAMG that will be different from any of the three existing SAMGs for the Westinghouse, Combustion Engineering and Babcock and Wilcox reactor designs as well as the increased plant-specific implementation efforts.

These costs are exclusive of training and qualification of the appropriate plant emergency response organization personnel which are addressed in the response to 4(g). The estimated costs provided below also do not include the long-term costs associated with the maintenance of the SAMG nor future SAMG enhancements as additional insights regarding the Fukushima accident becomes available.

To the extent that future regulatory requirements codify current activities, these cost estimates are a reasonable starting point. It is recognized that there will be additional costs attributed to regulatory oversight activities including preparation for and conduct of NRC inspections, etc.

Depending on the nature of final regulatory requirements that are above and beyond the current industry best practices, these costs could be far greater. For instance, application of 10 CFR Appendix B to the SAMGs would result in significant additional cost.

EPRI	BWRs	PWRs
TBR revisions – \$0.5M	Generic BWROG SAMG development - \$1.5M	Generic PWROG SAMG development - \$2M
	Plant-Specific SAMG Implementation (total for all BWRs) - \$4M	Plant-Specific SAMG Implementation (total for all PWRs) - \$8M
Estimated Completion – 2012	Estimated Completion -2015	Estimated Completion - 2015

Command and Control

3. The NTTF established the identification of clear command and control strategies as an essential aspect of Recommendation 8. What methodology would be best for ensuring that command and control for beyond design basis events is well defined? For example:

- a. Should separate procedures be developed that clearly establish the command and control structures for large-scale events? Should defined roles and responsibilities be included in technical specifications along with associated training and qualification requirements? Provide a discussion that supports your position.

Response: Separate procedures for a command and control structure are not necessary and would be potentially counterproductive. Licensees already have in place emergency response command and control structures that reflect the emergency preparedness planning standards of 10 CFR 50.47(b), the requirements of 10 CFR 50, Appendix E, and related guidance (e.g., NUREG 0654). These structures also incorporate the decision-making capabilities necessary to implement SAMGs as recommended by the appropriate Owners Group. Separate, event-based command and control structures would unnecessarily complicate response efforts, and potentially introduce confusion among licensee and offsite authority responders. Any potential improvements in this area should be considered within the context of existing command and control structures.

We believe that the defined roles and responsibilities for SAMG actions, and associated training and qualification requirements, should be described within a programmatic document determined by the licensee. The maintenance of this program/document could be referenced in the Rule or guidance documents. This approach would be similar to that used to provide administrative controls for other programs.

Consideration of this question should also include the relevant guidance contained in NEI 12-01, *Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities*, and NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*.

- b. Should the command and control approach be standardized throughout the industry or left for individual licensees to define? Provide a discussion that supports your position.

Response: Command and control responsibilities should be described at an appropriate level that allows licensees the opportunity for some flexibility. This may be accomplished through development of industry guidance for NRC endorsement under a final rule. The essential attributes of command and control should be defined at the guidance level. Licensees should retain the flexibility to address these attributes within the context of their existing emergency preparedness and response capabilities and applicable Owners Group guidance.

Consideration of this question should also include the relevant guidance contained in NEI 12-01, *Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities*, and NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*.

- c. What level of effort, in terms of time and financial commitment, will be required by the industry to develop these command and control strategies? If possible, please include estimated milestones and PWR/BWR cost estimates.

Response: The level of effort is difficult to estimate in the absence of further definition of the command and control strategy and regulatory expectation. Two to three years is an appropriate time frame to implement revised guidance or regulatory requirements.

Training, Qualification, and Drills

4. As the guidelines for accident mitigating procedures are revised and the command and control strategies are developed, personnel who will be implementing these procedures must be adequately trained, qualified, and evaluated. What would be the best approach for ensuring that the personnel relied upon to implement the revised procedures are proficient in the use of the procedures, maintain adequate knowledge of the systems referenced in these procedures, and can effectively make decisions, establish priorities, and direct actions in an emergency situation?

Response: Attachment 3 of the overall ANPR response provides "Joint PWROG / BWROG White Paper, Proposed Training and Drills for SAMG Updates Taking into Account Post-Fukushima Lessons Learned, Revision 1, May 2012." This paper provides the overall industry perspective on training. Training expectations for FLEX implementation procedures are addressed in NEI 12-06, *FLEX Implementation Guidance*, Section 11.6, Training. Also, Section 5.3.2 of NUMARC 91-04 addresses training for SAMGs. We propose to develop appropriate training guidance from these sources for NRC endorsement under the final rule

For example:

- a. Should a systems approach to training be developed to identify key tasks that would be performed by the various roles identified in the new strategies? Provide a discussion that supports your position.

Response: Elements of such an approach may be appropriate. A training needs analysis would be performed for all of the associated severe accident management (SAM) strategies. The training should be performance-based. Initial training for those individuals assigned to positions that require knowledge of SAM functions needs to cover the basics of the SAM strategies and guidelines including usage commensurate with their function and responsibilities. Walk-through and tabletop drills would be utilized to evaluate the participants' ability to perform the SAM function associated with the level of responsibility they have been assigned in as realistic a manner as possible. The frequency and content of training for participants would be based on the associated training task analysis. The industry position paper on training and drills, Attachment 3 to the overall ANPR response, describes the intent to adopt the principles of the systems approach to training process for the SAM portion of the emergency response training development.

For all of the associated SAMG emergency response organization (ERO) functions (implementers, evaluators and decision-makers), the training needs to be performance-based. That is, initial training for those joining the ERO in a SAMG function needs to cover the basics of the SAMG including usage commensurate with their function and responsibilities. Training needs to be followed by tabletop drills to test the participants' ability to use the SAMG.

In all cases, training needs to emphasize that the SAMGs are guidelines and verbatim compliance is not required. The training and drills need to make it clear that flexibility is key to severe accident management. Because the SAMGs may be used for an extended period of time and for events that cannot be foreseen, methods for considering input from outside of the ERO need to be part of the training and drills.

- b. Should the current emergency drill and exercise requirements be revised to ensure that the strategies developed as a result of this ANPR will be evaluated in greater depth? Provide a discussion that supports your position.

Response: We believe that the evaluation of accident mitigation capabilities for beyond-design-basis events should be performed using a regulatory process that is specifically tailored for this purpose. The process should be both different and apart from that currently used to evaluate licensee capabilities that meet the planning standards of 10 CFR 50.47(b) (i.e., the "traditional" emergency plan drill or exercise). To be most effective, the rule and associated guidance should address and integrate the periodic drill and evaluation requirements associated with all beyond design basis response strategies (e.g., EDMGs, FLEX and SAMGs). Consideration of this question should include the potential need to revise 10 CFR 50, Appendix E, section IV.F.2.j, and related guidance.

SAMG drills should be conducted using tabletop methods to reinforce training. The drills should not be graded drills because they are used to enhance training. There should be no requirement to upgrade plant full-scope simulator models to accommodate SAMG tabletop drills. Computer codes such as the Modular Accident Analysis Program (MAAP) or other engineering simulation tools can be used to assist in the development of tabletop drills; it is not necessary to use such tools during the execution of the tabletops. In addition, combining SAMG drills with emergency plan drills should be avoided due to the conflicting objectives of the two types of drills.

With respect to the development of a new evaluation process, the staff may wish to consider the approach used for hostile action-based (HAB) exercises. In this case, the industry developed a standard set of objectives and high-level extent-of-play descriptions, which were subsequently reviewed and endorsed by the NRC. Such objectives and descriptions should consider the differences in NSSS technologies and related accident management guidance.

- c. Should the revised accident mitigating procedures, specifically SAMGs and EDMGs, be added to the knowledge and abilities catalogs for initial reactor operator licenses? Provide a discussion that supports your position.

Response: No. Training on EOPs, which address responses to more frequent/likely events, would be significantly diluted by adding requirements associated with beyond-design-basis event responses. Operator actions described in SAMGs, EDMGs and FLEX procedures are fundamentally similar to actions performed in accordance with EOPs. Also, see Attachment 3 of the overall ANPR response for additional information concerning this topic.

- d. What level of plant expertise should be demonstrated by the personnel assigned to key positions outlined by the accident mitigation guidelines and command and control strategy? Should these personnel be required to be licensed or certified on the plant design? Provide a discussion that supports your position.

Response: We believe that decision-makers, with the exception of individuals that may temporarily hold this position during the initial phase of an EDMG response, should be a previously or currently licensed operator, or completed an approximately equivalent certification course. The license or certification should be related to the plant design. Licensees should retain flexibility to assign accident management strategy evaluation functions to the most appropriate positions within their emergency response organizations.

Also, see Attachment 3 of the overall ANPR response: "Joint PWROG / BWROG White Paper, Proposed Training and Drills for SAMG Updates Taking into Account Post-Fukushima Lessons Learned, Revision 1, May 2012." This paper addresses SAMG roles and responsibilities, decision-making and training. Appropriate information from this document could be added to industry guidance for NRC endorsement under the proposed rule.

- e. What training requirements should be developed to ensure emergency directors and other key decision-makers have the command and control skills needed to effectively implement an accident mitigation strategy? Provide a discussion that supports your position.

Response: See Attachment 3 of the overall ANPR response: "Joint PWROG / BWROG White Paper, Proposed Training and Drills for SAMG Updates Taking into Account Post-Fukushima Lessons Learned, Revision1, May 2012." This paper addresses SAMG roles and responsibilities, decision-making and training. Appropriate information from this document could be added to industry guidance for NRC endorsement under the proposed rule.

- f. What should the qualification process entail for key personnel identified in the new strategies? How would this qualification process ensure proficiency? Provide a discussion that supports your position.

Response: See Attachment 3 of the overall ANPR response: "Joint PWROG / BWROG White Paper, Proposed Training and Drills for SAMG Updates Taking into Account Post-Fukushima Lessons Learned, April 2012." This paper addresses SAMG roles and responsibilities, decision-making and training. Appropriate information in this regard could be added to industry guidance for NRC endorsement.

- g. What level of effort, in terms of time and financial commitment, will be required by the industry to develop and implement these training, qualification, and evaluation requirements? If possible, please include estimated milestones and PWR/BWR cost estimates.

Response: The following table depicts costs for currently forecasted activities by the industry to provide training for the enhanced SAMG discussed in the response to question 2(h) in the near-term post-Fukushima timeframe. This includes: joint efforts by the Owners Groups to provide a consistent industry-wide framework for implementation of the SAMGs including training, personnel qualification and maintenance; efforts by each of the Owners Groups to update the current generic SAMG training documents based on the enhanced generic SAMG; and efforts at each plant to update the plant-specific SAMG training based on the Owners Group generic training products. This includes the additional effort by the PWROG to develop a single PWROG SAMG training package that will be different from any of the three existing SAMG for the Westinghouse, Combustion Engineering and Babcock and Wilcox reactor designs, as well as the increased plant-specific implementation efforts.

These costs are exclusive of SAMG development costs that are addressed in the response to 2(h). The estimated costs provided below also do not include the long-term costs associated with the ongoing SAMG training and drills, nor future SAMG training enhancements as additional insights regarding the Fukushima accident becomes available.

To the extent that future regulatory requirements codify current activities, these cost estimates are a reasonable starting point. It is recognized that there will be additional costs attributed to regulatory oversight activities including preparation for and conduct of NRC inspections, etc.

Depending on the nature of final regulatory requirements that are above and beyond the current industry best practices, these costs could be far greater. For instance, application of EOP-level training requirements for the SAMGs would result in significant additional cost.

Joint OG Activities	BWRs	PWRs
SAMG Implementation and Maintenance Guidance - \$0.75M	Generic SAMG Training Development - \$1M	Generic SAMG Training Development - \$1M
	Plant-Specific Initial Training (Total for all BWRs) - \$6M	Plant-Specific Initial Training (Total for all PWRs) - \$9M
Estimated Completion – 2013	Estimated Completion -2016	Estimated Completion - 2016

Other NTTF Recommendations

1. What is the best regulatory structure for integrating the onsite emergency response capability requirements with other post-Fukushima regulatory actions, such that there is a full, coherent integration of the requirements?

Response: As noted earlier, there is a longer-term effort by the NRC under NTTF Recommendation 1 to establish a more consistent overall regulatory structure. This structure should clearly recognize and distinguish, where appropriate, the differences between design-basis and beyond-design-basis events. However, integration of post-Fukushima regulatory activities is a more immediate issue. In the interim, there should be reasonable consistency of approach and level of detail with regard to any rulemaking. Regulations should be high-level and performance-based where achievable, and implementation details should be addressed in industry guidance and NRC Regulatory Guides. NRC activities to develop these requirements should be coordinated at all levels, particularly the technical level. Rulemaking or other regulatory action resulting from this ANPR should be coordinated with FLEX, station blackout rulemaking, emergency planning, and other post-Fukushima regulatory activities.

2. Recommendations 4.1 and 4.2 address SBO regulatory actions and mitigation strategies for beyond-design-basis external events, respectively. The implementation strategies developed in response to Recommendations 4.1 and 4.2 will require corresponding procedures. The NRC recognizes the need for coordinating efforts under Recommendations 4.1, 4.2, and 8. What is the best way to integrate these three regulatory efforts to ensure that they account for the others' requirements, yet do not unduly overlap or inadvertently introduce redundancy, inconsistency, or incoherency?

Response: There are numerous activities underway that are related to Recommendation 8. These include actions associated with Recommendations 4.1 and 4.2, as well as aspects of Recommendations 9 and 10. These activities must be effectively coordinated. Given the complexity of the related regulatory activities, the staff should conduct public meetings to seek detailed input on this topic. The NRC should ensure their internal organizations, including the technical level, are actively coordinated throughout the process.

3. Recommendation 9.3 addresses staffing during a multiunit event with an SBO. Should staffing levels change as a result of a revised onsite emergency response capability or should these duties be assigned to existing staff?

Response: We believe duties should be assigned to existing staff, who can be trained in new roles as appropriate. A systematic approach to training will define the tasks and the support required to address multiple units impacted by emergencies.

To address the staffing aspect of Recommendation 9.3, the NRC issued a letter to licensees entitled "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident," dated March 12, 2012. This letter requested a variety of information related to accident response staffing. To assist with responding to the letter, the industry developed NEI 12-01, *Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities*. The guidance in this document has been reviewed and endorsed by the NRC staff (refer to NRC letter, "U.S. Nuclear Regulatory Commission Review of NEI 12-01, *Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities*, Revision 0, Dated May 2012," dated May 15, 2012).

The evaluation of staffing changes, including the assignment of responsibilities, should be performed in accordance with NEI 12-01.

4. Recommendation 10.2 addresses command and control structure and qualifications for the licensee's decision-makers for beyond design basis events. Should this recommendation be addressed concurrently with Recommendation 8?

Response: Yes, the recommendations should be addressed concurrently to ensure consistency of any new requirements and guidance.

Interim Regulatory Actions

The NRC recognizes that implementation of multiple post-Fukushima requirements could be a challenge for licensees and requests feedback on how best to implement multiple requirements, specifically onsite emergency response capability requirements, without adversely impacting licensees' effectiveness and efficiency. It will take several years to issue a final rule. Should the NRC use other regulatory vehicles (such as commitment letters or confirmatory action letters) to put in place interim coping strategies for onsite emergency response capabilities while rulemaking proceeds?

Response: The NRC has already determined that orders or confirmatory action levels were appropriate for certain post-Fukushima regulatory actions. No such determination was made with respect to Recommendation 8, and some time will be necessary to properly establish the revised TBR and SAMGs taking into account Fukushima lessons learned. Therefore, we believe the rulemaking process should proceed without the need for other regulatory vehicles. The NRC should also consider the cumulative effects of regulation and the priorities for addressing post-Fukushima regulatory requirements, as well as ongoing regulatory activities.



Guiding Principles for SAMG Updates

The SAMGs provide comprehensive technical direction for the operation of nuclear power plants during severe accidents (and emergencies conditions, as applicable). Consistent with the intent of NUREG-0737 Item I.C.1, "Guidance for the Evaluation and Development of Procedures for Transients and Accidents," updates to SAMG should utilize the following guidance:

1. Entry conditions and operator actions are keyed to certain plant parameters or symptoms. Actions are specified as appropriate to restore and maintain these key plant parameters to within limits which define controlled, stable plant conditions.
2. Consistent with the guidance above, SAMG limits and action levels must accommodate the use of all available indications, irrespective of instrument uncertainty. A "conservative" instrument bias cannot be defined in symptom-based procedures since the amount and sign of the appropriate adjustment are dependent on the event considered and the characteristics of the instrument being used. For any given action level, a lower value may be considered more conservative in some scenarios, but less conservative in others. Best-estimate, nominal values, without adjustment for instrument uncertainties, should therefore be specified.
3. Computational Aids should be provided where direct diagnosis of key plant conditions cannot be determined solely from instrumentation (e.g., containment hydrogen flammability and recriticality).
4. Identification of an initiating event is not required in order to determine which procedure developed from the SAMGs should be entered. Unless specifically defined, the operator actions specified are appropriate irrespective of the initiating event or the sequence with which subsequent events may occur.
5. The specified actions are consistent with operator capabilities and the manner in which control room operators actually operate plants, including concurrent or parallel performance of actions and the plant command and control structure.
6. The specified actions are based upon the existing configuration of plant structures and systems. There is no intent or proposal to modify any individual plant design to permit implementation of the generic guidance or to provide capabilities beyond those which currently exist. As the plant accident management capabilities change, the SAMG needs to change to reflect current capabilities.
7. Any mechanistically possible plant conditions for which generic operational guidance can be provided are addressed as appropriate to minimize the impact on public health and safety, irrespective of the probability of occurrence. Thus, the SAMGs address a spectrum of conditions more severe than were considered in developing the plant design basis. These conditions include multiple equipment failures and operator errors and consider coincident events at multiple units on the site.
8. Although guidance is provided for responding to plant conditions which extend beyond the original design basis of the plant, there is no intent or proposal to extend any design basis beyond that which is currently established.



9. Available systems and equipment are used as appropriate to accomplish SAMGs objectives irrespective of system safety classifications and equipment qualifications. Inclusion of a system in the SAMGs does not by itself impose any additional qualifications or programmatic requirements beyond those associated with the original system design functions.
10. Operator actions, limits, and action levels are based on realistically bounding best-estimate engineering calculations as opposed to traditional licensing or design-basis analytical methods and assumptions. Realistic uncertainties are to be considered in developing the best estimate accident progression and consequences.
11. The best possible operational guidance is specified, irrespective of licensing or design-basis assumptions or commitments. For example, operator actions are not necessarily conditioned on expiration of some time interval assumed as an input to a licensing analysis.
12. Changes to guidance and procedures should be validated using existing plant capabilities. It is not necessary to upgrade plant simulators to cover severe accident conditions.



**Joint PWROG / BWROG
White Paper**

**Proposed Training and Drills for
SAMG Updates
Taking into Account Post-Fukushima
Lessons Learned**

Revision 1
May 2012

BACKGROUND AND CURRENT USAGE:

As part of the closure of the Severe Accident regulatory issue in the late 1980's, Severe Accident Management Guidance (SAMG) was developed and implemented at each nuclear plant in the USA. To assist utilities in developing SAMG and the associated tools, each Owners Group (Westinghouse, Combustion Engineering, Babcock & Wilcox and BWR) developed generic material applicable to that reactor vendor's design. These SAMG were audited by the Nuclear Regulatory Commission (NRC) but never submitted for review and approval. Instead, each utility made a license commitment to the NRC to: 1) develop plant specific SAMG, including computational aids, from the generic Owners Group materials, 2) train the appropriate staff in the use of the SAMG including drills, and 3) maintain the SAMG guidance and capabilities throughout the plant life. The first two steps were completed by nearly all utilities by December 1998. This guidance was developed by the various Owners Groups as generic material. The scope and level of detail of training, associated with this material, was determined by each utility. In this way, plant specific information that was incorporated into the generic guidance would be included in SAMG training programs.

For each of the four reactor vendors, the SAMG material was developed for use by three distinct functions of the Emergency Response Organization (ERO): the Implementers, the Evaluators and the Decision-Makers. Implementers are the plant licensed operators in the main control room who actually carry out, or implement, the strategies. Evaluators¹ are part of an expert team comprised of the necessary disciplines (primarily operations and engineering) to evaluate the plant conditions and equipment availability to recommend the most appropriate SAMG strategies for implementation. The Evaluators may be supported by other functions such as Maintenance and Health Physics staff to enable effective evaluations to be efficiently completed. Decision-Makers receive recommendations from the Evaluators, assess the recommendation in light of other ongoing activities, and direct the Implementers to carry out the recommended strategies as appropriate. The authority and responsibility of plant personnel to carry out the SAMG are specified in the site Emergency Plan (E-Plan). An example of this would be where the site Emergency Director (ED) is the Decision-Maker and the Severe Accident Management Team which is comprised of an Operations representative that holds a current Senior Reactor Operator's License, a Reactor engineer, an I&C engineer, a Severe Accident specialist and Control Room Communicator are the Evaluators. The ED is part of the Severe Accident Management Team and makes all decisions including which strategies to be considered and/or implemented (based on input from the team). The ED also keeps the rest of the Technical Support Center (TSC) including Maintenance, Radiation Protection, and Engineering personnel involved.

This arrangement provides for reduced licensed operator burden (Implementers), assessment of event conditions and available mitigation strategies by a team of experts (Evaluators), and execution of appropriate decisions regarding the appropriate actions without undue delay (Decision-Makers). Based on the duties associated with each of these distinct functions, the degree of training required for each function varies.

Each of the Owners Groups developed generic products to assist utilities in developing plant specific training programs for the SAMG users. These training products varied by Owners Group and ranged from background material, to classroom and self-study material, and even computer based training products. The level of training for the SAMG was identified using the

¹ Some BWR's keep the SAMG in the control room. Under such conditions the Shift Manager is the Decision Maker, the Station Technical Advisor is the Evaluator, and the control room crew are the Implementers.

principles of the Systematic Approach to Training (SAT) and resulted in a level of training rigor that was below that expected for the Emergency Operating Procedures (EOPs) or the E-Plan. In addition, the Institute of Nuclear Power Operations (INPO) provided training material in the form of a broad, fundamental introduction to severe accidents. The intended audience for the INPO training material was those individuals that have little or no prior knowledge or experience with emergency response activities. The INPO training materials were designed for use "as-is" and were considered separate from the Owners Group training guidance. The INPO material was not considered part of the minimum performance expectations for training programs needed to implement severe accident principles. However, some or all of the INPO training material may have been used to enhance utilities' initial training programs.

The SAMG training has been prioritized to place severe accident training appropriately in the context of other training requirements, both for operators and other ERO personnel. Since operator training time is limited, it is appropriate that training in severe accident mitigation not be given undue weight in comparison with other training requirements; responsibility for demonstrating knowledge in this area should be similarly limited. It is also appropriate that the training and knowledge requirements be prioritized in the area of ERO training so that the ERO does not spend undue time training on low probability or otherwise inappropriate events.

In general, the greatest degree of training is associated with the Evaluators. This is because they must assess and understand the dynamic severe accident conditions and the effects of actions taken while providing concise and robust recommendations to the Decision-Maker relative to the action(s) to be executed. For this reason, their training needs to include the entire spectrum of severe accident phenomenology and be of a cognitive nature. Decision-Makers need to have a general understanding of severe accident phenomenology and the major consequences of actions taken. Their level of cognitive knowledge need not be as great as that of the Evaluators. Implementers also only need a general understanding of severe accidents with a focus on the expected plant response that might be associated with various strategies. Implementers also need to understand the non-standard equipment alignments that they might be asked to implement. This is because most of the actions implemented in a severe accident are very similar or the same actions which are implemented by them prior to core damage.

Once the ERO is staffed and available to perform their duties, the Evaluators and Decision-Makers will likely be located in the TSC, or as delineated in the site E-Plan. At many plants, the Decision-Maker is the ED. The on-shift licensed operators are expected to remain in the main control room, except for implementation of strategies requiring remote manual actions.

Each utility needs to weigh the current SAMG usage to determine the plant specific Implementer, Evaluator and Decision-Maker responsibilities. This includes the division of responsibility between the licensed operators and the engineering support staff and the placement of SAMG materials in the control room or TSC or Emergency Operations Facility (EOF). It is appropriate that each plant document this process so that the plant specific training priorities can be understood and prioritized. The format for this documentation should fall within documentation processes existing at each utility; the development of new formats or documentation processes is not desirable.

Table 1 below describes the current typical responsibility or support role for each SAMG element for each of these functions during severe accident mitigation. The responsibilities and roles in Table 1 assume that the primary responsibility for evaluation of SAMG strategies is with the engineering support staff. Because it was the utility's responsibility for plant specific SAMG implementation, considering existing E-Plan activities at the time of initial roll-out in the 1990's, variations from that shown in Table 1 are expected.

Table 1: Typical SAMG Roles and Responsibilities			
SAMG Element	ERO Function		
	Implementer	Evaluator	Decision-Maker
Transition to SAMG	R	S	S
Diagnosis of plant conditions	S	R	S
Assessment of Available Equipment	S	R	S
Evaluation of Pros and Cons	-	R	-
Use of Computational Aids	-	R	-
Selection of Appropriate Strategies	S	R	S
Decision to Implement Strategies	S	S	R
Implementation of Strategies	R	-	-
Evaluation of Adequacy of Strategy	S	R	-
Long Term Strategy Use	S	R	-
SAMG Exit	S	S	R
R = Responsible; S = Support			

The above discussion represents the current division of responsibility and will be the baseline for post-Fukushima SAMG. Any change to the roles and responsibilities as a result of Fukushima will only be considered if there is a strong basis for the change.

The SAMG was specifically developed for use by the plant engineering staff and implementation by the licensed plant operators for several reasons. Foremost is that the SAMG represents a paradigm shift in emergency response from preventing core damage by maintaining or restoring core cooling to preventing containment failure by addressing post-core damage challenges to the containment. There is a clear transition that is well defined. Even in the Combustion Engineering SAMG approach where both EOP and SAMG are used simultaneously, there are clear transitions. Secondly, although SAMG is symptom based, some of the Owners Groups decided that the post-core damage response is more knowledge-based and some parts cannot be developed in a rule-based format. On the other hand, some Owners Groups decided to develop SAMG using a rule-based format supported by knowledge-based input. A knowledge based response is better suited to engineering staff usage rather than licensed operators and is consistent with the role of the engineering staff in providing technical input in the pre-core damage EOP usage. Thirdly, use of the engineering support staff for the SAMG evaluations does not result in an increased training burden for licensed operators. The current training for licensed operators works very well and changes that add more burden could result in decreased effectiveness for the more probable plant challenges that the licensed operators must address.

Based on the foregoing discussions and table, the existing SAMG training was tailored to the responsibilities and needs of each of the three functions:

- The licensed operators, who serve as the **Implementers**, need detailed training on the transitions from the EOPs to the SAMG and the basis for their subsequent responsibilities including implementation of selected strategies. The SAMG training for licensed operators needs to be consistent with other beyond design basis accident emergency response

training that they receive. Only the transition from the EOPs to the SAMG needs to be at the level of other EOP training because these transitions may be included in licensed operator examinations. The remainder of the training needs to be consistent with operator training in their ERO responsibilities.

- The expert team of operations and engineering staff, who are the **Evaluators**, need the complete scope of SAMG training because they are responsible for the SAMG assessments; they must also understand the potential effects of implementing candidate actions. The SAMG training for the expert team needs to be consistent with other emergency response training that they receive.
- The **Decision-Maker** requires overview training in several areas of the SAMG to support his ability to carry out his responsibilities. The SAMG training for Decision-Makers needs to be consistent with other emergency response training that they receive.
- There is a fourth category of plant staff that may need to receive some SAMG training to familiarize them with activities that they might be requested to carry out to implement severe accident strategies. This includes certain members of the plant maintenance and health physics staffs. The SAMG training for these activities can be limited to familiarization with some of the likely strategies that may be different from their requirements prior to core damage including non-traditional equipment alignments and the use of portable equipment in a post core damage environment (radiation, lighting and temperatures).

Following the Fukushima event in March of 2011, INPO requested that utilities perform a self assessment of SAM capabilities using IER-11-1 as the basis. The NRC also conducted audits of SAM capabilities using a temporary inspection guidance, TI 2515/184. In both cases, the assessments were not performance based (e.g., observation of a table-top drill) but rather were based on prescribed criteria that describe a SAM program (e.g., maintenance of guidelines, training records, etc.).

FUTURE DIRECTIONS:

Based on the INPO and NRC review of the current SAMG training, personnel qualification and drills, it is clear that this area will receive significantly more attention in the future. As a result, there is a greater urgency to standardize SAMG training, personnel qualification and drills across the industry.

Training on SAMG strategies should not be considered part of any Accredited Training Programs. The SAMG training will be implemented using the principles of SAT and in a manner similar to the methods used for other beyond design basis guidance and procedures. SAMG training will be prioritized to place the training appropriately in the context of other training requirements both for operators and other ERO personnel. Since operator training time is limited, it is appropriate that training in Beyond Design Basis Event accident mitigation, and use of the SAM guidelines that support these strategies, not be given undue weight in comparison with other training requirements, and that responsibility for demonstrating knowledge in this area is similarly limited. It is also appropriate that the training and knowledge requirements be prioritized in the area of ERO training so that the ERO does not spend undue time training on low probability or otherwise inappropriate events. This is consistent with the approach being taken by the industry for FLEX support guidance training.

The training associated with individual SAM guidelines for equipment operation and TSC support functions will be based on providing the required knowledge, skills and abilities required

to ensure the function can be performed in a manner that supports the strategy in effect. The tasks associated with these guidelines will be evaluated using the principles of SAT. The training method and frequency selected by each utility will be consistent with the identified importance, difficulty and frequency of performance of the tasks. This training would be similar to the methodologies associated with the Implementor responsibilities defined for SAMG implementation.

A training Needs Analysis should be performed for all of the associated SAM strategies. The training should be performance based. Initial training for those individuals assigned to positions which require knowledge of SAM functions needs to cover the basics of the SAM strategies and guidelines including usage commensurate with their function and responsibilities. Walk-throughs and table-top drills should be utilized to evaluate the participants' ability to perform the SAM function associated with the level of responsibility they have been assigned in as realistic a manner as possible. The frequency and content of training for participants would be based on the associated training Task Analysis.

For all of the associated SAMG ERO functions (Implementers, Evaluators and Decision-Makers), the training needs to be performance based. That is, initial training for those joining the ERO in a SAMG function needs to cover the basics of the SAMG including usage commensurate with their function and responsibilities. Training needs to be followed by table-top drills to re-enforce the participants' ability to use the SAMG.

In all cases, training needs to emphasize that the SAMG is guidelines and verbatim compliance is not required. The training and drills need to make it clear that flexibility is key to severe accident management. Because the SAMG may be used for an extended period of time and for events that cannot be foreseen, methods for considering input from outside of the ERO need to be part of the training and drills.

SAMG drills should be conducted using table-top methods and should be conducted as training drills to re-enforce the training as opposed to evaluated drills. "ANSI/ANS 3.5, Nuclear Power Plant Simulators for use in Operator Training" certification of simulator fidelity (if used) is considered to be sufficient for the initial stages of the beyond design basis external event scenario until the current capability of the simulator model is exceeded. There should be no requirement to upgrade plant full scope simulator models to accommodate SAMG drills. Computer codes such as the Modular Accident Analysis Program (MAAP) or other engineering simulation tools can be used to assist in the development of table-top drills, it is not necessary to use such tools during the execution of the table-tops.

Criteria for performance need to be established by Owners Groups for SAMG usage during drills; such criteria would be used to assess adequate performance. The minimum frequency and content of training for participants may vary according to demonstrated performance during drills. The SAMG drills should be organized and conducted on a team or crew basis where this concept is used by a utility for other ERO activities. That is, the expert team of Evaluators, Decision-Makers or Implementers needs to be trained and participate in drills as a team. The mix of any teams between licensed operators, expert team staff and Decision-Maker functions may vary, but the composition of the crews in each function should remain stable. The training should form the basis for qualification of individuals to perform SAMG ERO functions, in much the same manner as other ERO functions.

The training for other ERO support functions, such as the maintenance and health physics staff, needs to include SAMG topics for familiarity with activities that may be conducted during the use of SAMG. The training material and the training methods need to be consistent with other ERO training.

Refresher training must be provided on a periodic basis to assure that knowledge, skills and abilities are maintained at a level that assures effective usage of the SAMG if an event were to occur.

Remedial training should be determined on the basis of need to address weaknesses or deficiencies identified during performance or during refresher training. Remedial training must be available in the event that participants do not demonstrate an adequate level of performance during training.

Because there are very different objectives for the E-Plan drill and the SAMG drill, care must be taken to avoid negative SAMG training by combining drills. Complications include denial of access to SAMG success paths in order to fulfill E-Plan drill objectives or unrealistically delaying the severe accident progression to accomplish E-Plan objectives). Therefore, it is not recommended to extend or combine E-Plan drills to include SAMG activities.

For multi-unit sites, training needs to include consideration of coincident multi-unit events. This will include coordination of activities in the ERO as well as consideration of actions and strategies for one unit that impact the other unit, including sharing of limited resources between the units.

Training also needs to be conducted when there are changes to the plant specific SAMG or to the Electric Power Research Institute (EPRI) SAMG Technical Basis (e.g., EPRI TR-101869). The level of training should be determined based on the scope of the changes². The timing of the training needs to be evaluated to determine whether it can be included in the normal training cycle or if more immediate training should be conducted. Also, the training method (classroom versus self-study) requires consideration of the scope of the changes. The Owners Groups will provide sufficient information regarding future changes to the generic SAMG or Technical Basis to assure uniform understanding of the changes.

There must be a high level of consistency between the Owners Groups with respect to SAMG training, but the details may not be identical due to the differences in the SAMG and the SAMG usage for the two Owners Groups (PWROG and BWROG). The Owners Groups propose a high level standard for SAMG training for utilities to ensure that capabilities are maintained as provided in the following Table 2. Plant specific deviations from this standard, based on SAT principles, needs to be documented.

While the development, delivery and maintenance of SAMG training material needs to be developed using good principles, the need for rigorous programs similar to licensed operator training are not necessary or in the best interests of overall plant safety. Each ERO individual already receives a significant amount of training each year. It is reasonable to assume that as more training material and requirements are added, there will be other training that may decrease in rigor. Development of training programs that meet the highest level of rigor that is currently reserved for licensed operator training are not likely to be in the best interest of overall safety. The SAMG training, as well as other post-Fukushima accident management enhancements, needs to be commensurate with the procedure and guidance hierarchy agreed upon for those procedures or guidance.

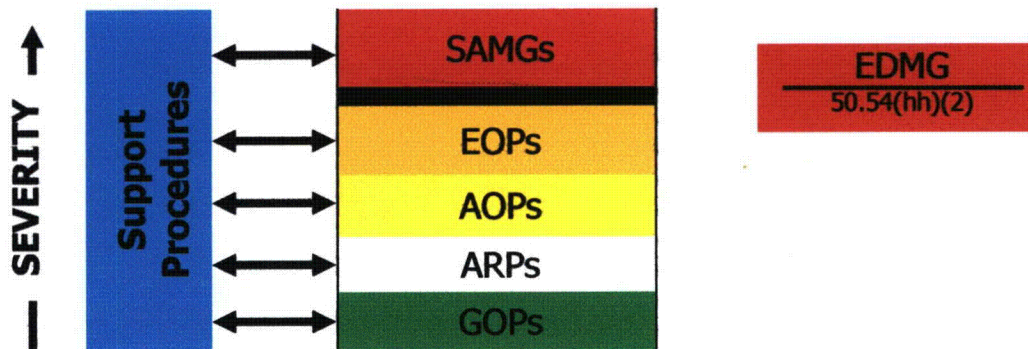
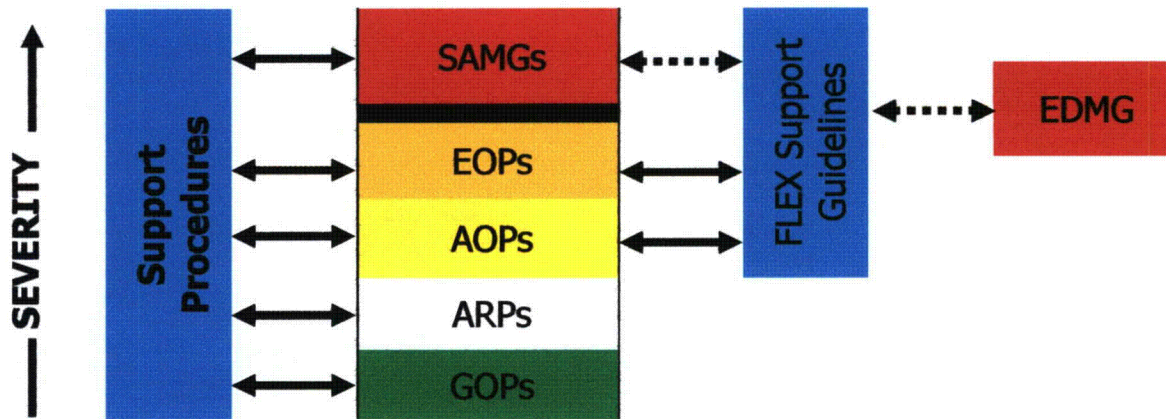
² The training and qualification for the two SAMG update phases in the 2011 EPRI SAMG Action Plan may be quite different based on the scope of the updates. For example, Phase 1 of the PWROG SAMG updates will be changes from the current SAMG as dictated by the changes in the Technical Basis whereas the PWROG Phase 2 updates will be a significant change for all PWR plants due to consolidation.

Table 2: Standard Requirements for Severe Accident Management Training			
Element	Implementers	Evaluators	Decision-Makers
A. Initial SAM Training for Newly Assigned ERO Persons			
1. Training Format	Classroom	Classroom	Classroom
2. Length of Training	8-12 hours	32-40 hours	12-16 hours
3. Method of Training Evaluation	Exam & SAM Table-top Drill	Exam & SAM Table-top Drill	Exam & SAM Table-top Drill
B. Refresher / Requalification Training			
1. Frequency for <u>an ERO individual</u> (interval between training)	3 years	3 years	3 years
2. Training Format	Classroom	Classroom	Classroom
3. Length of Training	2-4 hours, (excludes Drill)	4-8 hours (excludes Drill)	2-4 hours (excludes Drill)
4. Drills (to re-enforce training)	Table-top SAM Drill	Table-top SAM Drill	Table-top SAM Drill
5. Method of Remediation (training, drills, etc.)	Self-Study & Exam	Self-Study & Exam	Self-Study & Exam

SUMMARY:

In summary, this White Paper proposes that:

1. The scope of the generic SAMG changes in response to the Fukushima lessons learned are well defined. Material to assist utilities in developing plant specific training, personnel qualification and drills will be developed by each Owners Group in a timely manner to permit plant specific training to be conducted according to the EPRI SAMG Action Plan schedule for plant specific implementation. The EPRI SAMG Action Plan is a Building Block 7 activity in the industry's post-Fukushima response described in "The Way Forward". Each Owners Group will develop separate materials, but the development needs to be coordinated to assure consistency across the industry.
2. In the longer term, the SAMG training, personnel qualification and drills need to be carried out according to a consistent framework considering the hierarchy of all accident management procedures and guidance. The SAMG training program should be carried out using the principles of SAT. The assessment of the proficiency of the SAMG usage needs to be performance based using Table-top drills. The proposed industry Standard for SAMG training and drills is provided in Table 2 of this document,
3. The current severe accident management training and qualification processes should be examined to understand their strengths in moving forward so that these are preserved.

Figure 11-1**(a) Existing View of Typical Operating Procedure Hierarchy****(b) Future View of Typical Operating Procedure Hierarchy****Notes:**

- The central column represents the procedure set that is in "command and control" of plant functions dependent upon plant conditions, shown in sequence of severity (e.g. risk to protection of the core). EDMG/B5b Guidelines currently establish a separate command and control that is not recognized by the EOPs and SAMGs.
- Clear entry conditions and transitions exist between procedure sets as severity increases exist. Note that there may be some overlap on an Owner's Group specific basis where some AOPs, Alarm response and Normal plant procedures may be used to support each other or support the EOPs. However, there will be a clear controlling procedure in effect.
- Support procedures and FSGs are used to support the execution of plant strategies as shown, without exiting the controlling procedure. The double arrows mean that you may pull a specific strategy from the support procedure set without leaving the procedure in effect. Note, not all sites have AOPs that would refer to FSGs. Interface with SAMGs and EDMGs (dotted arrows) are not within the scope of this guide.
 - FSGs would be similar in intent as the current 50.54(hh)(2) guides. The future EDMG may rely upon FSGs.
- The heavy line between EOPs and SAMGs represents the procedure transition due to imminent core damage or damage to SFP fuel.

Attachment 5

Proposed Example Language for High-Level Rule

Each licensee shall develop and implement Severe Accident Management Guidance for implementing strategies intended to mitigate the impacts of a severe reactor accident, which is an accident involving significant fuel damage to the reactor core or spent fuel pool.

- 1) Licensees shall establish command and control responsibilities for severe accidents, including those for which the control room may be unavailable, and for which multiple units at a single site may be affected.
- 2) Licensees shall establish clear transitions from Emergency Operating Procedures to Severe Accident Management Guidance.
- 3) Licensees shall maintain and document Severe Accident Management Guidance.
- 4) Licensees shall establish appropriate training and drills for personnel responsible for mitigating severe accidents.

Rulemaking Comments

From: PIETRANGELO, Tony [arp@nei.org]
Sent: Monday, June 18, 2012 4:13 PM
Subject: Docket ID NRC–2012–031; 10 CFR Part 50 and 52, Onsite Emergency Response Capabilities; Advance Notice of Proposed Rulemaking (77 Fed. Reg. 23161)
Attachments: 06-18-12_NRC_Onsite Emergency Response Capabilities; Advance Notice of Proposed Rulemaking.pdf; 06-18-12_NRC_Onsite Emergency Response Capabilities; Advance Notice of Proposed Rulemaking_Attachment 1.pdf; 06-18-12_NRC_Onsite Emergency Response Capabilities; Advance Notice of Proposed Rulemaking_Attachment 2.pdf; 06-18-12_NRC_Onsite Emergency Response Capabilities; Advance Notice of Proposed Rulemaking_Attachment 3.pdf; 06-18-12_NRC_Onsite Emergency Response Capabilities; Advance Notice of Proposed Rulemaking_Attachment 4.pdf; 06-18-12_NRC_Onsite Emergency Response Capabilities; Advance Notice of Proposed Rulemaking_Attachment 5.pdf

June 18, 2012

Ms. Annette L. Vietti-Cook
Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attn: Rulemakings and Adjudications Staff

Subject: Docket ID NRC–2012–031; 10 CFR Part 50 and 52, Onsite Emergency Response Capabilities; Advance Notice of Proposed Rulemaking (77 Fed. Reg. 23161)

Project Number: 689

Dear Ms. Vietti-Cook:

On behalf of the commercial nuclear energy industry, the Nuclear Energy Institute (NEI) submits comments on the subject advance notice of proposed rulemaking (ANPR) regarding onsite emergency response capabilities. The industry has decades of experience in this subject, and has established substantial capability for severe accident mitigation, as well as its integration with the overall emergency response structure. We welcome the opportunity to respond to this ANPR.

The ANPR seeks information to inform a potential rulemaking or other regulatory action relative to establishing regulatory controls for onsite emergency response capabilities. In response to the accident at Fukushima Daiichi, the NRC is seeking information relative to severe accident management guidelines (SAMGs) and their integration with other elements of the onsite emergency response capability. These guidelines were developed and implemented by the industry in the 1990s and provide guidance for addressing a beyond-design-basis accident involving core damage. Following the events of September 11, 2001, the industry developed extensive damage mitigation guidelines (EDMGs) to address loss of large areas due to fire or explosion. In the subject ANPR, the NRC seeks information relative to transitions from emergency operating procedures (EOPs) to SAMGs or EDMGs, command and control responsibility, qualification and training of personnel, standardization, documentation and maintenance, technical bases, and incorporation of Fukushima lessons

learned. The ANPR also provides questions relative to integration of this effort with other post-Fukushima regulatory activities. Attachment 1 provides responses to the ANPR questions.

Despite a lack of a formal regulatory structure, the industry has developed considerable infrastructure and capability with respect to severe accident management. The NRC has also devoted considerable research and attention to this subject and has maintained awareness and involvement in the industry efforts. The overall industry structure involves EPRI, the reactor vendor owners groups (OG) and the individual plants. EPRI has responsibility for developing the Technical Basis Report (TBR), which provides the fundamental scientific understanding of severe accident phenomenology and its translation into "candidate high-level actions" to mitigate the accident progression. The OGs use the TBR to develop NSSS-specific severe accident guidelines taking into account NSSS reactor and containment design features. Each plant then uses the OG guidelines to develop plant-unique severe accident guidance. Transitions from EOPs to SAMGs or EDMGs, and command and control, are addressed in the overall site emergency response plan. The industry, through the OGs, has developed documents describing SAMG Guiding Principles, and SAMG Training and Drills. These documents are provided as Attachments 2 and 3, respectively, with the intent of providing the NRC with a better understanding of current industry practices.

A major industry effort is currently underway to update the TBR, and the OG Severe Accident Guidelines, to address insights from the accident at Fukushima, as well as to incorporate additional improvements and refinements. Further efforts are underway to improve the standardization of the three PWR SAMGs. Additionally, given the post-Fukushima significance of SAMGs, efforts are underway in the U.S. to assess and improve training, qualification, integration, command and control, and ensure transitions from or into EOPs or EDMGs are clear. With regard to transitions, implementation of the diverse and flexible coping strategies (FLEX) will result in new procedures and interfaces with EOPs and will affect SAMGs to a smaller degree. Discussion of pertinent FLEX procedural guidance is excerpted from NEI 12-06 and provided as Attachment 4.

The industry proposes that the NRC develop a high-level rule specifying necessary attributes of onsite emergency preparedness, and the industry would concurrently develop guidance for NRC consideration under the Regulatory Guide accompanying the rule. Attachment 5 provides example high-level rule language. We are prepared to begin associated guidance development in short order, and we believe the draft NRC Regulatory Guide should be published concurrent with the proposed rule. Elements of existing industry guidance, including the following, would be pertinent as starting points for industry guidance development:

1. NUMARC 91-04, Revision 1, *Severe Accident Issue Closure Guidelines*
2. NEI 12-01, *Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities*
3. NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*

With regard to resource and timeline estimates for meeting any new regulatory requirements, Attachment 1 primarily provides information with respect to ongoing industry activities to strengthen SAMGs. If these activities are essentially codified by the final rule, these estimates provide some indication of implementation resources. Should the NRC establish significant new expectations, such as applicability of 10 CFR Part 50, Appendix B, expected resource impacts would be far greater.

The industry looks forward to a productive engagement with the NRC as this rulemaking proceeds. We recognize that public engagements on the rulemaking will not occur until the end of 2012. In that regard, we propose conducting public meetings during 2012 to provide the NRC information on existing industry practices,

technical bases improvements, and other elements that would inform the NRC's deliberation. We recognize that these meetings would be informational and not to discuss the rulemaking activity.

We look forward to being involved in the public process regarding this important rulemaking. As noted earlier, detailed responses to each of the questions posed in the ANPR are contained in Attachment 1. If you have any questions regarding these comments, please contact me or Biff Bradley (202.739.8083; reb@nei.org).

Sincerely,

Anthony R. Pietrangelo
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