

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: Chairman Burns

SUBJECT: COMSECY-14-0037: INTEGRATION OF MITIGATING STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS AND THE REEVALUATION OF FLOODING HAZARDS

Approved X Disapproved X Abstain \_\_\_\_\_ Not Participating \_\_\_\_\_

COMMENTS: Below \_\_\_\_\_ Attached X None \_\_\_\_\_



SIGNATURE

11 March 2015  
DATE

Entered in "STARS" Yes  No \_\_\_\_\_

## **Chairman Burns' comments on COMSECY-14-0037: Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards**

The matters raised by the staff in COMSECY-14-0037, and in the associated non-concurrences, involve complex technical and policy issues related to the agency's implementation of two important lessons learned activities stemming from the accident at Fukushima Dai-ichi, namely, flooding hazard reevaluations and the implementation of mitigating strategies for beyond-design-basis external events. These matters are also presented to the Commission nearly four years into the Fukushima lessons learned implementation. As I have stated, the timely closure of the Fukushima lessons-learned implementation is a top priority for the agency. As such, I have tried to achieve a reasonable balance in my vote between ensuring that the agency is focused on the most safety-significant matters in achieving timely closeout and the need to ensure that we have a complete understanding of flooding risks at U.S. nuclear power plants.

In COMSECY-14-0037, the staff recommends that the Commission affirm the following:

1. Licensees for operating nuclear power plants need to address the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events;
2. Licensees for operating nuclear power plants may need to address some specific flooding scenarios that could significantly damage the power plant site by developing targeted or scenario-specific mitigating strategies, possibly including unconventional measures, to prevent fuel damage in reactor cores or spent fuel pools; and
3. The staff should revise the Near-Term Task Force (NTTF) Recommendation 2.1 flooding assessments and integrate the Phase 2 decision-making into the development and implementation of mitigating strategies in accordance with Order EA-12-049 and the related Mitigation of Beyond-Design-Basis Events (MBDBE) rulemaking.

I approve staff Recommendations 1 & 2. I do not approve the staff's proposal in Recommendation 3 as I interpret it to be asking the Commission to change course with respect to NTTF Recommendation 2.1 for flooding assessments in a manner not fully justified in the paper. I address my decision on each of the recommendations in more detail below.

### Recommendation 1

I agree with my Commission colleagues that it is clear from the language of the Mitigating Strategies Order that the Commission intended the mitigating strategies equipment to be protected from flooding levels beyond the current design basis.

The Commission has determined that ensuring adequate protection of public health and safety requires that power reactor Licensees and CP holders develop, implement and maintain guidance and strategies to restore or maintain core cooling, containment, and SFP cooling capabilities in the event of a *beyond-design-basis external event*.<sup>1</sup> [emphasis added]

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<sup>1</sup> Order EA-12-049 issued to all licensees, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012.

It is appropriate therefore, that licensees address the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events to comply with Order EA-12-049 and that the MBDBE rulemaking codify this requirement.

Recommendation 2:

Although I approve the staff's Recommendation 2, I agree with Commissioners Ostendorff and Baran that it is within the staff's authority, and is the staff's responsibility, to determine, on a plant-specific basis, whether targeted or scenario-specific mitigating strategies, possibly including unconventional measures, are an acceptable means of demonstrating compliance with the Mitigating Strategies Order.

Recommendation 3:

Recommendation 3 presents the most challenging of the staff's three recommendations in my view. In a sense, this issue arises in part because of the inherent difficulties in trying to apply regulatory approaches intended for new, not yet designed, reactors to existing operating reactors. The NRC has faced this issue on several occasions in the past and has found ways to assure adequate protection of public health and safety for both new and operating reactors, albeit through different means. In the instance of flooding reevaluations, methodologies originally intended to assess flooding risks for the purpose of siting yet-to-be built reactors were used to analyze hazards for existing plants in the context of Phase 1 of the 50.54(f) requests for information. As a result, both the NRC and industry are struggling to find reasonable and timely approaches to reach finality. The Commission's task here is to determine the most reasonable and responsible path forward.

It is important to recall the regulatory history that led to this issue. In the Staff Requirements Memorandum (SRM) for SECY-11-0124, "Recommended Actions to be Taken Without Delay from the Near-Term Task Force Report," the Commission approved the staff's intent to issue a request for information to all operating reactor licensees to address, among other things, reevaluations of seismic and flooding hazards in accordance with NTTF Recommendation 2.1. It was always envisioned that this would entail a two-phased approach. The request for information, issued under the provisions of 10 CFR 50.54(f) on March 12, 2012,<sup>2</sup> (50.54(f) letter) states:

A hazard evaluation consistent with Recommendation 2.1 will be implemented in two phases as follows:

- Phase 1: Issue 10 CFR 50.54(f) letters to all licensees to request that they reevaluate the seismic and flooding hazards at their sites using updated seismic and flooding hazard information and present-day regulatory guidance and methodologies and, if necessary, to request they perform a risk evaluation. The evaluations associated with the requested information in this letter do not revise the design basis of the plant. This letter implements Phase 1.

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<sup>2</sup> Letter to all licensees, "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.

- Phase 2: Based upon the results of Phase 1, the NRC staff will determine whether additional regulatory actions are necessary (e.g., update the design basis and SSCs important to safety) to provide additional protection against the updated hazards.

As stated further in Enclosure 2 to the 50.54(f) letter, part of the purpose of the request for information was to “collect information to facilitate NRC’s determination if there is a need to update the design basis and systems, structure, and components (SSCs) important to safety to protect against the updated hazards at operating reactor sites.” Enclosure 2 also explicitly stated that the letter was requesting licensees to “reevaluate the flooding hazards at their sites against present-day regulatory guidance and methodologies being used for early site permits and combined license reviews.” In addition, the 50.54(f) letter noted that licensees were also being asked to “identify actions that have been taken or are planned to address plant-specific vulnerabilities associated with the updated flooding hazards.”

The information requested with respect to flooding hazards was two-fold. First, the 50.54(f) letter requested a Hazard Reevaluation Report and, second, for “plants where the current design basis floods do not bound the reevaluated hazard for all flood causing mechanisms,” an Integrated Assessment Report was to be provided. The Integrated Assessment Report was to provide the following:

- a. A description of the integrated procedure used to evaluate integrity of the plant for the entire duration of flood conditions at the site.
- b. Results of the plant evaluations describing the controlling flood mechanisms and its effects, and how the available or planned measures will provide effective protection and mitigation, including a discussion of whether there is margin beyond the postulated scenarios.
- c. A description of any additional protection and/or mitigation features that were installed or are planned, including those installed during course of reevaluating the hazard. The description should include the specific features and their functions.
- d. Identification of other actions that have been taken or are planned to address plant-specific vulnerabilities.

Attachment 1 to Enclosure 2 provided a detailed ten-step process for developing the information requested. Step 7 directed licensees to “perform an integrated assessment using the procedures developed in interactions with the NRC staff,” for flood causing mechanisms that were not bounded by the current design basis.

The staff subsequently developed guidance for performing integrated assessments, with significant interactions with and input from the nuclear industry, and issued that guidance in the form of JLD-ISG-12-05, “Draft Interim Staff Guidance on Performance of an Integrated Assessment for Flooding.”

Finally, the 50.54(f) letter stated that the information provided in the Integrated Assessment Report “will be evaluated by the NRC in Phase 2 to consider any additional regulatory actions.” The letter also noted that “[i]nformation related to the identification of actions that will be taken or planned to be taken to address plant-specific vulnerabilities will inform staff’s development of ‘acceptance criteria’ necessary to conduct Phase 2.”

I read COMSECY-14-0037 as a request by the staff for approval to allow licensees to forego providing the second part of the information requested for Phase 1 of the flooding assessments, i.e., results from the performance of the integrated assessment as laid out in the 50.54(f) letter

and detailed further in JLD-ISG-12-005, and to integrate the Phase 2 decision-making process with the development and implementation of mitigating strategies. After a careful review of the history of the 50.54(f) letters, I conclude that what the staff is requesting in Recommendation 3 deviates from what the Commission has previously approved with respect to implementation of NTTF Recommendation 2.1. Although I am not of the view that deviation from a course set three years ago is not possible, in this instance, I am not convinced that the staff has sufficiently justified such a deviation. I also believe that it is premature to determine that there is no possibility of significant safety benefit for at least a subset of plants in continuing with the current approach, albeit it in some modified form. As the staff acknowledges in the paper, their recommended approach “reduces the level of information to be submitted by licensees, and the assessments will focus on mitigating strategies instead of more varied enhancements to protect against a broad range of flooding conditions.” Thus, my concern is that it is premature to reach the conclusion that there cannot be justifiable safety benefits that could be realized by continuing with the existing approach in some form.

That being said, I agree with Commissioners Ostendorff and Baran that this is an appropriate time to take a step back to ensure that we are taking a realistic, efficient, and risk-informed approach to addressing reevaluated flooding hazards. At this point, I do not believe that it is necessary for the Commission to direct the staff to revisit the flooding hazard evaluation guidance established for Phase 1 of the flooding assessments, which is based on long-standing guidance for new reactors and was developed by the agency’s technical experts in this area with significant industry input.

However, in recognition of the possibility that use of the flooding guidance intended for new reactors may result in overly-conservative results for existing facilities, and the fact that the staff still appears unsure of what it might do with those results from a regulatory perspective, I agree that it is an appropriate time for the staff to reassess the integrated assessment guidance. It is likely that experience in reviewing flood hazard reevaluations has highlighted improvements that could be made to the guidance before the industry proceeds with performance of integrated assessments. In addition, I agree with Commissioners Ostendorff and Baran that a graded approach to determining the need for and scope of plant-specific integrated assessments is warranted. This is similar to the approach the agency has taken in determining which licensees should perform seismic probabilistic risk assessments (PRAs) based on the characteristics of the exceedance of the reevaluated seismic hazard as compared to the current licensing basis. I agree with Commissioner Baran that revised guidance for performing integrated assessments should include additional screening criteria so that integrated assessments are focused on those plants where there is the greatest opportunity for additional safety enhancements and that the staff’s existing graded approach should be incorporated into the revised guidance and refined, if necessary.<sup>3</sup>

I also agree with Commissioners Ostendorff and Baran that it is time to develop clear guidance for Phase 2 to address how the Phase 1 information will be used in regulatory decision-making in the context of NTTF Recommendation 2.1 for flooding. Any process developed by staff needs to ensure that the Phase 2 guidance and acceptance criteria take into account the fact that flood hazard reevaluations were done using guidance meant for plants that have not yet been designed and constructed and for which there would still be the opportunity to “design in” flood protection and mitigation features. Therefore, the Phase 2 process should allow a great deal of flexibility in the way in which licensees choose to address vulnerabilities identified

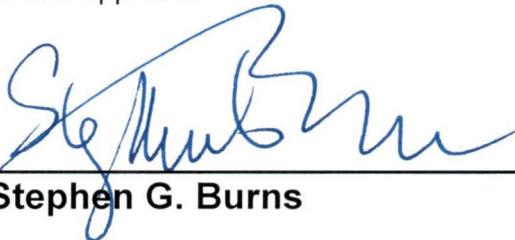
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<sup>3</sup> Letter to Nuclear Energy Institute (ADAMS Accession No. ML12326A912), “Trigger Conditions for Performing an Integrated Assessment and Due Date for Response,” December 3, 2012.

through the integrated assessment process that relied on hazards developed using guidance for new plants. That flexibility should include the opportunity for licensees to demonstrate that vulnerabilities identified may be less risk significant when more realistic assumptions are applied in the analyses. The process should provide for efficient closure of Recommendation 2.1, use resources judiciously, and be risk-informed and performance-based, to the extent practicable. The process should also take into account the fact that the licensees are protecting mitigating strategies equipment from the reevaluated flood hazard developed in accordance with the 50.54(f) letter and the associated guidance. Of course, the Phase 2 process should also be consistent with our existing backfit guidance for determining whether additional requirements are warranted.

In his vote, Commissioner Ostendorff drew an analogy between the staff's request for adjustments to the flooding assessment process and the redirection that the agency took with respect to seismic hazard reevaluations when it was determined that full seismic PRAs would likely take longer than originally envisioned. In that case, the industry proposed and the staff accepted the "expedited approach" whereby, once the reevaluated hazard was determined, a simplified analysis was used to identify near-term safety enhancements that could be made while more time was allowed to perform the more complex seismic PRAs. Here, in the face of a possibly protracted flooding assessment process, the protection of mitigating strategies equipment from the reevaluated flood hazard will likewise provide near-term safety benefit while the more complex but necessary integrated assessments are completed. I agree with the Advisory Committee on Reactor Safeguards (ACRS), which noted that the integrated assessments "should evaluate all pertinent plant equipment that is important to safety, as well as that identified in the mitigating strategies, and the corresponding personnel actions." The ACRS further stated, "Results from the assessments should be used to identify measures that effectively balance protection of normal plant safety systems with mitigation of damage to those systems."<sup>4</sup>

The staff should proceed expeditiously to clearly define the steps needed to complete our actions in response to NTTF Recommendation 2.1 for flooding and, within three months of the date of the SRM for COMSECY-14-0037, provide a plan for achieving closure of this recommendation to the Commission for review and approval.

  
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**Stephen G. Burns**

**11 March 2015**  
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**DATE**

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<sup>4</sup> Letter from John W. Stetkar to Allison M. Macfarlane, "Commission Paper, Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards," December 10, 2014.

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary  
FROM: COMMISSIONER SVINICKI  
SUBJECT: COMSECY-14-0037: INTEGRATION OF MITIGATING STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS AND THE REEVALUATION OF FLOODING HAZARDS

Approved XX Disapproved \_\_\_\_\_ Abstain \_\_\_\_\_

Not Participating \_\_\_\_\_

COMMENTS: Below \_\_\_\_\_ Attached XX None \_\_\_\_\_

  
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**Commissioner Svinicki's Comments on COMSECY-14-0037  
Integration of Mitigating Strategies for Beyond-Design-Basis External Events  
and the Reevaluation of Flooding Hazards**

In this paper, the NRC staff requests that the Commission affirm the appropriate regulatory treatment of the flooding reassessments and their integration with the development and implementation of mitigating strategies in accordance with Order EA-12-049 and the related rulemaking addressing mitigation of beyond-design-basis events (MBDBE). I approve the staff's three recommendations and, in so doing, affirm the staff's understanding of the course that the Commission has set in the pattern of its post-Fukushima decision-making over the course of the nearly past four years; activities in which I have been a direct participant. Under this approach, the agency's regulatory responses to the events in Fukushima are considered as a reinforcing set of actions, where each subsequent regulatory action considers and builds on the knowledge gained during each evaluative step that has come before it.

Specifically, the staff requests that the Commission affirm: 1) that licensees for operating nuclear power plants need to address the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events; 2) that licensees for operating nuclear power plants may need to address some specific flooding scenarios that could significantly damage the power plant site by developing targeted or scenario-specific mitigating strategies, possibly including unconventional measures, to prevent fuel damage in reactor cores or spent fuel pools, and; 3) that the staff should revise the flooding assessments and integrate the Phase 2 decision-making into the development and implementation of mitigating strategies in accordance with Order EA-12-049 and the related MBDBE rulemaking. While I am not convinced that all actions embodied in this request require Commission approval (believing some to be delegated staff-level implementing decisions), I nonetheless affirm and approve all three items.

I do not find this matter to be a close call, or a nuanced, philosophical judgment. The staff asks that NRC be permitted "to prioritize developing and implementing robust mitigating strategies capable of responding to the newly identified hazards." In the staff's own words, "[l]icensees and the NRC staff would be able to leverage their recent experience and lessons learned from implementing Order EA-12-049 in addressing potential changes to the mitigating strategies or developing targeted hazard-specific strategies for specific external events."

This is consistent with the direction previously issued by the Commission regarding another hazard – namely, seismic. Specifically, with regard to the regulatory treatment of the seismic reevaluations, the Commission directed that "[i]f the industry submits an alternative, practical engineering approach . . . that could result in the quicker implementation of plant safety enhancements while enabling plants to complete the assessment within the schedule defined in the 50.54(f) request for information letter, the staff should provide an information paper to the Commission containing a determination of whether this approach is acceptable to the staff, or, if not, explaining how continuing with the staff's approach . . . provides superior safety benefits on a reasonable timetable." [See SRM, 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."]

Here, the staff has made a parallel determination of the benefits, but for the flooding hazard, and states "that the integration of the activities will provide the desired outcome in terms of meaningful and assured safety improvements. The recommended approach also provides benefits in terms of established regulatory clarity and stability, reducing demands on schedules

and resources, and ensuring timely responses to the lessons learned from the Fukushima accident.” While I will not assert that such decisions fall exclusively in the staff’s implementing domain, in light of the consistency of the staff’s requests here with previous Commission direction regarding a parallel hazard, I certainly find no policy basis for the Commission to deny the staff’s requests.

Quite to the contrary, this approach is entirely consistent with the Commission’s previous direction regarding the agency’s post-Fukushima actions, which stated: “As the staff evaluates Fukushima lessons-learned and proposes modifications to NRC’s regulatory framework, the Commission encourages the staff to craft recommendations that continue to realize the strengths of a performance-based system as a guiding principle. In order to be effective, approaches should be flexible and able to accommodate a diverse range of circumstances and conditions. In consideration of events beyond the design basis, a regulatory approach founded on performance-based requirements will foster development of the most effective and efficient, site-specific mitigation strategies, similar to how the agency approached the approval of licensee response strategies for the ‘loss of large area’ event under its B.5.b program.” [See SRM, SECY-11-0124, “Recommended Actions to be Taken Without Delay from the Near-Term Task Force Report.”]

With respect to the staff’s second request that the Commission affirm that licensees may need to address some specific extreme flooding scenarios by possibly developing unconventional measures which may ultimately sacrifice the asset in the interest of protecting public health and safety, based on my study of agency policy and precedent, I share the staff’s conclusion that such approaches are consistent with longstanding policies on the treatment of design-basis events and safety enhancements to address beyond-design basis events. I am aware of no policy or provision of law requiring NRC regulations to value the saving of an asset over the protection of public health and safety. If an asset must be sacrificed to do so, our regulations should certainly prove no impediment.

I respect the work of the Near-Term Task Force, whose members did yeoman’s work in 90 short days and whose final report stands out among those of other Nations in erudition and thoughtfulness, but it is time to speak plainly to the fact that no one has the whole answer in 90 days. In the intervening years since that report, the Commission has deliberated and closed Recommendation 1 and the NRC staff – as a body made up of hundreds of experts – has taken the Task Force’s good efforts and advanced the agency’s thinking significantly beyond it. All of the agency’s contributors are to be commended for their long labors to this end. To the extent that this paper advances merely one in a whole series of informed refinements in our regulatory response to Fukushima, the Commission should continue to foster this NRC culture of continuous evaluation, feedback, learning, and improvement. To do otherwise would be inconsistent with the NRC Principles of Good Regulation and detrimental to the cause of safety.

The differing staff experts on this issue are a thoughtful group of individuals, long recognized for their commitment to the NRC and its mission. While approving the staff’s three requests in this paper, I also agree and acknowledge that the activities related to the flooding reevaluations may result in the NRC staff identifying safety concerns and the need to consider regulatory actions beyond those being implemented in accordance with Order EA-12-049 and the related MBDDBE rulemaking. The staff should direct these safety issues to established agency processes for site-specific resolution or generic issues to the NRC’s Generic Issues Program, consistent with Management Directive 6.4. The staff should develop plans for generic issue resolution and communicate these plans to the Commission.

U.S. nuclear power plants are operating safely. From statements made by an agency former Chairman as he stood in the Rose Garden with President Obama in the earliest days after the Fukushima accident to testimony given just last month before the U.S. Congress by our most recent former Chairman, NRC has given and repeated this assurance. In responding to the Fukushima event, therefore, the NRC's obligation to the American people is fulfilled not through an elusive search for a state of perfect knowledge of risk – the adding of decimal places to analyses of high consequence events of vanishingly small probability. It is fulfilled through the achievement of tangible, real world safety enhancement. In the United States, this approach has yielded significant regulatory action, and industry response, thus far. Here, the staff asks us to re-affirm that we intend to stay this course and pursue this goal for the reassessed flooding hazard and presents the staff's step-wise implementation actions for a rational means to its achievement. I affirm this goal and provide my full support to the staff's intended actions.



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Kristine L. Svinicki 1/13/2015

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary  
FROM: COMMISSIONER OSTENDORFF  
SUBJECT: COMSECY-14-0037: INTEGRATION OF MITIGATING STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS AND THE REEVALUATION OF FLOODING HAZARDS

Approved  Disapproved  Abstain  Not Participating

COMMENTS: Below  Attached  None

  
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Entered in "STARS" Yes  No

**Commissioner Ostendorff's Comments on COMSECY-14-0037:  
"Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the  
Reevaluation of Flooding Hazards"**

The NRC's post-Fukushima actions represent a comprehensive and integrated suite of safety enhancements to address the key lessons learned from the March 2011 accident at Fukushima Dai-ichi. Significant progress has been made by the NRC and industry to address the lessons learned from this accident. As directed by the Commission, priority has been given to those actions with the greatest opportunity for safety enhancements. In keeping with this philosophy, the staff should continue to ensure that implementation of Order EA-12-049 is completed in a timely fashion to provide near term safety enhancements, including the capability to maintain the plant in a safe condition in the event of a flood beyond the current design basis.

In COMSECY-14-0037, the staff specifically sought Commission approval of three recommendations. Some of these individual matters could have arguably been addressed by the staff without Commission involvement. However, it was prudent of the staff to bring these issues to the attention of the Commission in light of the significant level of Commission involvement in post-Fukushima regulatory actions and also in light of the high level of stakeholder interest in these matters. I support and encourage the staff to continue to take this conservative approach in raising matters to the Commission in a timely manner to facilitate prompt regulatory decision-making. I thank the staff across the Agency, including the authors of the non-concurrences on COMSECY-14-0073, for their continued diligence and significant progress on these and all other Tier 1 Fukushima actions. I also thank the Advisory Committee on Reactor Safeguards (ACRS) for their timely review and valuable perspectives on these matters. My vote for each recommendation is provided below.

Recommendation 1: I approve recommendation 1.

As stated 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," the strategies and guidance developed and implemented by licensees in response to the requirements imposed by Order EA-12-049 will provide the necessary capabilities to supplement those of the permanently installed plant structures, systems, and components that could be unavailable following beyond-design-basis external events. The capability to maintain the plant in a safe condition in the unlikely event of a flood beyond the current design basis provides additional safety margins and defense-in-depth. On March 9, 2012, the Commission approved this order to ensure adequate protection of public health and safety.

In parallel, the staff requested that licensees reevaluate flooding hazards in letters to power reactor licensees issued on March 12, 2012, pursuant to Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Section 50.54(f) (hereafter referred to as the § 50.54(f) letter). I agree with the ACRS's conclusion that "to provide confidence that the mitigating strategies developed in accordance with Order EA-12-049 achieve the desired objectives, there should be assurance that the associated equipment will remain available and the identified personnel responses are feasible under the reevaluated flooding hazard conditions." Licensees for operating nuclear power plants must provide the capability to mitigate beyond design basis flooding hazards within their mitigating strategies for beyond-design-basis external events to comply with this order, and the staff should include this requirement in the proposed mitigation of beyond-design-basis events (MBDBE) rulemaking when it is submitted to the Commission for approval.

Because of conservatism in the flooding hazard methodologies and the limited capability to conduct probabilistic flooding hazard assessments, the reevaluated flooding hazard may not be appropriate for use in determining whether plant-specific backfits are warranted. The NRC's Reliability Principle of Good Regulation states that:

“Regulations should be based on the best available knowledge from research and operational experience. Systems interactions, technological uncertainties, and the diversity of licensees and regulatory activities must all be taken into account so that risks are maintained at an acceptably low level. Once established, regulation should be perceived to be reliable and not unjustifiably in a state of transition. Regulatory actions should always be fully consistent with written regulations and should be promptly, fairly, and decisively administered so as to lend stability to the nuclear operational and planning processes.”

In keeping with the Reliability Principle, implementation of the mitigating strategies order should proceed expeditiously to provide enhanced capability to address the reevaluated flooding hazards. While the reevaluated hazards submitted by licensees in response to the March 12, 2012, § 50.54(f) letter should be used to establish the performance capabilities of the mitigating strategies equipment and procedures, as stated in the § 50.54(f) letter, “the evaluations associated with the requested information in this letter do not revise the design basis of the plant.” As stated in the staff's March 1, 2013, letter providing information to supplement the § 50.54(f) letter, “the NRC staff will follow established regulatory processes, including the backfit rule, in determining whether additional requirements are warranted.” Further, the mitigating strategies order was never intended to lead to a revised design basis for any specific external hazard. Rather, the order provides additional safety margins through enhanced mitigation capability to maintain safety through a prolonged station blackout event that could result from beyond-design-basis external events. As discussed in more detail under recommendation 3, the NRC will use established regulatory processes, including the backfit rule (10 CFR 50.109), in determining whether additional regulatory actions, including backfits, are warranted in response to the information gathered through the March 12, 2012, § 50.54(f) letter.

Recommendation 2: I approve recommendation 2.

I agree in principle with the staff's recommendation for the Commission to affirm that some licensees may need to develop targeted or scenario-specific mitigating strategies to address flooding hazards. However, it is under the staff's purview to make the determination on a plant-specific basis as to whether targeted or scenario-specific mitigating strategies are an acceptable means to provide enhanced capability to maintain the plant in a safe condition in the event of a flood beyond the current design basis in order to demonstrate compliance with Order EA-12-049. In making this determination, the staff should ensure that the strategies are feasible and that they are capable of functioning for the expected duration of the flood and the time during which the flood is expected to recede. Further, licensees should have the capability to mitigate a range of beyond design basis floods to ensure the capability to address potential cliff-edge effects that may result from a lesser but potentially more likely flooding scenario. If the staff determines that revised orders are necessary to permit non-conventional targeted or scenario-specific mitigating strategies, the staff should seek Commission approval.

Recommendation 3: I disapprove recommendation 3.

The March 12, 2014, § 50.54(f) letter divided the flooding hazard reevaluations into two phases. Phase 1 consists of requesting that licensees reevaluate the flooding hazards at their sites, and,

if necessary, to request they perform a risk evaluation. In Phase 2, the NRC was to use the results of Phase 1 to determine whether additional regulatory actions are necessary (e.g., update the design basis and SSCs important to safety) to provide additional protection against the updated hazards. My understanding of the staff's recommendation 3 in COMSECY 14-0037 is that the reevaluated flooding hazards determined in response to Phase 1 of the March 12, 2014, 50.54(f) letter would be addressed through mitigating strategies capabilities (Order EA-12-049) and that phase 2 of NTTF Recommendation 2.1 flooding integrated assessments would be suspended. I do not approve this approach.

While issuance of letters pursuant to § 50.54(f) is under the staff's purview, in this case, the Commission approved the implementation of NTTF Recommendation 2.1 through issuance of the § 50.54(f) letter, as part of a comprehensive set of safety enhancements to address the lessons learned from the Fukushima accident as described in SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," and SECY-12-0025. In COMSECY-14-0037, the staff did not provide a compelling basis to suspend Phase 2 of the NTTF Recommendation 2.1 Flooding reevaluations. I agree with the ACRS that "results from the assessments should be used to identify measures that effectively balance protection of normal plant safety systems with mitigation of damage to those systems." That said, the staff has nearly two years of experience thus far in reviewing the reevaluated flood hazards submitted by licensees in response to the § 50.54(f) letter. It is appropriate at this time to take a step back to ensure that we are taking a realistic, efficient and risk-informed approach to addressing the reevaluated flooding hazards.

This step back is similar to what occurred over the course of the seismic hazard reevaluation reviews. The approach for seismic hazard reevaluations has evolved as new information has become available. For example, during the seismic reviews it was recognized that updated ground motion models would provide more reliable results. In addition, the expedited seismic evaluation process was developed as a screening, evaluation, and equipment modification process to provide additional seismic margin and expedite plant safety enhancements for certain core and containment cooling components while more detailed and comprehensive plant seismic risk evaluations are being performed. Further, state-of-the-art probabilistic techniques are available to support risk-informed decision-making based on reevaluated seismic hazards. In the case of flooding, a step back at this stage is even more warranted, because flooding analysis methods are still largely deterministic and in some cases arguably overly conservative for the purpose of regulatory analysis of potential safety enhancements to operating plants.

Therefore, to support reliable decision-making, the staff should revise or supplement the guidance developed for Phase 1 and Phase 2 of the flooding reevaluations, and ensure that clear guidance is put in place for how this information will be used in regulatory decision-making in the context of NTTF Recommendation 2.1. Consistent with the NRC's Principles of Reliability, Efficiency and Clarity and the Commission Policy on the use of PRA, the overall approach should seek to identify realistic flooding scenarios, use risk information to the extent practical, and consider lessons learned from all ongoing and completed Fukushima regulatory actions.

In developing this approach, the staff should address the following:

Flooding Hazards:

Recognizing that the Commission supported the use of so-called "present-day" guidance and methodologies, the staff should now evaluate potential changes to the guidance for

determining flooding hazards to introduce more realism for the purpose of identifying potential safety enhancements for operating reactors. For example:

- In the absence of mature probabilistic flooding hazard methods, the staff should take a practical approach to determine realistic flood levels. The staff should focus its attention on flood scenarios of a higher likelihood that could result in cliff-edge effects and where substantial safety benefits can be achieved, rather than on scenarios of very low likelihood where limited risk improvements are expected. In doing so, the staff should continue to use engineering judgment and consider the qualitative likelihood initiating events when quantitative tools and data are not available.
- Notwithstanding the guidance in ANSI 2.8, 1992, the staff should evaluate NRC guidance regarding concurrent events for the purpose of reevaluating flooding hazards for operating reactors. Concurrent events should be assumed only when there is causality between the events. For example, dam failure is a potential outcome of a seismic event. However, assuming that dams are at maximum capacity coincident with a seismic event introduces unnecessary conservatism when assessing existing nuclear facilities. At the time of a seismic event, dams and rivers should be assumed to be at nominal or typical levels, consistent with normal dam operating practices and procedures rather than at flood levels.
- Assumptions should be evaluated for realism. For example, for local precipitation events, it should not be necessary for the licensee to assume that drains are clogged if there is a commitment for periodic surveillance of the drains, and if plant procedures call for verifying that drains are clear when a precipitation event is forecast.
- The staff should assess the level of precision that is required in the flooding hazard and use sensitivity analysis when appropriate in order to complete timely reviews, consistent with the NRC Principle of Efficiency which states that “where several effective alternatives are available, the option which minimizes the use of resources should be adopted,” and that “regulatory decisions should be made without undue delay.”

#### Assessment of Plant Response to Reevaluated Flooding Hazards:

The staff should evaluate potential changes to the guidance for assessing the plant response to reevaluated flooding hazards to introduce efficiencies including:

- Developing additional screening criteria, based on available physical margin and other factors, to allow the NRC and industry to focus its attention on those plants where there is the greatest opportunity for additional incremental safety enhancements. Currently, NRC guidance calls for an integrated plant assessment for all sites where the reevaluated flooding hazard exceeds the current design basis. In some of these cases, there may be no resulting damage to plant equipment. Therefore, the staff should consider developing criteria for a more graded approach in determining which plants would be required to complete an assessment of the plant response to reevaluated flood hazards and developing a more graded approach to the scope of such assessments.
- Continuing to consider all available means to maintain the plant in a safe condition, including the mitigating strategies equipment, to assess the plant response to reevaluated flood hazards. The staff should also credit the use of temporary flood

protection features when the capability is demonstrated and sufficient warning and preparation time are available.

#### Regulatory Decision-Making Based on Flooding Assessment Results:

The “Backfit Rule” (10 CFR 50.109, “Backfitting”) and NRC Management Directive 8.4, “Management of Facility-Specific Backfitting and Information Collection,” provide a sound framework for regulatory decision-making. Additional regulatory guidance is also available in NUREG/BR-0058, Revision 4, “Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission, and NUREG-1409, “Backfitting Guidelines.” However, there is a lack of clarity in COMSECY-14-0037 with regard to how this regulatory decision-making framework will be implemented to evaluate potential future regulatory actions resulting in the case of flooding hazard reevaluations.

- To provide a clear path forward on the closure of the § 50.54(f) letter, additional clarity should be established on how the staff intends to implement the backfit rule to evaluate potential safety enhancements beyond those required by Order EA-12-049 to address the flooding hazard information gathered in response to the § 50.54(f) letter.
- Regulatory decision-making based on flooding assessment results should consider an appropriate balance between protection and mitigation based on the principle of defense-in-depth with recognition of the inherent practicalities of modifying an existing plant. When practical, permanent or temporary flood barriers should be considered rather than relying solely on mitigating strategies.

The NTTF members, the Staff and the Commission have always recognized that NTTF Recommendation 2.1 flooding reevaluations would be challenging and time consuming. While the flooding hazard reevaluations are even more complex than originally envisioned, leading to a longer review schedule than originally anticipated, plant safety enhancements are already being implemented through the mitigating strategies order. These enhancements provide defense-in-depth and additional safety margin while the staff completes the flooding evaluation and determines what, if any, additional regulatory actions are warranted on a plant-specific basis. These enhancements also allow time for the staff to thoughtfully assess any prudent adjustments to the resolution path for NTTF Recommendation 2.1 flooding reevaluations to ensure the Principles of Reliability, Clarity and Efficiency are upheld in our regulatory processes. Closure of the § 50.54(f) letter should proceed in parallel with implementation and closure of Order EA-12-049 and the associated MBDBE rulemaking and should not impact the schedule for these actions. The staff should provide a plan and schedule for development of revised guidance for NTTF Recommendation 2.1 flooding reevaluation guidance by April 30, 2015.

In conclusion, the § 50.54(f) letter should be closed in a systematic, reliable, and transparent way for all plants, using a graded approach considering aspects such as the level of the reevaluated hazard, the available physical margin, the warning time available for each specific flood scenario and the estimated frequency of the flooding scenarios.

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary  
FROM: Commissioner Baran  
SUBJECT: COMSECY-14-0037: INTEGRATION OF MITIGATING STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS AND THE REEVALUATION OF FLOODING HAZARDS

Approved XX Disapproved XX Abstain \_\_\_\_\_ Not Participating \_\_\_\_\_

COMMENTS: Below \_\_\_\_\_ Attached XX None \_\_\_\_\_

  
\_\_\_\_\_  
SIGNATURE

3/3/15  
\_\_\_\_\_  
DATE

Entered in "STARS" Yes ✓ No \_\_\_\_\_

**Commissioner Baran's Comments on COMSECY-14-0037,  
"Integration of Mitigating Strategies for Beyond-Design-Basis  
External Events and the Reevaluation of Flooding Hazards"**

In this policy paper, the NRC staff asks the Commission to clarify the relationship between the reevaluation of flooding hazards for nuclear power plants and the post-Fukushima mitigating strategies required by orders and potentially by a future beyond-design-basis external events rulemaking. The NRC staff also recommends changing the previously-approved course set by the Commission in the Staff Requirements Memorandum (SRM) for SECY-12-0025 regarding licensee implementation of Near-Term Task Force (NTTF) Report Recommendation 2.1 for the reevaluation of flooding hazards.

Over the past three months, I have reviewed the staff's paper, the enclosures and references, the related non-concurrences, prior Commission direction in SRMs regarding the post-Fukushima recommendations, and the Advisory Committee for Reactor Safeguards (ACRS) letter report and meeting transcripts. I have had the opportunity to hear the views of a variety of external stakeholders on the matter. In addition, I benefitted from several briefings from the NRC staff and management, including from those who non-concurred, to further explore their perspectives. I want to express my appreciation for the time and effort that went into these briefings. It is valuable to have a range of staff views on this important issue.

## **Background**

Shortly after the Fukushima Dai-ichi accident in Japan on March 11, 2011, the Commission tasked the NTTF, comprised of agency staff, with conducting a systematic review of NRC processes and regulations to determine whether the agency should make additional improvements to our regulatory framework. The NTTF provided recommendations to the Commission in July 2011 in what is commonly referred to as the NTTF Report.<sup>1</sup> Recommendation 2.1 of the NTTF Report was to issue licensees orders to reevaluate the seismic and flooding hazards at their sites against current NRC requirements and guidance, and if necessary, update the plant's design basis and equipment important to safety to protect against any newly identified hazard. Recommendation 4.2 was to issue licensees mitigating strategies orders to provide reasonable protection for certain equipment already in place pursuant to NRC regulations from the effects of external events and to add equipment as needed to address events involving multiple reactors at one site.

In September 2011, the NRC staff submitted a paper to the Commission recommending that some high-priority NTTF recommendations, including Recommendations 2.1 and 4.2, be undertaken without unnecessary delay.<sup>2</sup> The Commission affirmed the staff's recommendations by directing the staff to issue letters to licensees requesting information to address Recommendation 2.1 and mitigating strategies orders to licensees to address Recommendation 4.2.<sup>3</sup> The Commission also directed the staff to initiate a rulemaking to implement Recommendation 4.1, which recommended strengthening station blackout mitigation

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<sup>1</sup> SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," and SRM-SECY-11-0093, dated July 12, 2011, and August 19, 2011.

<sup>2</sup> SECY-11-0124, "Recommended Actions to be Taken Without Delay from the Near-Term Task Force Report," and SRM-SECY-11-0124, dated September 9, 2011, and October 18, 2011.

<sup>3</sup> These request for information letters are pursuant to 10 CFR 50.54(f). SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," and SRM-SECY-11-0137, dated October 3, 2011, and December 15, 2011.

capabilities for design basis and beyond-design-basis external events. This rulemaking was later consolidated with other NNTF-recommended rulemakings and is now referred to as the Mitigation of Beyond-Design-Basis Events (MBDBE) Rulemaking.<sup>4</sup>

In March 2012, the Commission approved issuing letters to all power plant licensees to reevaluate the flooding hazards at their sites using the current regulatory guidance and methodologies for reviews related to new reactors. In those letters, the NRC staff described the two phases of implementation of NNTF Recommendation 2.1 for flooding:<sup>5</sup>

- Phase 1: This phase consists of licensees submitting a flooding hazard reevaluation followed by an integrated assessment to the NRC staff. The flooding hazard reevaluation involves re-examining the flooding hazards facing a site using current guidance to identify potential site vulnerabilities. In the integrated assessment, licensees perform an evaluation of the equipment important to safety at the plant in light of the reevaluated site flooding hazard results in order to identify any equipment vulnerabilities along with proposed subsequent actions to address those vulnerabilities.
- Phase 2: If necessary based on the results of Phase 1, the NRC staff determines whether additional regulatory actions are needed to protect against any newly identified hazards. For example, NRC could determine that it is necessary for a given plant to update the design basis and structures, systems, and components important to safety.

This approach was informed by stakeholder input from numerous public meetings and recommendations from the ACRS and directed in part by Congress, which required in the fiscal year 2012 appropriations act:<sup>6</sup>

The Nuclear Regulatory Commission shall require reactor licensees to re-evaluate the seismic, tsunami, flooding and other external hazards at their sites against current applicable Commission requirements and guidance for such licensees as expeditiously as possible, and thereafter when appropriate, as determined by the Commission, and require each licensee to respond to the Commission that the design basis for each reactor meets the requirements of its license, current applicable Commission requirements and guidance for such license. Based upon the evaluations conducted pursuant to this section and other information it deems relevant, the Commission shall require licensees to update the design basis for each reactor, if necessary.

Since issuance of the orders, letters, and accompanying guidance in 2012 and 2013, NRC and licensees have made progress in implementing the NNTF recommendations related to flooding and mitigating strategies.<sup>7</sup> For example, improvements were made to correct flooding deficiencies at power plants as a result of the post-Fukushima flood walk

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<sup>4</sup> SECY-14-0046, "Fifth 6-Month Status Update on Response to Lessons Learned from Japan's March 11, 2011, Great Tōhoku Earthquake and Subsequent Tsunami," and SRM-SECY-14-0046 dated April 17, 2014, and July 9, 2014.

<sup>5</sup> Letter to all licensees, "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.

<sup>6</sup> December 2011 Consolidated Appropriations Act, 2012 (Public Law (PL) 112-74).

<sup>7</sup> Order EA-12-049 issued to all licensees, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012, and the ongoing MBDBE rulemaking.

downs.<sup>8</sup> However, the current approach for reevaluating flooding hazards has resulted in slower progress than anticipated. The flooding hazard reevaluations and integrated assessments are not on track to be completed in five to seven years, the staff's original goal. One factor that contributed to the slower progress for flooding analysis as compared to seismic analysis is that the post-Fukushima seismic reevaluations had the advantage of prior seismic probabilistic risk assessment studies and research, which looked at the effects of increased ground motion and likelihood of seismic events on installed plant equipment. The NRC staff did not have that advantage for flooding reevaluations. The staff realized that the inherent complexities of flood modeling and the evolving body of knowledge of flooding hazards as it applied to existing operating reactors created a dynamic situation. As a result, the NRC staff found themselves developing and assessing new analytical tools and models.

### **Staff Paper Recommendations**

The staff paper before us presents three recommendations related to licensees' flooding hazard reevaluations and integrated assessments.

First, the staff recommends that the Commission affirm that licensees for operating nuclear power plants need to address the reevaluated flooding hazards in their mitigating strategies for beyond-design-basis external events. Specifically, this recommendation asks the Commission to affirm that the mitigating strategies order and MBDBE rulemaking will require mitigating strategies that are able to address the reevaluated flooding hazards developed in response to the request for information letters to ensure reasonable assurance of adequate protection of public health and safety.

There is broad agreement among the NRC staff, including those who did not concur with the paper, and the ACRS that this recommendation is sound. Requiring licensees to utilize the flooding hazard reevaluation flood height level, calculated using present-day methodologies, for implementation of the mitigating strategies orders and MBDBE rulemaking is consistent with the intent of those orders. Moreover, it is necessary for the MBDBE rulemaking to meet the intent of NTF Recommendation 4.2 and the requirements of the fiscal year 2012 appropriations act. Therefore, I approve the NRC staff's first recommendation to ensure reasonable assurance of adequate protection of public health and safety. It is imperative that the NRC staff work together with licensees to expeditiously complete and review the Phase 1 flooding hazard reevaluations.

Second, the staff requests that the Commission affirm that "licensees for operating nuclear power plants may need to address some specific flooding scenarios that could significantly damage the power plant site by developing targeted or scenario-specific mitigating strategies, possibly including unconventional measures, to prevent fuel damage in reactor cores or spent fuel pools." I recognize that some power plants licensed in the 1960s and 1970s previously proposed to cope with some extreme flooding scenarios through the use of unconventional measures that may irreparably damage a plant in order to prevent fuel damage in the reactor cores and spent fuel pools, and the NRC staff accepted these methods that are now part of those facilities' current licensing basis. Therefore, I agree with Commissioner Ostendorff that "it is under the staff's purview to make the determination on a plant-specific basis as to whether targeted or scenario-specific mitigating strategies are an acceptable means to

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<sup>8</sup> Information Notice 2015-01, "Degraded Ability to Mitigate Flooding Events," dated January 9, 2015.

provide enhanced capability to maintain the plant in a safe condition in the event of a flood beyond the current design basis in order to demonstrate compliance with” the mitigating strategies order.

The third NRC staff recommendation asks the Commission to effectively eliminate the Phase 1 integrated assessments and incorporate the Phase 2 decision-making about whether additional regulatory actions are necessary into the development and implementation of the mitigating strategies order and MBDBE rulemaking. On this matter, I disagree with the staff’s recommendation. The staff did not provide a compelling technical basis for halting implementation of the currently required Phase 1 integrated assessments. Nor did the NRC staff provide a convincing rationale for the integration of the Phase 2 decision-making into the development and implementation of the mitigating strategies order and related MBDBE rulemaking. In the wake of the Fukushima Dai-ichi accident, it is vital that we conduct a systematic, site-specific evaluation of flooding mitigation and protection at U.S. nuclear power plants. Therefore, I disapprove this third staff recommendation and instead offer a modified approach for proceeding with the Phase 1 and Phase 2 activities.

### **Next Steps**

The NRC staff should continue to work with licensees toward the expeditious completion of the flooding hazard reevaluations in order to ensure that flooding hazards are understood for every site using the current flooding regulations and guidance. Within six months of the date of the SRM resulting from this paper, the staff should also update and improve the existing staff guidance for performing integrated assessments. The revised guidance should include additional screening criteria so that the integrated assessments are focused on those plants where there is the greatest opportunity for additional safety enhancements. The staff’s existing graded approach for determining the prioritization and scope of integrated assessments should be incorporated into the guidance and refined, if necessary.<sup>9</sup> The guidance should be performance-based and conservative in its approach, but also realistic and not more prescriptive than necessary. The staff should consider allowing for the option of performing the evaluations of mitigation capability and onsite flood protection in sequence in order to facilitate timely completion of the mitigating strategies orders and MBDBE rulemaking. As part of this updated process, the staff should obtain and consider available physical margin data in order to assess the flooding vulnerability for each site.

Although Phase 2 decisions about whether additional regulatory actions are necessary at given plants based on the flooding hazard reevaluations and integrated assessments will be made consistent with current regulatory processes, including the Backfit Rule, I agree with Commissioner Ostendorff that there is a lack of clarity about how Phase 2 decisions will be made within this regulatory framework. This uncertainty may be contributing to the relatively slow progress in finalizing and completing review of the flooding hazard reevaluations.

Within six months of the date of the SRM resulting from this paper, the NRC staff should develop the criteria for determining whether additional Phase 2 regulatory actions are necessary for plants with completed integrated assessments to protect against the

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<sup>9</sup> Letter to Nuclear Energy Institute (ADAMS Accession No. ML12326A912), “Trigger Conditions for Performing an Integrated Assessment and Due Date for Response,” dated December 3, 2012.

reevaluated flooding hazard. While I recognize that flooding hazard reevaluations do not benefit from the same types of risk insights as the seismic reevaluations, NRC has regulated external flooding hazards in a deterministic, risk-informed, performance-based manner for over 40 years. This experience, combined with the recent knowledge that the NRC staff has gained in this area, provides a solid basis to establish criteria for assessing whether additional regulatory actions are necessary to protect certain plants. For example, the criteria could be as simple as utilizing the available physical margin compared to the reevaluated flooding hazard to assess whether a scenario for a given plant site should be deemed beyond-design-basis and addressed by mitigating strategies or whether a plant site requires additional regulatory action, such as changing the current licensing basis of the plant.

In my view, the Phase 2 criteria and guidance developed by the NRC staff should be straight-forward and provide a clear path to the closure of the 10 CFR 50.54(f) letters with additional clarity on how the staff intends to implement Phase 2 and how it will evaluate potential safety enhancements or changes to the licensing basis, if necessary. The criteria for determining whether additional regulatory actions are necessary should reflect the Commission's defense-in-depth safety philosophy and recognize that both mitigation and protection are essential.

Once the staff has updated the guidance for Phase 1 and developed Phase 2 guidance, the ACRS should be given an opportunity to review the final guidance and provide recommendations to the Commission. The staff should notify the Commission if the mitigating strategies orders or 10 CFR 50.54(f) letters require revision. While I recognize that the flooding hazard reevaluations may take longer than initially envisioned, addressing the reevaluated flooding hazard with mitigating strategies, followed by evaluation of whether additional measures to address protection for a given site are necessary, will ensure a timely evaluation of and response to the true hazard at each site.

Finally, I note that this paper and its related briefings appear to be the first indications to the Commission from the NRC staff that the flooding hazard reevaluations and integrated assessments were on track to significantly exceed the original time estimates for completion. While the Commission receives written status updates biweekly and every six months on the post-Fukushima measures, past updates did not highlight the delays encountered in this area. Future updates should provide more detailed information on the status of the flooding hazard reevaluations and integrated assessments, as well as the Phase 1 and Phase 2 guidance.

The reevaluation of flooding hazards for operating plants is a complex and technically challenging endeavor and I want to thank the NRC staff for their hard work on this effort. I also want to acknowledge those NRC staff and managers who used the non-concurrence process to clearly articulate a differing view.