NRC Responses to Public Comments

Japan Lessons-Learned Project Directorate Interim Staff Guidance

JLD-ISG-2012-05: Guidance for Performing the Integrated Assessment for Flooding in Response to the March 2012 Request for Information Letter

(Docket ID NRC-2012-0222)

1. Introduction

This document presents the U.S. Nuclear Regulatory Commission (NRC) staff's responses to comments received on the Draft interim staff guidance (ISG) document, "JLD-ISG-2012-05: Guidance for Performing the Integrated Assessment for External Flooding." The Draft ISG was published in the *Federal Register* on September 28, 2012 (77 FR 65417). The public comment period closed on October 29, 2012; there were no late comments received.

Comment submissions on the draft document are available electronically at the NRC's Electronic Reading Room at http://www.nrc.gov/reading-rm/adams.html. From this page, the public can gain entry into the Agencywide Documents Access and Management System (ADAMS), which provides text and image files of NRC's public documents.

This comment resolution document is also available electronically at the NRC's Electronic Reading Room under ADAMS Accession No. ML12311A216.

The final ISG can be found in ADAMS at Accession No. ML12311A214.

2. Comment submissions

The NRC received four (4) comment submissions. The NRC-designated identifier for each unique comment submission, the name of the submitter, the submitter's affiliation (if any), and the ADAMS Accession Number is provided below.

Summary Table		
Name	**Affiliation**	**ADAMS Accession No.**
1. James H. Riley	Nuclear Energy Institute	ML12311A018
2. Richard Centenaro	PPL Susquehanna, LLC	ML12306A028
3. Jack Stringfellow	PWR Owners Group	ML12311A019
4. Sarah Hofmann	Vermont Public Service Department	ML12313A331

3. Public Comments and NRC Response

Comments provided on the ISG are broken up into seven categories:

- General comments (Table 1)
- Comments related to the evaluation of mitigation capability (Table 2)
- Comments related to peer review (Table 3)
- Comments related to examples (Table 4)
- Comments related to redundancy and equipment reliability (Table 5)
- Comments related to evaluation of manual and operator actions (Table 6)
- Comments related to evaluation of flood protection (Table 7)

Table 1: General comments

1. General comments		
Comment No.	**Comment**	**NRC Response**
1.1 [J. Riley]	**Page 4**: *"(The loss of the UHS from causes other than flooding are not included.)"* It has never been totally clear that this does not include seismic failure of downstream dams. In the ACRS public meeting on the revision to RG 1.59 the ACRS questioned this point and the implication of the testimony is that downstream dam failures resulting in loss UHS would include consideration of seismic failures of the downstream dams. **Recommendation:** The statement "(The loss of the UHS from causes other than flooding are not included.)" should be revised to make this clear – *"(The loss of the UHS from causes other than flooding, **such as seismic failure,** are not included.)"*	NRC staff agrees with the comment. The text has been changed as recommended.
1.2 [J. Riley]	**Page 8**: *"The Integrated Assessment should also consider whether specific vulnerabilities may arise during modes of operation other than full-power (e.g., conditions where flood protection features may be bypassed or defeated for maintenance or refueling activities)."* The ISG should remain consistent with the scope and intent of the 50.54(f) with regard to evaluating all modes of operation. A qualitative analysis of the expected plant configuration at the time of the flood event that identifies challenges to any flood protection or mitigation features is appropriate. The configurations evaluated should be limited to those resulting from the execution of plant procedures and processes. Also, modes of operation and plant configuration are being integrated in this sentence and it is confusing. **Recommendations:** Clarify the guidance on the type of analysis that can be used.	NRC staff agrees with the comment. The text has been changed as recommended.

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	Change the quoted sentence to – *"The Integrated Assessment should also consider whether specific vulnerabilities may arise during modes of operation* ***or configurations*** *other than* ***normal*** *full-power* ***operation and configuration*** *(e.g., conditions arising from normal plant procedures or processes where flood protection features may be bypassed or defeated for maintenance or refueling activities)".* Change the prior sentence to read – *"In addition, the Integrated Assessment should describe the expected total plant response under other modes of operation, including a discussion of controls* ***(such as programmatic controls)*** *that are in place in the event that a flood occurs during any of these modes (e.g., during refueling)".*	
1.3 [J. Riley]	**Page 9**: Typo in footnote, *ref 28* should be ref 27.	NRC staff agrees with the comment. The text has been changed.
1.4 [J. Riley]	**Page 20** *"Controlling Flood Mechanism(s)"* In earlier discussion it was noted that the identification of the conservatism of the analysis that led to the scenario may be useful in understanding the IA results and therefore it would be acceptable but not mandatory to include such information. **Recommendation:** Add a statement such as – *"If desired and useful to understanding the scenario parameters, describe the conservatisms associated with the flooding analysis that led to the scenario parameters."*	NRC staff agrees with this comment. The text has been updated accordingly.
1.5 [J. Riley]	**Page 21** *"Provide an evaluation (including sensitivity studies if appropriate) regarding the effectiveness of the total mitigation capability"* It isn't clear what this means. It would be helpful to list or describe the elements against which the evaluation should be performed. **Recommendation:** Change to –	NRC staff agrees with this comment. The text has been updated to indicate that this documentation requirement pertains to the conclusions of the assessment rather than documentation of the individual portions of the evaluation. Specifically, the following change has

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	"Provide an evaluation (including sensitivity studies if appropriate) regarding the effectiveness of the total mitigation capability ***in providing the following elements: - - - "*** OR *"Provide an evaluation (including sensitivity studies if appropriate) regarding the effectiveness of the total mitigation capability* ***as specified in the following bullets specific to scenario-based, margins-base[d] and full PRA evaluations."***	been made to the text: "Provide an evaluation (including sensitivity studies if appropriate) regarding the effectiveness of the total mitigation capability" has been changed to "Document conclusions (including sensitivity studies, if appropriate) regarding the effectiveness of the total mitigation capability."
1.6 [R. Centenaro]	**Section 1 - Introduction** - Recommend changing the second sentence to read:"Using the results of the site specific flood hazard reevaluations, the Integrated Assessment evaluates the total ....."	NRC staff agrees with this comment. The text has been updated accordingly.
1.7 [R. Centenaro]	**Section 1 - Introduction - third paragraph** - "flood hazard" should read "flood hazard(s)" since more than one flood hazard may be evaluated.	NRC staff agrees with this comment. The text has been updated accordingly.
1.8 [R. Centenaro]	**Section 1 Introduction - third paragraph** - It should be recognized that the site flooding evaluations (documented in calculations) could be more conservative (higher flood levels) than what may be stated in licensing basis documentation (such as the FSAR). Inspections performed in response to the 50.54f letter, Recommendation 2.3, may also have been performed based on the higher flood levels. It is assumed that if the evaluated flood levels (documented in site calculations) are higher than what is stated in current licensing basis (CLB) documentation, the evaluated flood levels (even though they may be higher than the CLB levels) can be used to determine if the reevaluated hazard is bounded by the design basis flood at the site. Is this correct?	As specified in the March 12, 2012, 50.54(f) [Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54] letter, the Near-Term Task Force (NTTF) Recommendation 2.3 walkdowns are performed against the current licensing basis. For the purposes of determining whether an integrated assessment is required, the reevaluated hazard should be compared to the current design basis flood. If the reevaluated hazard is not bounded by the design basis flood for all mechanisms, an integrated assessment is required. NRC plans to issue a separate document describing: (1) conditions when an integrated

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		assessment is required; and (2) special circumstances in which an abbreviated review is acceptable rather than a "full" integrated assessment. Further clarification regarding the "trigger" for an integrated assessment will be provided in this supplemental document and will not be provided in the integrated assessment ISG.
1.9 [R. Centenaro]	**Section 1.2 Scope of Integrated Assessment - first sentence** - it is not clear what the first sentence in this paragraph is attempting to convey. At the end of the sentence which says "....due to the status of flood protection features", it could be revised to read ".....due to the potential impact on flood protection features during postulated flooding events" - please clarify sentence accordingly.	NRC staff agrees with this comment. Section 3.2.2 in Rev. 0 of the ISG provided clarification on modes of operation and concurrent conditions. To address this comment, the text in Section 3.2.2 has been moved to Section 1.2.
1.10 [R. Centenaro]	It is recommended that a summary level outline or an overview section (1 or 2 pages) be included in the guidance document, which identifies the requirements that must be fulfilled to complete an Integrated Assessment in accordance with this guidance document. Can a generic template be developed for submitting an approach for developing the integrated assessment? Is this the intent of Section 8 of this document?	NRC staff agrees with this comment, in part. Staff recognizes that a template may assist licensees in formatting responses to the integrated assessment. However, due to site-specific circumstances and the diverse ways that licensees may perform the integrated assessment, it is not possible to develop a generic template at this time. Following the issuance of the integrated assessment ISG, NRC staff will continue to engage with external stakeholders to discuss the feasibility and applicability of a generic template. In addition, the documentation requirements in Section 8 of the ISG

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		have been expanded to provide additional detail about the information that should be provided in the integrated assessment submittal.
1.11 [R. Centenaro]	The guidance document should contain a section dedicated to "Criteria for Identification of Vulnerabilities" since licensees are expected to submit an approach for developing an Integrated Assessment Report, including criteria for identifying vulnerabilities, within 60 days of the date of the NRC's issuance of this guidance document.	The March 12, 2012, 50.54(f) letter defines plant-specific vulnerabilities as "those features important to safety that when subject to an increased demand due to the newly calculated hazard evaluation have not been shown to be capable of performing their intended safety functions." In addition to the above definition, the ISG provides additional guidance related to specification of vulnerabilities associated with flood protection: "[a]ny flood protection feature or system determined not to be capable of performing its intended safety function under the reevaluated hazard should be documented as a vulnerability." The ISG further specifies that "[t]he integrated assessment should also consider whether specific vulnerabilities may arise during normal and full-power configurations and other modes of operation or configurations (e.g., conditions where flood protection features may be bypassed or defeated for maintenance or refueling activities)." With the above guidance in mind, licensees should look at site-specific circumstances and develop more detailed criteria for defining plant-

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		specific vulnerabilities at each site.
1.12 [R. Centenaro]	**Section 2.3 - NTTF Recommendation 2.1 Flood Hazard Reevaluations** – Is the reevaluation of a flood hazard required even if it is obvious that there is significant physical margin available? For instance, if current licensing basis for the PMF on streams and rivers shows that the site is 200 feet above these maximum flood levels, is it necessary to reevaluate this flood hazard using present day regulatory guidance and methodologies? In lieu of a detailed evaluation, would it be acceptable to simply provide a general discussion stating why this flood hazard would not be of concern, given the physical margin available?	The March 12, 2012, 50.54(f) letter requests that addressees perform a reevaluation of all appropriate external flooding sources, including the effects from local intense precipitation on the site, probable maximum flood (PMF) on stream and rivers, storm surges, seiches, tsunami, and dam failures. It is requested that the reevaluation apply present-day regulatory guidance and methodologies being used for early site permits and combined license reviews including current techniques, software, and methods used in present-day standard engineering practice to develop the flood hazard. NRC staff discussed the screening of flood hazards with external stakeholders during a public meeting on August 8-9, 2012. The meeting summary can be found using the NRC's Agencywide Documents Access and Management System using Accession No. ML12233A585. Additional discussion of the hazard reevaluations is outside the scope of the integrated assessment ISG.
1.13 [J. Stringfellow]	**In the Background Section of the front material**, it states that "[T]he March 12, 2012 50.54(f) letter includes a request that respondents reevaluate flooding hazards at nuclear power plant sites using updated flooding hazard information and present-day regulatory guidance and methodologies. The letter also requests the comparison of the reevaluated hazard to the current design basis at the site for each potential flood mechanism. *If the reevaluated flood hazard at a site is not bounded by the current design basis, respondents are requested to perform: an*	NRC staff disagrees with this comment. The current licensing basis includes design basis information related to the flood hazard (against which the reevaluations are compared) as well as the flood protection and other commitments

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	Integrated Assessment." [Emphasis added.] If the current design basis bounds the revaluated flood hazard, then no Integrated Assessment (IA) need be performed. The introduction to the Interim Staff Guidance (ISG), identifies that one of the purposes is to "evaluate the effectiveness of the current licensing basis." This purpose should be deleted - the effectiveness/adequacy (or lack) of the current licensing basis was used to determine if the IA needed to be performed, therefore it should not be a purpose of the IA itself. Considering the specificity of the third purpose, the second purpose should be expanded to just include vulnerabilities due to external flood hazards.	contained in plant documents. Therefore, the integrated assessment evaluates the effectiveness of the current licensing basis (e.g., protection and mitigation capability) given the reevaluated hazard. The March 12, 2012, 50.54(f) specifically states that "[t]he purpose of the integrated assessment is to determine the effectiveness of the existing design basis and any other planned or installed features for the protection and mitigation of flood conditions for the entire duration of the flood."
1.14 [S. Hofmann]	In section 2.3 of JDL-ISG-2012-05 "Guidance for Performing the Integrated Assessment for External Flooding", the Department finds the guidance needs to be more explicit with respect to the reevaluation of the Probable Maximum Flood (PMF). This section has reference to using present-day regulatory methodologies and present-day standard engineering practice. It is not clear whether these current methods/standards are adequate and valid with respect to the PMF. This is critical because the PMF is highly dependent on the methodologies and assumptions that are used to calculate the Probable Maximum Precipitation (PMP).	The flood hazard reevaluations will be performed under a set of activities that occur prior to entry into the integrated assessment. Therefore, calculation of flood hazards (including flood height and the associated effects of flooding) is outside the scope of the integrated assessment ISG. Because this comment is outside the scope of the integrated assessment ISG, NRC staff will address this comment via separate communication.
1.15 [S. Hofmann]	[W]ith regard to calculation of the PMP it is not clear whether the PMP methodology and related assumptions consider climate change. Given that the widely held definition of PMP is *"the greatest depth (amount) of precipitation f or a given storm duration that is theoretically possible for a particular geographic location* ", will "theoretically possible" consider recent data and research related to climate change? Should PMP durations be extended to consider climate change, and is there a need to employ other extreme event characterization techniques, such paleo-flood reconstruction and analysis?	The flood hazard reevaluations will be performed under a set of activities that occur prior to entry into the integrated assessment. Therefore, calculation of flood hazards (including flood height and the associated effects of flooding) is outside the scope of the integrated assessment ISG. Because this comment is outside the scope of the

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		integrated assessment ISG, NRC staff will address this comment via separate communication.
1.16 [S. Hofmann]	If current practice regarding estimation of PMP/PMF are robust and this is articulated in NRC technical guidance then reference to these should be included. If not, then a more specifics are needed in this section to stress the importance of the hazard reevaluation component, since the value of the *Integrated Assessment Process* hinges what the "current design basis hazard" is and whether it is adequate.	The flood hazard reevaluations will be performed under a set of activities that occur prior to entry into the integrated assessment. Therefore, calculation of flood hazards (including flood height and the associated effects of flooding) is outside the scope of the integrated assessment ISG. Because this comment is outside the scope of the integrated assessment ISG, NRC staff will address this comment via separate communication.
1.17 [R.Centenaro]	Section 8.a) - Is the "integrated procedure" referred to in this section really the "method of evaluation" used to access the integrity of the plant during a postulated flooding event? Please clarify.	The language that appears in Section 8(a) of the ISG is taken directly out of the March 12, 2012, 10 CFR 50.54(f) [Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54] letter. Therefore, this language will not be modified in the ISG. The details provided in Section 8 of the ISG (“Documentation”) are intended to provide guidance and clarification with respect to submission of the information requested by the March 12, 2012, 10 CFR 50.54(f) letter.

Table 2: Comments related to evaluation of mitigation capability

2. Comments related to evaluation of mitigation capability		
Comment No.	**Comment**	**NRC Response**
2.1 [J. Riley]	Sections 7.1 and 7.2 have a bias towards margin-type or full PRA mitigation evaluations. As a result, it would be very difficult to evaluate the use of FLEX to mitigate flooding reevaluation results that are greater than a plant's design basis. The following explains our concern and provides a basis for a different approach. **Basis for our concern:** • A principle based approach using deterministic criteria is needed as the baseline for mitigation evaluations so that fundamentals goals are validated to ensure predictability of outcomes. This should be the baseline for mitigation evaluations so that the maintenance of fundamental goals is not lost in the details of analyses. • NRC has endorsed the use of FLEX (as described in NEI 12-06) for mitigation of beyond design basis accidents. The specific design requirements for FLEX are established during implementation. • Recognizing the first bullet as a baseline, if a site uses FLEX to mitigate beyond design basis floods, it should be acceptable to evaluate only the additional challenge to FLEX caused by the reevaluated flood as compared to the flooding parameters to which FLEX was designed (such as additional flood height or additional flood duration). • Utilities must be able to evaluate FLEX's capability to mitigate by the scenario based approach because the PRA tools and data that will be necessary to evaluate FLEX equipment and associated operator actions under a margins-type or full PRA evaluation are not yet available. • The document noticed for comment prevents the use of the scenario based approach to evaluate FLEX because it excludes application of the scenario based approach in situations with complex interactions or interdependencies, or complex operator actions. The term "complex" is not defined, yet the way it is used in this section implies that it is a threshold that determines when the scenario based approach is not appropriate. Rather than try to define the term "complex," it would be better to explain what the expectations for the scenario based approach are and let the engineering process determine when acceptable results cannot be obtained; therefore requiring a margins type or full PRA approach. **Recommendation:**	NRC staff agrees, in part, with the comment and the suggested resolution. In response to this comment, modifications have been made to the description of the scenario-based evaluation and portions of the suggested text have been incorporated into the ISG. The modifications to the description of the scenario-based evaluation were discussed with external stakeholders at a public meetings on October 24-25 and November 7, 2012.

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Comment No.	**Comment**	**NRC Response**
	Industry suggests that the second paragraph in section 7.1 (beginning with "A margins-type evaluation...") be deleted. In its place describe a set of attributes that the scenario based approach should include or specific tools that must be used to document the evaluation. For example, the elements that should be included in a scenario based evaluation should include: • Description of the scenario and its key components • Discussion of the mitigating actions • Timeline showing necessary actions or logic structure containing information on reliability of actions and active components (the failure branches of the logic structure would not have to be fully developed as long as the reliability of components can be adequately justified) • Evaluation of components against Appendix A • Documentation of component reliability data when available • Evaluation of actions against Appendix C • Conclusion of the overall reliability of the mitigation strategy If the logic structure and failure branches become too complex it would be apparent that the scenario based evaluation is not capable of reaching a justifiable conclusion, thereby requiring the use of a margins-type or full PRA evaluation. In this way the evaluation of mitigation capability could mimic the HHA approach outlined in NUREG/CR-7046. Specifically: an evaluation of mitigation capability can start with a scenario based (deterministic) evaluation of mitigation strategy. If adequate reliability cannot be demonstrated using traditional engineering techniques and performance based criteria, then a margins-based approach should be tried. If it is still not possible to justify reliability with margins analysis (conservative assumptions) then a detailed PRA analysis with increased technical rigor is necessary. Therefore it is recommended that the paragraph be replaced with the following: *"The integrated assessment can start with the scenario based evaluation methodology. A scenario based evaluation should include the following elements:* • *Description of the scenario and its key components* • *Discussion of the mitigating actions* • *Timeline showing necessary actions or logic structure containing information on*	

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	reliability of actions and active components • *Evaluation of components against Appendix A* • *Documentation of component reliability data when available* • *Evaluation of actions against Appendix C* • *Conclusion of the overall reliability of the mitigation strategy* *The approach will largely use deterministic engineering evaluations applying engineering principles and performance based criteria to demonstrate reliability of the mitigation strategy. Appropriate factors of safety are required for all engineered structures, pumps and other components. A scenario based evaluation should be structured and documented using logic tools such as FMEA, logic trees, or other success path approaches to model all the components and actions required for the mitigation, however the failure branches of the logic structure do not have to be fully developed as long as the reliability of components can be adequately justified. Each component or action within the scenario should be evaluated for reliable performance using qualitative and/or quantitative deterministic acceptance criteria as described in Appendices A and C as applicable. Information on component reliability (such as mean time to failure) should be documented if available, but the overall probability of success of any path in the scenario need not be computed. Effects of redundancy and diversity should be addressed. When the scenario is complete, identify all success paths to define the SSCs required to safely shutdown the reactor and maintain a safe condition for the flood duration. If an assessment of the resulting scenario confirms that at least one success path can be reliably executed, then the evaluation of flood mitigation is complete. (Reliability of a success path need not be a calculated number; it can be assessed by consideration of component reliability and comparison of components and actions to the success criteria in Appendices A and C.)* *If it is not possible to demonstrate reliability with the scenario based approach, a margins-type evaluation should be pursued. The margins-type evaluation can account for more complicated interactions and dependencies. In the margins-type evaluation, operator actions and active component reliability should be evaluated against quantitative probabilistic values, if possible, for the acceptance criteria in Appendices A & C. If greater detail is required than is possible in a margins-type evaluation, an external flood PRA should be considered."*	
2.2 [J. Riley]	The opening paragraph in section 7.2 further perpetuates the bias towards a margins assessment. The paragraph should be re-written to say what is required, as opposed to what is not necessary, but nice to include.	NRC agrees, in part, with the comment. The paragraph referenced in the comment

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Comment No.	**Comment**	**NRC Response**
	Recommendation: Change the first paragraph in section 7.2 as follows: *"The scenario-based evaluation is used to demonstrate that there is high confidence that key safety functions can be maintained, typically using engineering analysis and insights, and quantitative deterministic information. This evaluation method should define a clear success path and the equipment required to achieve a safe plant state. Engineering evaluations should be used to demonstrate that these key pieces of equipment are adequately designed to meet their intended function (e.g. pumps have adequate capacity or flood gates have adequate structural capacity). The additional guidance and qualitative acceptance criteria in Appendices A and C should be used to determine the reliability of active components and operator actions (respectively)."*	has not been modified. However, in response to this comment, modifications have been made to other portions of the ISG describing the scenario-based evaluation. NRC staff disagree with the specification of a single success path under the scenario-based evaluation. The text now indicates that licensees should provide sufficient detail and supporting information to demonstrate that there is high confidence that key safety functions can be maintained. Diversity, redundancy, and other considerations that support the robustness of approaches used to mitigate the event provide increased confidence that key safety functions can be maintained. The modifications to the description of the scenario-based evaluation were discussed with external stakeholders at a public meetings on October 24-25 and November 7, 2012.
2.3 [J. Riley]	The first sentence in foot note 17 at the bottom of page 17 provides important additional guidance on the use of non-quantified approaches. As such, it should be moved up into the body of the document and placed at the end of the second bullet in the last list on the page 17. In addition, the word "quantitatively" should be removed from this bullet since	NRC staff agrees with this comment, in part. In response to this comment, the referenced text has been

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	quantitative acceptance criteria are not required for a scenario based approach. Also, the second sentence in footnote 17 requiring an evaluation of the effect of excluding the component should be deleted. This severely limits the ability to evaluate equipment reliability in a non-quantifiable manner. Evaluating the capability of the remaining equipment should only have to be assumed if the criteria in Appendix A cannot be met. There should be no distinction in how a component is treated as long as it meets the acceptance criteria, no matter whether the criteria are qualitative or quantitative. The acceptance criteria in Appendix A section A.1.2 and table A.1 came from work done in the Equipment Reliability area and are based on sound engineering principles and operating experience. Since there is no specific criteria for what is considered acceptable quantified reliability, there should not be an arbitrary prejudice against the use of established qualitative criteria. Recommendation: Footnote 17 should be deleted as explained above and the second bullet in the last list on page 17 should now read: *"Evaluate the reliability of active components based on the plant Equipment Reliability Program, operating experience, testing or other available information. The considerations of section A.1.2 of Appendix A should be used to justify high confidence in the reliability of the active component."*	modified to indicate that all equipment must be qualified (e.g., using the criteria in Table A1). In addition, if information is available, licensees should quantitatively evaluate and document the reliability of active components based on operating experience, testing, and other available information using traditional probabilistic risk assessment (PRA) or statistical techniques.
2.4 [R. Centenaro]	In the "scenario based" evaluation of mitigation capability (Section 7.2), it must be demonstrated that there is high confidence that key safety functions can be maintained. Are additional single failures required to be postulated to demonstrate that key safety functions can be maintained? As an example, for internal flooding events, the design basis for the station may require that an additional single failure be postulated to demonstrate that the unit can be safely shutdown and maintained shutdown following the flooding event. What criterion is expected to be applied for the external flooding events?	Under the scenario-based evaluation, the licensee is responsible for justifying that the scenario-based evaluation provides sufficient detail and supporting information to demonstrate that there is high confidence that key safety functions can be maintained. Logic structures developed under the scenario-based evaluation should be developed in sufficient detail to demonstrate that there is high confidence that key safety functions can be

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		maintained. It is noted that diversity, redundancy, and other considerations that support the robustness of approaches used to mitigate the event (e.g., robustness against single failures) provide increased confidence that key safety functions can be maintained. Modifications to the scenario-based evaluation were discussed during public meetings on October 24-25 and November 7, 2012.
2.5 [R. Centenaro]	In the "scenario based" evaluation of mitigation capability (Section 7.2), it talks about use of PRA to evaluate reliability of active components. Use of PRA is typically for operability considerations, not design basis considerations. Is the evaluation of mitigation capability to be eventually included in the station licensing basis documentation as part of the station flooding design basis or are these evaluations viewed more as operability evaluations[?]	Results of PRAs are used in a variety of applications beyond operability considerations and provide a broad spectrum of information that informs the regulatory process. Evaluation of the reliability of components is only one element of PRA. The integrated assessment is performed in response to the March 12, 2012, 50.54(f) letter and is intended to provide risk insights in light of reevaluated flood hazards. Licensee responses will provide NRC staff further information to determine whether plant licenses should be modified, suspended, or

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		revoked. Upon receipt of information and further staff evaluation, staff will make a determination regarding whether additional regulatory action (e.g., change to plant licensing basis) is required.
2.6 [J. Riley]	***Page 16*** *"An evaluation of mitigation capability is appropriate for sites that have not demonstrated that the flood protection systems are reliable and have margin."* *If the intent is that an evaluation is required then it would be clearer to say it is required.* ***Recommendation:*** *Change to –* *"An evaluation of mitigation capability is required for sites that have not demonstrated that the flood protection systems are reliable and have margin."*	NRC staff agrees with this change. The text has been updated as recommended.
2.7 [J. Riley]	**Page 18** first paragraph in section 7.3: clarify the expectations on the scope of the margin assessments. **Recommendation:** Add the following after the second sentence in the first paragraph in Section 7.3: *"Margins assessments should be performed for a flood protection feature or flood protection feature combinations that are not judged to be reliable or have margin. While "scenario-Based" assessments may assume flood protection features are failed, margin assessments may consider the probability of the flood protection feature failure in the impact assessment."*	NRC staff agrees with this comment, in part. Text has been added to the ISG to indicate that margins assessment can consider the probability of flood protection failure. All credible flood protection failure modes must be considered along with the probability of each failure mode.
2.8 [J. Riley]	**Page 18** second paragraph, second sentence: "plant system models should be updated or developed". Plants do not currently have shutdown PRAs. Furthermore no PRA standard for shutdown PRAs has been developed. While 'at-power" PRAs can be enhanced to include additional mitigation components, such as those introduced due to FLEX, developing a full shutdown PRA model to quantify CCDP and LERP impacts should not be expected as part of the integrated assessment.	NRC staff disagrees with this comment. NRC staff does not want to preclude the development of new system models necessary to perform the integrated assessment.

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	Recommendation: Change to "at-power plant system PRA models should be updated or enhanced".	Therefore, the term "developed" has not been removed from the text.
2.9 [J. Riley]	**Page 19** first sentence after second bullet: Suggest clarification. **Recommendation:** Modify sentence as follows: *"In addition, for all resources and actions credited in the Margins evaluation, the evaluation should:"*	NRC staff agrees with this comment. The text has been updated accordingly.
2.10 [J. Riley]	**Page 19** first paragraph after the [second] set of bullets: Requiring evaluation of all failure modes should be unnecessary if lesser failure modes can be shown to be bounded by more severe modes. **Recommendation:** Clarify that lower mode evaluations can be subsumed by evaluation of more extreme failure modes.	NRC staff agrees with this comment in part. However, the implications of changing the text in response to this comment had to be coalesced with the implications of the changes requested by comment 2.7. It is noted that licensees may consider bounding flood protection failure modes (i.e., failure modes that bound lesser failure modes) to reduce the number of failure modes considered under the margins-type evaluation. However, in this case, the failure of flood protection should be assumed to occur (i.e., the probability of flood protection failure is 1.0).
2.11 [J.Stringfellow]	**Section 7.2**, in the second bullet on the bottom of page 17, indicates that to quantitatively evaluate the reliability of active components, a traditional PRA (or statistical techniques,	NRC staff agrees, in part, with this comment. Modifications

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Comment No.	**Comment**	**NRC Response**
	that would be used by a PRA analyst) can be used. This weakens the scenario-based method by relying on a PRA. (It is not clear that an unmodified "'traditional" internal events PRA will provide the appropriate data.) (There is a footnote discussing what to do when an active component cannot be quantified, but this is not to apply to all active components.)	were made to the text in response to a similar comment (see response to comment 2.3).
2.12 [J.Stringfellow]	**Section 7.3** discusses the margin-type evaluation of mitigation capability. Unfortunately, it suggests even more dependency on a PRA. See, for example, the need to update plant system models (bottom of page 18), in which footnote 19 suggests the "internal events PRA, *with appropriate modifications,* can be used." [Emphasis added.] There is also a component reliability evaluation for the margins assessment ... it is not clear that the required information can be obtained without modification to the PRA. Hence, this approach is also weakened by the apparent dependencies on a modified PRA. Also the description of what needs to be done in a margin assessment, as per the ISG, is very high level and non-specific, creating some regulatory uncertainty (during a review) of what is (and is not) acceptable.	A margins-type evaluation is quantitative and uses conditional core damage probability (CCDP) and conditional large early release probability (CLERP) as figures of merit. It utilizes logic structures to model plant response. The intent of the text referenced by the comment is to provide guidance on how internal event models can be leveraged to facilitate performance of the margins-type assessment. It is not intended to require the modification of internal events models and specifies that system models (i.e., logic structures) can be developed specifically for use as part of a margins-type evaluation of mitigation capability. Due to site-specific circumstances, the description of the margins-type evaluation allows flexibility in how licensees choose to model total plant response.

2. Comments related to evaluation of mitigation capability		
Comment No.	**Comment**	**NRC Response**
2.13 [J.Stringfellow]	**Section 7.4** discusses the use of a PRA to evaluate mitigation capability. It correctly identified Section 8 of the ASME/ANS PRA Standard that should be used. However, since the IA requires the consideration of plant modes other than "at-power," this leaves the PRA user at a disadvantage, as there is no current consensus or standard for low power/shutdown (LP/SD) modes of operation. This raises the question about how LP/SD modes will be reviewed by the staff.	NRC staff recognizes the limitations expressed by the commenter. PRA is not a requirement of the integrated assessment. Nonetheless, NRC staff does not want to preclude the performance of a PRA as part of the integrated assessment. The integrated assessment should evaluate the effectiveness of flood protection and mitigation capability of the plant for the mode(s) of operation that the plant will be in for the entire flood event duration. The integrated assessment should describe the expected total plant response under other modes of operation, including a discussion of controls (e.g., programmatic controls) that are in place in the event that a flood occurs during any of these modes (e.g., during refueling). Therefore, the focus of the assessment is on the modes and plant configuration that the plant will be in for the flood event duration. In addition, there should be discussion of expected response under other modes of operation.

2. Comments related to evaluation of mitigation capability		
Comment No.	**Comment**	**NRC Response**
		It is further noted that some advanced reactor design certifications have completed shutdown PRAs, which have been evaluated against Standard Review Plan (NUREG-0800) Chapter 19.0. In addition, Regulatory Guide 1.200 describes the necessary scope and the technical attributes and characteristics for a shutdown PRA.
2.14 [J.Stringfellow]	How does one demonstrate the "high confidence that the CCDP is low"? Is a CCDP low limit consistent with RG 1.177 guidelines?	The text referenced in the comment appears in an older version of the document, but did not appear in the version of the document that was published for public comment.
2.15 [J.Stringfellow]	**On page 19**, last paragraph of Section 7.3, it states that "Given the updated system models, the CCDP and CLERP should be calculated using plant system models. The evaluation of mitigation capability should be repeated until all flood protection failure modes and sets of flood scenario parameters have been evaluated." Requiring all failure modes should be unnecessary if lesser failure modes can be shown to be bounded by more severe modes. If floods will reach 10 feet above all barriers, the CCDP of flood barrier failure at 5 feet may not be relevant. Also do we need to look at each barrier individually or we can look at the failures in aggregate?	Refer to the response associated with comment 2.10.
2.16 [J.Stringfellow]	**On Page 18** it is noted that once the plant conditions have been specified along with equipment affected by the flood protection failure, plant system models should be updated or developed to reflect the current plant state and available equipment. Margins assessments should be performed for [each non-conforming barrier or barrier combinations subject to common failure hazard conditions]. As failure of certain flood protection features are not guaranteed for all flood conditions, consideration of barrier failure probability can be acceptable with justification. That is, in the margins assessment,	Refer to response associated with comment 2.7.

2. Comments related to evaluation of mitigation capability		
Comment No.	**Comment**	**NRC Response**
	the possibility of FPF failure need not be assumed to be 100% just because a failure condition is possible.	

Table 3: Comments related to peer review

3. Comments related to peer review		
Comment No.	**Comment**	**NRC Response**
3.1 [J. Riley]	The extent to which additional peer reviews (in addition to normal QA processes) are expected in the responses to the March 12, 2012 50.54(f) letter is unprecedented and could lead to much unnecessary license burden. Licensees should be able to use their regular QA processes to review the integrated assessment, augmented when necessary to address unique aspects or areas of specialized expertise not covered by licensee staff.	NRC staff believes peer review is an important element of ensuring technical adequacy. Use of a peer review is consistent with other evaluations performed under NTTF Recommendation 2.1, including seismic margins assessment and seismic PRA. Moreover, use of peer review is consistent with previous evaluations of external hazards such as the individual plant examination of external events (IPEEE) program. The ISG has been updated to explicitly facilitate the use of reviewers from inside the licensee's organization if they have the appropriate attributes (as outlined in Appendix B of the ISG). If reviewers with requisite attributes cannot be assembled from within the licensee's organization, it is necessary to assemble reviewers from outside the licensee's organization. Peer review and the suggestion modifications to the text of the ISG were discussed at a public meeting

3. Comments related to peer review		
Comment No.	**Comment**	**NRC Response**
		held October 24-25, 2012.
3.2 [J. Riley]	The 50.54(f) letter did not call for a peer review. The addition of the requirement for additional Peer Review in the ISG is unprecedented for such an endeavor. To date, regulatory requirements for Peer Review have largely been limited to PRAs under Reg. Guide 1.200. Under RG 1.200, PRAs are reviewed against the requirements of a national consensus standard and the purpose of the peer review is to reduce the need for detailed Staff review of the PRA models used in support of risk-informed licensing changes. In the case of the IA, there is no Standard against which the evaluation will be assessed. Thus, the peer reviewers do not have a consistent basis for their review. This creates a potential for variability in peer review findings that could actually complicate the entire IA process. In addition, it is not clear why a utility's normal QA processes could not satisfy the peer review functions described in Appendix B. Requiring an additional layer of review beyond that which would normally be applied to any information submitted to the NRC under oath or affirmation is an unnecessary burden. If there are aspects of the integrated assessment that require the application of expertise beyond that possessed by utility staff, it is the licensee's responsibility to recognize this and obtain the expertise necessary from an outside organization. It should be sufficient to describe the attributes of the peer review and leave it to the licensees to ensure that the attributes are met. Finally, it is not clear how a peer review expedites the NRC's review of licensee submittals. Consequently, the requirement for peer review is an extra cost with no positive benefit.	As noted by the commenter, there is no consensus standard guiding the performance of the integrated assessment. The novel nature of the integrated assessment and the lack of consensus standards is a contributing factor to the staff's belief that a peer review is an important part of ensuring the technical adequacy of the evaluation. Performance and documentation of a peer review will contribute to staff's confidence in the conclusions of the assessment. The ISG has been updated to explicitly facilitate the use of reviewers from inside the licensee's organization if they have the appropriate attributes (as outlined in Appendix B of the ISG). If reviewers with requisite attributes cannot be assembled from within the licensee's organization, it is necessary to assemble reviewers from outside the licensee's organization. Peer review and the suggestion modifications to the text of the ISG were

3. Comments related to peer review		
Comment No.	**Comment**	**NRC Response**
		discussed at a public meeting held October 24-25, 2012.
3.3 [J. Riley]	There is no basis (or precedent) for a regulatory requirement for a participatory peer review. There is no reason to believe that a peer review, if required at all, could not be effectively performed at the completion of the licensee analysis. Any cost impact that might be incurred due to the performance of a peer review is purely an economic consideration and should not be a concern to the NRC. It should be a licensees decision whether or not it is in their best interest to have a peer review performed in a "participatory" manner. Again, the regulatory requirement is imposing an extra resource impact on licensees without any commensurate benefit.	NRC staff believes an in-process peer review (previously referred to as a participatory peer review) will facilitate an efficient and informative review. The text of the ISG has been changed to reflect that while an in-process peer review is preferred, it is not required.
3.4 [J. Riley]	Industry is concerned that the imposition of an unnecessary peer review will impose additional burden and cost on licensees and, due to limited availability of some of the resources necessary to perform the peer review as presented in the ISG, cause schedule delays in the completion of the evaluations. **Recommendations:** The peer review should be performed by utility staff in accordance with their normal QA processes unless there are aspects of the Integrated Assessment that require expertise that is not available within the licensee staff. Appendix B should describe the key attributes of the peer review. Licensees should be expected to determine if the attributes can be satisfied by their normal processes, or require additional efforts. In this regard, we suggest the following changes to Appendix B. • Revise Appendix B in general to be less prescriptive and to indicate that the items discussed are attributes of a peer review. • Change the introduction to Appendix B to allow a licensee to credit their internal processes as a means to satisfy the peer review attributes and to expect that the licensee will obtain outside assistance for those attributes that cannot be satisfied by their internal programs or expertise. • Delete the requirement to justify independence of the reviewers. Ensuring an appropriate degree of independence is part of a licensee's normal processes.	NRC staff agrees in part with the comment. The recommendations provided here are consistent with the discussions at public meetings on October 24 and 25. The ISG has been updated to reflect these items.

3. Comments related to peer review		
Comment No.	**Comment**	**NRC Response**
	• A participatory review may be recommended for the reasons explained in the appendix, but it should be optional at a licensee's discretion. • Focus the expectations for peer review on those aspects of the integrated assessment that are unique, outside of normal practice, demanding of special expertise, or important for the overall accuracy of the assessment. • Require that the integrated assessment report include a description of how the licensee satisfied the peer review attributes in Appendix B. • Change the other places in the ISG that describe the peer review process in a manner consistent with Appendix B.	
3.5 [J. Stringfellow]	From the perspective of peer review performed for PRAs (to satisfy Regulatory Guide 1.200), the peer review requirements discussed in Section 4 and Appendix B are philosophically different, potentially incomplete, and will likely have an impact on the analysis being performed. Until now, a peer review is performed after an analysis has been completed and reviewed, not contemporaneously, as indicated in Section B.2. This is a philosophical change in the approach to a typical peer review. Without experience and guidance in performing such a peer review, the peer review may not lead to the results anticipated. For a PRA, a peer review must follow a written process; the process provided in Section B.3 is not detailed enough to be considered a workable process and as such is likely to perturb the analysis itself. The IA is likely to be an iterative process that requires an understanding of certain SSCs that may not be clear or defined. Thus a Peer Review Team will likely lead to discussions regarding methods and treatments and without guidance does not seem to be a reasonable or effective foundation to support a peer review. In the case of defining methods and treatments the peer review team effectively becomes part of the analysis team, and the results of the peer review, effort likely have reduced utility. The peer review approach as it is currently proposed should be reconsidered to allow for a more traditional final product review using utility resources and processes where available and applicable. In addition, clarification of the expectations regarding the implementation of the participatory process review should be provided.	NRC staff believes an in-process peer review (previously referred to as a participatory peer review) will facilitate an efficient and informative review. The text of the ISG has been changed to reflect that while an in-process peer review is preferred, it is not required. In addition, the ISG has been updated to explicitly facilitate the use of reviewers from inside the licensee's organization if they have the appropriate attributes (as outlined in Appendix B of the ISG). If reviewers with requisite attributes cannot be assembled from within the licensee's organization, it is necessary to assemble reviewers from outside the licensee's organization.
3.6 [J. Riley]	**Page 44** "Individuals with experience assessing operator manual actions (e.g., for fire)	Due to changes made in

3. Comments related to peer review		
Comment No.	**Comment**	**NRC Response**
	should be included in the peer review team at sites relying on operator manual actions to protect against or mitigate a flood event." The use of "fire" implies it is a relevant "analog" to flooding which is not appropriate as fire and flooding events require significantly different action response times, types of actions, number of operators involved, etc. and is misleading in the sense that it implies there is an analogous, consensus-accepted approach. **Recommendation**: Change to the following by deleting (e.g. for fire) – *"Individuals with experience assessing operator manual actions should be included in the peer review team at sites relying on operator manual actions to protect against or mitigate a flood event."*	response to comments provided in Table 3, the referenced text is no longer part of the document.

Table 4: Comments related to examples

4. Comments related to examples		
Comment No.	**Comment**	**NRC Response**
4.1 [J. Riley]	The guidance contained in the ISG is very complex and difficult to interpret. Examples are one way to provide greater clarity. Appendix D provides examples, but none are applicable to this guidance. In fact, most are, in one form or another, external flood PRAs that are the least likely part of this guidance to be used given the difficulty of quantifying flooding hazards and these old studies would be unlikely to be acceptable under current regulatory guidance (i.e., RG 1.200). Industry has offered to work with the NRC to provide examples and is presently working on an example application of the scenario based approach. Further, given the complexity of this guidance, some sort of pilot or documented table top evaluation will be essential to gaining clarity and predictability in the process. A pilot process would provide a means to identify issues, clarify the guidance, and document examples. **Recommendation:** Add the type of appendix that illustrates the use of the IA ISG and delete current Appendix D content. Appendix D should contain examples of the use of the ISG or state that the examples will be developed later. Examples could be developed, reviewed during industry-NRC meetings, and approved using the FAQ process established for the flooding walkdown guidance. If references to the material currently included in Appendix D are retained in the document, then the inclusion should be more selective as the examples are very non-uniform in completeness and "quality" and some do not represent the apparent intent of the ISG and would be misleading (the ISG caveat statement – *"However, this Appendix does not necessarily endorse the methodologies used in the external flood risk studies referenced here and these references do not supersede the guidance contained in this ISG."* – is not helpful to guide the user / implementer.)	NRC staff agrees in part with this comment. NRC staff recognizes the importance of example applications. However, it is also acknowledged that the development timeline for this ISG does not facilitate the development of comprehensive examples for inclusion in the ISG. NRC staff will continue to work with external stakeholders to develop examples. It is further recognized that Appendix D does not provide specific examples that demonstrate how an integrated assessment may be performed. Nonetheless, NRC staff believes the references in Appendix D provide useful insights regarding previous activities and programs related to evaluation of flood risk. As a result, Appendix D will be retained and labeled as "existing references and resources" (without reference to "examples.") NRC staff has also expanded on the information in Appendix

4. Comments related to examples		
Comment No.	**Comment**	**NRC Response**
		A and Appendix C to provide guidance in lieu of additional examples.
4.2 [J. Stringfellow]	The analysis requirements for the IA assessments for both the scenario based approach and the margins evaluation would benefit from examples.	NRC staff agrees, in part, with this comment. See response to comment 4.1.

Table 5: Comments related to redundancy and equipment reliability

5. Comments related to redundancy and equipment reliability		
Comment No.	**Comment**	**NRC Response**
5.1 [J. Riley]	Appendix A, Table A.1, P. 42 "Equipment redundancy shall be provided for equipment that may be required to operate in an active manner at any time during the flood event duration". - This seems to impose the defense-in-depth requirement for design basis accident mitigation systems even though this is a beyond-the-design-basis situation. For design basis accident mitigation systems there are no requirements to use PRA type approaches to demonstrate reliability. **Recommendation:** Remove the redundancy requirement from the table. The need for consideration of redundancy or diversity should be included as part of the scenario evaluation guidance. This concept was added to the recommended language above in [comments associated with the scenario-based evaluation].	NRC staff agrees with the comment. The text has been removed from Table A1. However, it is observed that, in evaluation of mitigation capability using a scenario-based evaluation, diversity, redundancy, and other considerations that support the robustness of approaches used to mitigate the event provide increased confidence that key safety functions can be maintained.
5.2 [J. Riley]	**Page 14** *"quantify the reliability of the active features, other than flood doors and hatches, based on operating experience and other available data or information using traditional PRA or statistical techniques".* This is discussed more completely in A.1.2. **Recommendation:** change "quantify the reliability of the active features, other than flood doors and hatches, based on operating experience and other available data or information using traditional PRA or statistical techniques" to *"quantify the reliability of the active features* ***in accordance with A.1.2****".*	NRC staff agrees with the comment, in part. The text has been updated to indicate that licensees should justify the reliability of active components using operational data, performance criteria (e.g., see Table A 1), and based on consideration of operational requirements and incorporation of equipment in plant programs. In addition, if information is available, licensees should quantitatively evaluate and document the reliability of active components based on operating

5. Comments related to redundancy and equipment reliability		
Comment No.	**Comment**	**NRC Response**
		experience, testing, and other available information using traditional PRA or statistical techniques
5.3 [J. Riley]	Page 21 (two places) “the reliability of active features”, if Table A 1 is used this will not be available. **Recommendation:** Change to – *“the reliability of active features or results of application of Table A 1.”*	NRC staff agrees with this comment and the text has been updated accordingly (though using different language than recommended by the comment).

Table 6: Comments related to evaluation of manual and operator actions

6. Comments related to evaluation of manual and operator actions		
Comment No.	**Comment**	**NRC Response**
6.1 [J. Riley]	**Page 19** *"When it is not feasible to use HRA concepts and approaches,"* this is in reference to quantification so quantification should be included. **Recommendation:** Change to – *"When it is not feasible to use HRA concepts and approaches* ***to quantify the reliability****",*	Due to changes made in response to comment 6.2, the referenced text is no longer part of the document.
6.2 [J. Riley]	**Page 19,** second bullet at the top of the page: "*When it is not feasible to use HRA concepts and approaches, criteria described in Appendix C to demonstrate acceptability of the operator manual actions. In such cases, for quantification purposes in a margin analysis, use an initial failure probability of no less than 1X10^{-1} if the criteria in Appendix C are met*." The focus of this statement should be on the procedure to be used when a qualitative assessment is used in lieu of a detailed quantitative analysis. The statement should not reference Appendix C tables as those tables are judged to justify feasible and reliable actions and could in principle, based on its detailed structure, be quantified. In fact using Appendix A of SPAR-H and the limiting performance shaping factors from Section C.1, page 48, the human error probability can be calculated to be less than 3x10^{-2}. The focus should be on the analyst's choice to use purely qualitative approaches. **Recommendation:** Change to: *"When the analyst chooses to use qualitative approaches or engineering judgment within a quantitative model to quantify Human Error Probabilities (HEP), use an initial screening failure probability of no less than 0.1. This value may be used as a basis for further refinement (e.g., through justifying improved performance shaping factors via use of past experience, relevant results of plant drills, improvements to training, modifications to operator manual actions, etc.)."* If the parenthetical statement at the end of this bullet is retained, change the phrase "exceed the requirements" to	NRC staff disagrees with this comment, in part. Meeting the criteria in Appendix C does not imply a human error probability of less than 3x10^{-2}. Moreover, the staff disagrees with the suggested text recommending the use of an a priori screening value of 0.1 in conjunction with an assessment of human error probabilities based on qualitative considerations or engineering judgment (i.e., without a connection to the considerations provided in Appendix C). NRC staff has removed the reference to an initial failure probability of 0.1 associated with meeting the criteria of Appendix C. Instead, the text of the ISG now states that the reliability of credited

6. Comments related to evaluation of manual and operator actions		
Comment No.	**Comment**	**NRC Response**
	"exceed the nominal requirements"	human actions should be quantified using human factors engineering and human reliability concepts and approaches.
6.3 [J. Riley]	**Page 47** *"This appendix provides guidance on evaluating operator manual actions associated with flooding based on concepts and approaches used in human reliability analysis (HRA)."* It has been discussed during public meetings on several occasions that consensus methods for assessing reliability of operator(s) actions during flooding events do not exist and that use of existing methods entail a "best effort" type approach. **Recommendation:** Change to: *"This appendix provides guidance on evaluating operator manual actions associated with flooding based on concepts and approaches used in human reliability analysis (HRA).* ***Due to the nature of and variety of potential flooding events and responses it is anticipated that other approaches may be used or developed for this purpose."***	NRC staff agrees with this comment and suggested text, in part. A footnote has been added to Appendix C in response to this comment.
6.4 [J. Riley]	**Page 52** The following experience metrics are not relevant to this situation – a more appropriate measure would be training on the action or procedure. See recommendation below. **"▪** *Low—less than 6 months experience and/or training. This level of experience/training does not provide the level of knowledge and deep understanding required to adequately perform the required tasks; does not provide adequate practice in those tasks; or does not expose individuals to various abnormal conditions.* ▪ *Nominal—more than 6 months experience and/or training. This level of experience/training provides an adequate amount of formal schooling and instruction to ensure that individuals are proficient in day-to-day operations and have been exposed to abnormal conditions.* ▪ *High—extensive experience; a demonstrated master. This level of experience/training provides operators with extensive knowledge and practice in a wide range of potential*	NRC staff agrees with this comment, in part. The text has been updated, though using different language than recommended by the comment.

6. Comments related to evaluation of manual and operator actions		
Comment No.	**Comment**	**NRC Response**
	scenarios. Good training makes operators well prepared for possible situations." **Recommendation:** Change to a training based metric along the lines of the following: • *Low— on the job training obtained while performing flooding event actions during a flooding event.* • *Nominal— training at the frequency of periodic compulsory site training* • *High— training at the frequency of periodic compulsory site training for multiple training sessions and/or participation in the development of the training*	
6.5 [J. Riley]	**Page 55** "Human factors engineering**"**: The discussion of this topic in the ISG point out the fundamental and significant differences in flooding related events and those typically addressed by HRA, yet the PSFs utilized are those for events associated with operators in a control room environment, such as major focus on instrumentation. **Recommendation:** Recommend deleting this area until research is done to understand what the relevant human factors engineering PSFs are for flooding events.	NRC staff disagrees with this comment. However, additional text has been added to Appendix C to provide additional guidance and structure for the evaluation of manual actions.
6.6 [J. Stringfellow]	On **page 53** of the ISG, near the top, it says "Except under special circumstances involving skill-of-the-craft, operator manual actions that are not associated with procedures should be considered unfeasible. Written and maintained plant procedures must be available to cover all credited manual actions..." During a severe flood scenario, many operator actions may be required, and it is difficult to anticipate in detail or order of priority what they may be during and the first few days after a flooding event. For example, there may be a need to place sump pumps in some locations and find ways to power them; or, there may be a need to purchase and install equipment to replace equipment damaged by the postulated flood. Once the time frames are long enough, there should be some, relaxation of the no procedure = no credit rule.	NRC staff agrees with this comment, in part. Text has been added to Appendix C to allow credit to be taken under degraded performance shaping factors (PSFs) with strong justifications and appropriating accounting as part of the timing analysis.

Table 7: Comments related to evaluation of flood protection

7. Comments related to evaluation of flood protection		
Comment No.	**Comment**	**NRC Response**
7.1 [J. Riley]	**Page 36** *"The following sections provide points of consideration in evaluating soil structures (embankment, levees, and berms), concrete barriers, seals and plugs, and drainage systems. In evaluating these types of barriers, licensees should refer to the guidance below as well as appropriate codes and standards to assess whether in place or planned systems conform to good practices."* It isn't clear how these are supposed to be used in decision making or reporting. **Recommendation:** Change to – *"The following sections provide points of consideration in evaluating soil structures (embankment, levees, and berms), concrete barriers, seals and plugs, and drainage systems. In evaluating these types of barriers, licensees should refer to the guidance below as well as appropriate codes and standards to assess whether in place or planned systems conform to good practices.* ***Plant features not meeting the implied expectations associated with these points of consideration shall be identified and a technical judgment provided summarizing what their implications are if they are noteworthy and if not noteworthy why they are not."***	NRC staff agrees with this comment. The text has been updated (though using different language than recommended by the comment).
7.2 [J. Riley]	**Page 39** *"Equipment should not be damaged or otherwise adversely effected by the flood event (e.g., due to direct inundation, humidity, hydrodynamic forces, or debris) or adverse environmental conditions."* It is not practical to avoid any humidity. **Recommendation:** *"Equipment should not be damaged or otherwise adversely effected by the flood event (e.g., due to direct inundation,* ***excessive*** *humidity, hydrodynamic forces, or debris) or adverse environmental conditions."*	NRC staff agrees with this comment. The text has been updated accordingly.
7.3 [J. Riley]	**Page 40** *"A.2 Evaluating flood protection systems*" and **Page 14**. *"Performance criteria"* The relationship between these two sections is confusing. There is duplicate content, example: 6.2 - evaluate the feasibility and reliability of credited operator actions (including construction, installation, or other actions) through comparison against criteria	NRC staff agrees with this comment. The text has been updated accordingly.

7. Comments related to evaluation of flood protection		
Comment No.	**Comment**	**NRC Response**
	described in Appendix C A.2 - the feasibility and reliability of operator manual actions that must be performed to install or construct barriers (e.g., flood gates, sandbag walls), including factors that can influence operator performance, as described in Appendix C And there is important, seemingly more detailed content in 6.2 (presumed to be the higher level section) that is not included in A.2. For example: 6.2 - compare the performance, characteristics, and configuration of the flood protection feature(s) against appropriate, present-day design codes and standards (including Standard Review Plan Sections 3.4.1 and 3.4.2, Refs. (5) and(6)) to determine that the feature(s) conforms to good practices and is sufficiently robust (e.g., demonstrates an appropriate factor of safety) **Recommendation:** Clarify the relationship between these two sections	
7.4 [R. Centenaro]	**Section A.1.1.2** - The last sentence states: "Suitable instrumentation is being used to obtain information on the performance and condition of the structure". Need to clarify what is meant by this statement. Are you referring to level instruments to monitor inleakage? If so, the statement should be revised accordingly.	NRC staff agrees with this comment. Text has been added to the ISG to clarify the statement.
7.5 [R. Centenaro]	**Section A.1.1.3** - first [bullet] - it states that "all sizes have been tested to withstand hydrostatic seal pressures...". We should not have to test all sizes. The larger, bounding seal configurations are tested and the results can be applied to the smaller seal configurations - please clarify.	NRC staff disagrees with this comment. It is necessary to understand the capability and capacity of all seals. This information may be provided by the manufacturer or may require testing on a site-specific basis.
7.6 [R. Centenaro]	**Section A.1.1.3** - sixth [bullet] - it states that plugs and seal should be "adequately resistive to fires, corrosive fluids, UV and radiation". Recommend adding, "as applicable" at the end of this sentence since not all seals and penetrations require these additional protective features.	NRC staff agrees with this comment. The text has been updated accordingly.
7.7 [R. Centenaro]	**Section A.1.1.4** - Suggest clarifying that this section is applicable if storm drains are	NRC staff agrees with this comment. The text has been

7. Comments related to evaluation of flood protection		
Comment No.	**Comment**	**NRC Response**
	credited in the flooding evaluations.	updated accordingly.
7.8 [J. Riley]	**Page 15** *"The Integrated Assessment should also demonstrate that the flood protection system integrity is reliably maintained with margin based on comparison against appropriate performance criteria or quantification of feature or system reliability."* It isn't clear how this demonstration is to be provided. **Recommendations:** Delete the sentence OR change to *"The Integrated Assessment should also demonstrate that the flood protection system integrity is reliably maintained with margin based on comparison against appropriate performance criteria or quantification of feature or system reliability* ***by examples to be provided later.****"* OR *"The Integrated Assessment should also demonstrate that the flood protection system* ***has*** *margin based on comparison against appropriate performance criteria or quantification of feature or system reliability."*	NRC staff agrees with this comment. The sentence has been deleted.
7.9 [J. Riley]	**Page 15** *"In addition, if a flood protection feature or system is not able to accommodate the flood scenario parameters, the flood protection evaluation should determine at what flood height and under what associated effects, the flood protection feature or system is able to reliably accommodate a flood with margin."* Since the feature or system has already been determined to not be adequate for the scenario it may be more relevant to know what the absolute capability is, that is without margin. **Recommendation:** Change to – *"In addition, if a flood protection feature or system is not able to accommodate the flood scenario parameters, the flood protection evaluation should determine at what flood height and under what associated effects, the flood protection feature or system is able*	NRC staff agrees with this comment. Changes have been made to the text.

7. Comments related to evaluation of flood protection		
Comment No.	**Comment**	**NRC Response**
	*to reliably **accommodate a flood**."*	
7.10 [J. Stringfellow]	**Section 1.1** indicates that the licensee needs to determine the "margin" for site flood protection. While the purpose of JLD-ISG-2012-05 is to provide IA guidance, there should be guidance (and discussion) with respect to determining adequate margin.	Due to site-specific considerations, the ISG does not specify an acceptable margin. Instead, the determination should be made by licensees on a site-by-site basis with appropriate justification.
7.11 [J. Stringfellow]	In **Section 7**, the ISG indicates that "an evaluation of mitigation capability is appropriate for sites that have not demonstrated that existing flood systems are reliable and have margin." Again, the term "margin" is not defined or any indication of how much "margin" is acceptable. Also, the term reliable, which is "paired" with "margin" throughout the document, is not defined in a way that it can be used as a metric. What constitutes a "reliable" flood system? Is this a qualitative or quantitative definition of reliable? Please work with the FFTF to provide clarification regarding expectations regarding how the analyst is to confirm that margin is adequate. For example, adequate margin will be available when the Flood Protection Features are designed in accordance with accepted codes and standards for that feature to function as a flood barrier. That is if the flood barrier meets stress limits, seals meet hydraulic pressure limits to function as a flood barrier for the re-evaluated hazard, the barrier will not be overtopped by the re-evaluated hazard etc.	Section 6.2 (performance criteria) of the ISG states "To provide confidence in the reliability and margin of flood protection, considering both qualitative and quantitative performance criteria, the flood protection evaluation should do the following:…" Therefore, the performance criteria outlined in the integrated assessment provide confidence in the reliability of site flood protection. The determination of whether margin is appropriate should be made by licensees on a site-by-site basis with appropriate justification.