

Enclosure 1

NEI Response to NRC Request for Additional Information – Date October 30, 2008

NEI 07-01, “*Methodology for the Development of Emergency Action Levels (for) Advanced Passive Light Water Reactors*”

#	EAL	NRC Comment	NEI Response
1	General	1. This document should be split into two distinct parts. One for the AP1000 design and one for the ESBWR design. The ESBWR design certification must be completed before the staff can endorse generic EAL development guidance applicable to this design. However, as the AP1000 design has been certified, it is the best interest of all concerned to address the AP1000 design now.	In the NRC public meeting on December 17, 2008, the NRC stated that ESBWR DCD under review by the NRC contains sufficient information for the staff to complete their review of NEI 07-01 for this design. Therefore, NEI 07-01 will not be split into AP1000 and ESBWR sections.
		2. The draft of NEI 07-01 did not incorporate all the changes made to NEI 99-01 Revision 5. It is expected that NEI 99-01 R5 be used as the basis for the development of NEI 07-01 unless specifically excluded by the applicable design. This includes differentiating between developer information and user information, as well as all notes and clarifiers. Please provide a redline-strikeout version between NEI 07-01 and NEI 99-01 R5.	NEI 99-01 Revision 5 was used as a basis for NEI 07-01. Differences in EALs were based on design differences. NEI 07-01 has been revised to differentiate between developer and user information, as well as all notes and clarifiers. A comparison of the revised NEI 07-01 and NEI 99-01, Revision 5, was performed and is provided. Additions to NEI 99-01 appear in the body of the document with text color red. Items deleted from NEI 99-01 appear as

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			strike out.
		3. An exception to comment #2 above relates to EAL technical basis information applicable for EAL development vs. EAL use. Due to expediency, the staff agreed to allow italicized EAL technical basis information be applicable for EAL developers and not require it to be incorporated into the site's EAL Technical Basis Document for NEI 99-01 Revision 5. However, as NEI 07-01 is a new document, the staff expects the EAL technical basis for each EAL to have a section for EAL basis information and a section for EAL developer information. The section for EAL developer information need not be incorporated into a site's EAL Technical Bases Document.	Unlike the format of NEI 99-01, Basis and Developer information were split into two separate parts.
		4. This document should only contain sufficient detail to allow for the development of site specific EALs applicable to the AP1000 design and ESBWR design. Putting actual equipment names and instrument IDs in this document restricts applicants utilizing these designs to adopt the naming conventions considered appropriate today, which may change over time, and is not technically relevant to the staff's endorsement of this generic guidance.	The NEI 07-01 task force reviewed the final detail provided in NEI 07-01 and approved the use of equipment names and instrument IDs were provided in the document where available. This information is being retained in the template to provide standardization. This information is not expected to change over time because the plant designs are standard.
		5. Several parts of the document state that NEI 99-01 R5 is in development. Please update to reflect its acceptability for use.	References to NEI 99-01, Revision 5, still in development, were removed from the document. They were originally included in NEI 07-01 because 99-01 was not approved by the NRC. These references are no longer required because NEI 99-01 is endorsed by the NRC.

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		6. Do not use "TBD", state " <i>{site specific}</i> " if necessary.	"TBDs" were removed from the document and either replaced by approved terminology or values. Where terminology or values cannot be provided at this time, "TBD" was replaced with "site specific" and a developer note providing a method to develop the needed value was added.
2	Front Section	1. Add a note in the Executive Summary to reflect the rationale for not including Defueled EALs.	Defueled EALs were added back into NEI 07-01.
		2. Please ensure the acronyms are correct and appropriate. For example, CMT is used in the AP1000 DCD (see Appendix C of the design certification Safety Evaluation) to connote "core makeup tank" but is defined in NEI 07-01 as "containment." The endorsed acronyms, applicable to the EALs, should be reflected and not redefined in this document.	Acronyms were reviewed for correctness and appropriateness, and revised, as necessary to be consistent with DCD.
		3. All of the front section material in NEI 99-01 R5 should be maintained in NEI 07-01. These documents are to be only applicable to the site's utilizing the applicable designs and should be all-inclusive to that design. Passive reactor sites should not need to refer to NEI 99-01 for information. However, it is expected that these documents are exactly alike, particularly in the front sections, unless a change is necessary due to the applicable design.	Front matter from NEI 99-01 R5 that applies to the passive reactor design was added back into NEI 07-01.

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3	EAL Setpoints	<p>1. In order to obtain as much closure as possible for COL/ESP applicants using this guidance document in the development of their EALs as part of their application, please perform the following as applicable.</p> <p>a. Add information to the Developer Section to assist applicants using the applicable design to document how the expected values are to be determined. Provide as much detail as is possible. Ensure to note if the expected value is calculated for this EAL, if it is pulled from the ODCM (or Tech Spec's), or if it is an EAL specific calculation based upon a value pulled from the ODCM (or Tech Spec's).</p>	<p>As discussed in the December 17, 2008, meeting a separate developer section was added following the Basis section where applicable.</p>
		<p>b. If calculated just for the EAL, specifically document the method used for determining this value or, if all relevant information is known, perform the setpoint calculation and place it in the EAL.</p>	<p>Where calculated values are required by an EAL, reference to vendor calculation is provided. Applicable references are available for the revised NEI 07-01.</p>
		<p>c. If pulled from the ODCM or Tech Spec's, specifically state what section in what document contains the value necessary for the EAL. If this value is known, incorporate it in the EAL.</p>	<p>ODCMs have not been developed for the passive design plants. Although the specific information is not available, the content and the methodologies used are known. No EALs reference a specific Tech Spec value.</p>
		<p>d. If the EAL setpoint is derived from a calculation based upon a value pulled from the ODCM or Tech Spec's, perform the calculation and document the value if all relevant information</p>	<p>Set-point calculation information was placed in the appropriate EAL Developer section.</p>

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		is known to do the setpoint calculation, or specifically document the method used to determine the EAL setpoint.	
4	ISFSI	Include the E-HU1 ISFSI EAL from NEI 99-01 R5 as it has no relation to the design and should not be excluded from NEI 07-01 as it is generic guidance for the development of EALs. Applicants without an ISFSI, or with ISFSI EAL(s) already addressed, need not incorporate this part of the generic guidance.	The ISFSI EAL was added to NEI 07-01.
5	Definitions	1. Definitions are expected to be as stated in NEI 99-01 R5 as well as any new terms applicable to the specific design. Terms not applicable to the applicable design may be excluded with justification.	Definitions were added or deleted as appropriate to be consistent with NEI 99-01 R5 and to reflect the AP1000 and ESBWR designs. Only terms used in NEI 07-01 are defined.
		2. Verify that the "significant transient" definition is appropriate for these designs.	Significant transient was removed from IC SS6, which was the only EAL that used the term. Therefore the term was removed from the definition section.
		3. Verify that all definitions and acronyms do not conflict with the applicable DCD.	All definitions and acronyms were verified to not conflict with DCD.
6	EAL Format	1. Follow the format established in NEI 99-01 R5, i.e., EAL (AU1, AA1, etc.) bolded and sections bolded (IC, Op Mode, etc.).	NEI 07-01 was revised to follow the NEI 99-01 format. The task force decided to retain New Times Roman font for readability purposes.
		2. Have a section for Basis information and for Developer Information.	Basis and Developer sections were split, as previously discussed.
		3. Remove extraneous detail not necessary for endorsement of this	Confirmed information was retained in the template to provide

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		generic development guidance.	standardization. This information is not expected to change over time because the plant designs are standard.
		4. Remove information not related to the AP1000 (ESBWR) design.	Non-applicable design information was removed.
		5. Remove instrument IDs and TBDs.	<p>As previously discussed, the NEI 07-01 task force determined it was appropriate to retain instrument IDs where available.</p> <p>Instrument IDs are being retained in the template to provide standardization. This information is not expected to change over time because the plant designs are standard.</p> <p>TBDs were removed from the document and replaced by either approved terminology or values. Where terminology or values cannot be provided at this time, "TBD" was replaced with "site specific" and a developer note was added providing a specific method to develop the needed value.</p>
		6. Incorporate ALL basis information from NEI 99-01 R5 unless excluded by the applicable design.	NEI 07-01 was reviewed against NEI 99-01, Revision 5, and NEI 07-01 was revised to incorporate 99-01 Basis information appropriate to the AP1000 and ESBWR.

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		7. Add additional basis information applicable to the design.	NEI 07-01 was reviewed and appropriate design specific information was added to the Basis section.
		8. Follow numbering/labeling convention used in NEI 99-01 R5 for the Fission Barrier Matrix thresholds.	NEI 07-01 was revised to include the NEI 99-01 numbering convention and table layout.
		9. Follow convention used in NEI 99-01 R5 for layout of basis information applicable to a specific EAL (i.e., EAL #1 ...).	NEI 07-01 was revised to follow the NEI 99-01 Basis layout convention with one exception. The exception is a Developer section was added.
7	Station Blackout EALs	<p>1. Please explain in much greater detail why the NRC should consider the removal of EALs related to loss of AC power during cold shutdown and/or refuel op modes given there is no temperature differential to allow for "boil off" or natural circulation.</p> <p>2. In light of SECY-95-132 and section 8.5.2.3 of the AP1000 SER, provide further explanation regarding the removal of SBO EALs for all applicable operating modes.</p>	Refer to Enclosure 2 for a response to this RAI.
8	EALS Related to Digital I&C	<p>1. Issues related to digital I&C, particularly equipment in the Control Room, the Technical Support Center, and digital RPS/ESF systems will continue to be an open item for the conceivable future.</p> <p>a. However, the loss of all indication and control due to a complete loss of digital I&C, regardless of the platform/instrumentation a licensee chooses to install, would be appropriately classified as a Site Area Emergency (SAE).</p> <p>b. Likewise, a precursor to the above SAE should be developed at the Alert classification level.</p> <p>2. Provide an Alert EAL and Site Area Emergency EAL that can be</p>	SA4 and SS6 were modified for a partial (precursor) and complete loss of all indication and control. The EALs were made generic and can be implemented regardless of the platform/instrumentation a licensee chooses to install. Developer notes were added for the AP1000 and ESBWR to indicate instrumentation terminology provided in each DCD.

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		<p>indicative of the worst-case scenario related to digital I&C (i.e., loss of control and/or indication) with appropriate technical basis information to provide the necessary context for classification.</p> <p>[Note that these EALs will not be reliant upon a certain digital I&C platform but will rather be based upon the generic loss of control and/or indication.]</p>	
9	Operating Modes	<p>The operating mode descriptions in the ICs and recognition class tables need to be reviewed and corrected as appropriate. The staff observed many instances in which the BWR modes are given as "Power" (Mode 1), "Startup" (Mode 2), "Stable Shutdown" (Mode 4), omitting "Hot shutdown" (Mode 3). PWR Mode 3, "Hot Standby" is given. Please modify the proposed EAL and its basis accordingly or provide additional justification.</p>	<p>NEI 07-01 was reviewed to ensure that correct and consistent terminology was used throughout the document.</p> <p>Table 5-F-1 was changed to add the word "Shutdown" to provide mode terminology consistency.</p>
10	CU1	1. There should be a value for the AP1000 as a precursor to CA1.	<p>A threshold was added to CU1 for AP1000.</p> <p>Since a precursor was added to CU1, the Basis discussion in CA1 on precursor events was removed.</p>
		2. Where is the information related to relief valve operation, or an evaluation for its exclusion?	A Basis discussion was added to CU1 on relief valve operation.
		3. The discussion appears to be, in part, inconsistent with the passive core cooling system design. The passive heat removal system (PRHR) credited as a source of water has no inventory of its own and has no injection capability (PRHR circulates water from the hot leg through a heat exchanger submerged in the in-	Since a precursor was added to CU1, the Basis discussion in CU1 on precursor events was removed.

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		containment refueling water storage tank to the cold leg). Please correct this apparent editorial inconsistency.	
11	AA1	This 50% protocol isn't reflected in Appendix A. Please update Appendix A.	Appendix A was updated.
12	CU2 CA1	The staff is concerned regarding the possible confusion that could occur given two level indications for the same condition which are more than a few feet apart, and when the hot leg level 9.7% threshold is also one of the thresholds for IC CA1-what does the emergency director call, a NOUE or an Alert? Please reconsider the thresholds in both IC CU2 and CA1, modify the proposed EAL and its basis accordingly, or provide additional justification.	CU2 was modified. 9.7% was deleted and replaced with Low-3. CA1 was modified. 9.7% was deleted and replaced with Low-4.
13	CU3 SU1	<p>The loss of power to the battery chargers for the class 1E DC distribution system identified as the proposed IC could be caused by a loss of offsite power and by a loss of the standby diesel generator. As such, the proposed IC obscures the fundamental concern of NEI 99-01 IC CU3, namely the loss of offsite power. The proposed basis advances the argument that since the ALWRs do not have safety grade diesels but rely instead upon the safety related batteries, the loss of offsite AC power doesn't warrant a NOUE classification. The staff disagrees in that:</p> <ol style="list-style-type: none"> 1. A declaration under NEI 99-01 IC CU3 is not a function of the emergency diesel generators nor the DC batteries. 2. Offsite AC power, the fundamental subject of IC CU3 is not safety-related at any current or proposed reactor. Thus, the non-safety configuration of the ALWR AC distribution is not justification for this ALWR specific deviation from NEI-99-01. 3. As stated in the NEI 99-01 bases, unplanned loss of offsite AC power reduces required redundancy and potentially degrades the level of safety of the plant by rendering the plant more vulnerable 	See Enclosure 2 for a response to this RAI.

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		<p>to a complete loss of AC power (e.g., station blackout). In addition, the loss of offsite AC power forces the licensee to rely solely on equipment powered through the emergency buses to control and shutdown the plant, thereby complicating the shutdown. The fact that the ALWR emergency buses are DC rather than AC does not change the need for the licensee to rely on equipment powered through the emergency buses only nor does it eliminate complicating the shutdown, a degradation in the level of safety of the plant.</p> <p>4. The operability of the Class 1E DC power subsystems (and by extension power sources needed to make the chargers operable) is addressed under Technical Specification 3.8.1, and the outage of the chargers would be addressed under IC SU2.</p> <p>5. The argument regarding Technical Specification 3.9 is non-persuasive in that the existing LWR fleet has a corresponding limitation. The staff also notes that this LCO is driven largely by the offsite dose consequences of a fuel handling accident rather than by decay heat.</p> <p>6. The battery chargers are powered from 480 VAC buses that are normally powered by offsite power or the main generator, but can be powered by the non-Class 1E standby diesel generators, which are onsite power sources, even if they are non-Class 1E. By focusing on the existence of power on this bus, the CU3 focus on the availability of offsite power is inappropriately diminished.</p> <p>7. The progression of events identified in the bases, namely, boiling in the IRWST and activation of passive IRWST injection would be a significant transient on the plant the response to which warrants an emergency classification greater than NOUE. (Cold/Refuel)</p> <p>Please modify the proposed EAL and its basis accordingly or provide additional justification for this deviation.</p>	

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14	CU3 SU1	1. "PIP" is not an endorsed acronym in the DCD and should not be used.	PIP was eliminated in all AP1000 references. PIP is used by the ESBWR and was retained.
		2. In light of SECY-95-132 and section 8.5.3.2 of the AP1000 SER, the statement that "...passive ALWRs do not need/have safety-related standby diesel generators" is misleading in that this design does need diesel generators, they are just not safety-related (RTNSS issue). Provide greater detail why this statement should not be changed to accurately reflect the role non-safety related AC systems have on the ability of the site to respond to an emergency as well as explain the RTNSS issue for SBO EALs.	Basis section was modified to make it clear that passive ALWRs do not have safety related diesel generators but have batteries that are the safety-related power supplies. A response to the RTNSS issue related to SBO EALs was provided in Enclosure 2.
15	CA1 CS1	The NEI 99-01 CS1 duration is set at 30 minutes and the bases describes this value as being 50 percent of the corresponding duration in IC CS1, and that fuel damage is not expected until the core has been uncovered for greater than one hour per the analysis referenced in the CG1 Bases. The proposed Threshold #2 increased this duration to 30 minutes and the proposed Threshold #3 in CS1 was revised to 60 minutes. Neither of the proposed bases provides a rationale, based on design differences between LWRs and ALWRs, for the 100% increase in the durations. Please modify the proposed thresholds and their basis accordingly or provide additional justification for this deviation from NEI 99-01.	Reference added as a basis for why design differences allow for change of 100% in durations: ESBWR reference added to both CA1 and CS1 is NEDO-33201 Section 16.3 and for CS1 Table 16.3-6. Westinghouse reference is Section 4.2 of the Passive Cooling System Specification Document, APP-PXS-M3-001.
16	CA4	Contrary to the logic statement "(1 or 2 or 3)", There are only two thresholds for each reactor type. Does the indentation of Threshold #2 have any significance? These should be corrected.	The number 3 was removed from the logic statement and indentation error corrected.
17	CG1	Elsewhere in this proposed EAL scheme, a reading of 9.7% on RCSLT-160A and LT-160B, which is 3" above the bottom centerline	9.7% is not used as the surrogate for TOAF in CU2, CA1 or CS1. 9.7% is the

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		of the hot leg, is used as a surrogate for TOAF as stated in the NEI-99-01 R5 bases. Why is "offscale low" used as the TOAH surrogate here when 9.7% indication is used elsewhere.	Low-2 set-point which activates all passive water injection with ADS 4 and IRWST injection for Core Heat Removal. The basis does not indicate that TOAF is warranted. In CG1, off-scale low is the closest TOAF available. No revision is warranted.
18	Table 5-F-1, 4 th Bullet	The staff agrees that technical specification issues involving containment integrity should not be declared in the absence of an event needing containment barrier mitigation. However, the language of the second sentence appears to expand this caveat to issues NOT associated with technical specification integrity. For example, in Table 5-F-3, there are three potential loss thresholds that are reductions in the level of safety of the plant, regardless of the other barrier performance, and should be declared. These are (1) a containment pressure greater than 59 psig, (2) Hydrogen concentration in containment, and (3) containment Hi-Hi pressure with failure of passive containment cooling to actuate. A steam line break can pressurize containment without a loss of either fuel or RCS barriers. Please modify the proposed note accordingly or provide further justification.	Industry agrees with staff thought process as described in RAI 18 and has deleted the last sentence of the 4th bullet to prevent needless confusion and potential incorrect classification.
19	Table 5-F-3, Fuel # 4	The staff notes that the proposed use of 3 inches above the bottom of the hot leg (9.7%) appears to be an increase in conservatism over the top of active fuel (TOAF) used in the corresponding NEI 99-01 thresholds. However, in the proposed EAL CG1, "offscale low indication" was used instead as a surrogate for TOAF, Please modify the proposed EALs and their basis accordingly or provide justification for the differences in the two AP1000 parameters and TOAF as	9.7% was deleted and replace with Offscale Low which is the closest indication to TOAF. Inventory CSF – Yellow Entry Conditions met was removed in that it does not indicate TOAF.

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		provided in the NEI-99-01 R5 EAL.	
20	Table 5-F-3, CNMT#2, Potential #2	<p>1. The staff has identified some apparent inconsistencies between the table threshold language and that in the corresponding bases. Please modify the proposed thresholds and their basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.</p> <p>2. The bases identifies CNMT design pressure as 45 psig, whereas Table 5-F-3 states a value of 59 psig.</p>	Value in the Basis section was changed from 45 to 59. Value in the table is correct.
		<p>3. The last sentence in the last paragraph of the basis refers to operation of "<i>pressure suppression</i>" after failure of the PCS. This appears to be inconsistent with our understanding of the AP1000 design in which the pressure reduction occurs as an outcome of CNMT cooling by the PCS.</p>	The last paragraph was modified to clarify that in the event the PCS does not actuate, a challenge to containment that requires operator action to initiate alternate pressure suppression systems exists.
21	Table 5-F-3, CNMT#3, Potential #3	The proposed potential loss threshold includes a " <i>Stage 4 ADS actuated</i> " logic "and-ed" with the two conditions identified in NEI 99-01. The staff sees this added condition as a potential reduction in the effectiveness of the threshold because if the Automatic Depressurization System (ADS) Stage Four doesn't actuate for whatever reason, then the other two conditions cannot, in of themselves, result in a classification, as would the original language. The staff believes that having lost core cooling in conjunction with the lack of a success path to restore the cooling within 15 minutes is sufficient in of itself to warrant a General Emergency classification regardless of the status of ADS. The staff notes that the success or	"AND Stage 4 ADS actuated" was deleted from table. Additional clarification was added to the Basis.

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		failure of ADS would already be reflected in whether the original two conditions would be exceeded or not. Please modify the proposed EAL and its basis accordingly or provide justification for this deviation from NEI 99-01.	
22	Table 5-F-3, RCS Barrier	The proposed BWR Tbl 5-F-2 includes as a threshold for a loss of RCS Barrier that addresses automatic or manual actuation of the automatic depressurization system (ADS). Since the AP1000 also has an ADS which, on actuation, would have the same outcome, namely a large release of RCS mass to the CNMT (via IRWST), it seems necessary that the AP1 000 also address this condition as a loss of the RCS barrier. Please modify the proposed thresholds and their basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.	ADS operation was added to RCS Loss 2.
23	HU1 HA1	1. The AP1000 scheme for HU1 did not include the threshold <i>"Internal flooding that has the potential to affect safety related equipment required by technical specifications for the current operating mode in any of the following areas:"</i> No justification was given for this ALWR-specific deviation from NEI 99-01. Please modify the proposed EAL and its basis accordingly or provide justification for this deviation from NEI 99-01.	The basis for not including internal flooding hazards is provided in the following references: ESBWR – DCD 3.4.1.4 AP1000 – Section 3.4 of the DCD.
		2. The basis for this threshold includes a developer's note that states "... should be developed on a site-specific basis" Since the AP1000 is a certified design, why is the seismic threshold site specific rather than design-specific? What is the purpose of paragraphs 4 or 5? Please modify the proposed EAL and its basis accordingly or provide justification for this omission.	"Actuation of the seismic system indicators" replaced "TBD" in HU-1 and "site specific" removed from Basis.
		3. The developer's note in this discussion provides for use of "...FSAR design basis..." for establishing the high wind speed threshold. Since the AP 10000 is a certified design, why is the	Values are now included in the HA1 for both designs. "Should be" is replaced in Basis section with "is".

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		wind speed threshold site-specific rather than design-specific? Please modify the proposed EAL and its basis accordingly or provide justification for this omission.	
		4. Are the NUMARC station blackout initiatives (issued before there were ALWRs) referred to in the developer's note for this threshold 23 applicable to ALWRs? This concept was added to the EAL for existing plants since loss of offsite power due to severe weather was a concern. But, the ALWRs don't have this concern. Is the guidance regarding severe weather in NUMARC applicable to sites not in existence when the guidelines were developed? If the NUMARC guidance is generic enough, why not excerpt the applicable text as a developer's note. Please modify the proposed basis accordingly or provide additional justification for why this should be considered acceptable.	Developer Notes are added to HU1 and HA1 indicating that Sites subject to severe weather should include a Threshold based on damage associated with the severe weather condition.
		5. In the proposed bases for Threshold #1 of HU1, it was argued in the bases that no OBE applied to AP1000, Yet this proposed Threshold #1 for HA1 cites OBE and states " <i>AP1000 - 0.10g as indicated by seismic instrumentation.</i> " as the numeric threshold. The proposed HA1 basis does not establish how this numeric value was established. Please modify the proposed thresholds and their basis accordingly or provide additional justification why the as proposed version should be considered acceptable.	OBE was deleted from HA1 EAL1 and replaced with a value indicative of 1/3 of the SSE. The Basis was revised to explain the value.
		6. Although the ESBWR has identified a Threshold #4, none is provided for the AP1000. No justification was given for this AP1000-specific deviation from NEI 99-01. Please modify the proposed EAL and its basis accordingly or provide justification for this deviation from NEI 99-01.	No missile hazard exists due to turbine orientation with respect to containment. Discussion is added to the Basis.
24	HU2	The language in the proposed Threshold #1 deviates from the corresponding EAL in NEI 99-01, in that "verification" was replaced	HU2 was revised for consistency with NEI 99-01 wording.

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		with "receipt," even though the basis still discuss verification. Please modify the proposed EAL and its basis accordingly or provide justification for this deviation from NEI 99-01.	
25	HU3	The phrase "... <i>that may enter the site boundary...</i> " should be deleted as was done in NEI 99-01 Revision 5. The source of the toxic, etc., gases is not the issue here; the issue is whether that gas adversely affects NORMAL PLANT OPERATIONS. The current language would exclude any release that occurs onsite. Please modify the proposed thresholds and their basis accordingly or provide additional justification why the as proposed version should be considered acceptable.	HU3 was revised for consistency with NEI 99-01 wording.
26	HA2	Suggest" ... Establish or Maintain Safe Shutdown (APi 000) or Stable Shutdown (ESBWR)...." for clarity. Please modify the proposed IC accordingly or provide additional justification why the as-proposed version should be considered acceptable.	HA2 was revised to accommodate the wording suggested in the RAI.
27	HA4	The staff has requested NEI to omit the sentence " <i>Validation is performed by calling the NRC or by other approved methods of authentication.</i> " from IC HA4 in NEI 99-01 and requests the same here. The process of validation need not be discussed in this document. Please modify the proposed basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.	Sentence was deleted.
28	HS2	1. There are two citations to " <i>site-specific</i> " time of control transfer. Since the AP1000 is a certified design, why are site-specific criteria being denoted here? Isn't the time to core uncover already addressed in the accident analyses in the DCD? Please modify the proposed basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.	"TBD" is changed to 60 minutes in HS2. The Basis is provided. This value is justified since operator actions are only required well beyond 60 minutes.

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		2. With regard to the 2nd paragraph, please explain why the remaining critical safety functions identified in the Westinghouse EOP scheme are not addressed by this text, since the function restoration procedures for ALL CSFs could be implemented depending on the plant condition.	Removed all CSF discussion from the HS2 Basis.
29	HG1 Basis, 2 nd and 7 th paragraphs	1. Delete "typically." Please explain why the remaining critical safety functions identified in the Westinghouse EOP scheme are not addressed by this text, since the function restoration procedures for ALL CSFs could be implemented depending on the plant condition. Please modify the proposed basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.	"Typically" was deleted from HG1. Removed all CSF discussion from the HG1 Basis.
		2. This is not a developer's note. Unless this information is provided to the ED, how is the ED expected to interpret Threshold #2? Given that the AP1000 is a certified design and that this parameter is design related, why is this described as "site-specific." Doesn't the design parameters or accident analyses for the spent fuel cooling systems establish this for the certified design? If this parameter is in fact site-specific, a developer's note that explains how to develop the site-specific value is needed. Please modify the proposed basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.	The Developer Note is removed from the Basis section. The Basis information is retained and provides guidance on imminent fuel damage.
30	SU5	Since both AP1000 and ESBWR have automatic depressurization systems (ADS), the staff believes that additional clarification is needed with regard to ADS operation for AP1000. The staff suggests that no opening of an ADS valve should be discounted as RCS leakage, since this is not expected normal operation, even if the operators can subsequently shut the valve(s). Please modify the proposed basis	ADS operation was added to EAL RCS #2 B in Table 5-F-3. ADS operation discussion was added in the Basis section in SU5.

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		accordingly or provide additional justification why the as-proposed version should be considered acceptable.	
31	SA1	Please provide more information supporting the determination of 60-min vs. 30-min. You could use 30 minutes to ensure augmentation. Why was 60 minutes specifically selected? Note that the staff is NOT stating that 60 minutes is unacceptable, just that the basis for 60 minutes is not provided. Please modify the proposed basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.	The Basis section was revised recognizing that no operator action is required for 72 hours. 60 minutes was therefore selected as a reasonable achievable time in order to allow for ERO augmentation support.
32	SA2	1. There appears to a significant disconnect between the proposed threshold and the discussion in the 1st paragraph of the bases? How does 1.0E-8 amps on the intermediate range correspond to the 3-5% power condition identified in the 1st paragraph of the proposed bases? (Or for that matter, the 0.25% proposed for the ESBWR.) Please modify the proposed EAL and its basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.	The 0.25% for ESBWR was removed and replaced with APRM ATWS Permissive. "Typically 3 to 8% power" was removed from the Basis section. The Basis explains that the EALs use 1.0E-8 amps (AP1000) and APRM ATWS Permissive (ESBWR) as the values that indicate the reactor is shut down based on operations procedures.
		2. Based on the understanding of the AP1000 RPS, the manual trip controls contain contacts that provide an input to the voting logic and that directly interrupts power to the reactor trip breaker shunt coils. As such the manual trip is both "manual" and "automatic." This paragraph should be modified to specifically reflect the AP1000 design rather than posing a question to the developer. Please modify the proposed basis accordingly or provide additional justification why the as-proposed version should be considered	The discussion concerning switches and pushbuttons on the control room console were removed. No developer note is required for a standard design.

#	EAL	NRC Comment	NEI Response
		acceptable.	
		3. Explain why it is necessary to state a type of trip (PMS, PLS, DAS) instead of just "trip".	The task force determined that it is not necessary to state the type of trip. Therefore the type of trip was deleted from the threshold.
33	SA4	<p>1. Are the Protection and Safety Monitoring System (PMS) and the Plant Control System (PLS) the only sources of parameter indication available to the control room operator?</p> <p>2. Does the loss of indications from PMS denote that protective functions provided by PMS are also lost?</p> <p>3. Are the annunciation and indication functions of PMS and PLS integrated in such a manner as the loss of annunciation always denotes loss of indication and loss of indication always denotes loss of annunciation? Can the annunciation function fail and the associated indication still be available (assuming sensor is operable)?</p> <p>4. What sources of information would the operator have available if all PMS and PLS indications were lost as postulated in the proposed threshold?</p> <p>5. The staff recognizes that the proposed SA4 is SU3 escalated for the ALWR EAL scheme. The staff suspects that this was based on the fact that with the loss of both PLS and PMS indication, there would be no "compensatory indication" as referred to in NEI-99-01 IC SU3 or SA4. Please confirm or correct the staff's understanding of the rationale used in eliminating SU3 and developing SA4.</p>	<p>1. The Diverse Actuation System (DAS) provides indication and control function in addition to PMS and PLS.</p> <p>2. Loss of PMS indications does not denote that the protective functions have been lost. There is independence between the protective and indication functions.</p> <p>3. The annunciator function is provided by the Base Alarm System and the Alarm Presentation System. These systems are independent from PMS and PLS. Annunciator function can fail and the associated indication system still be available.</p> <p>The indication functions of PMS and PLS are provided by the Digital Display System (DDS) I&C network. As a minimum, to lose indication on PLS and</p>

#	EAL	NRC Comment	NEI Response
			<p>PMS, the DDS I&C network must be lost.</p> <p>4. As a minimum the Operator would have indication available thru DAS if all PMS and PLS indications are lost.</p> <p>5. SU3 for NEI 99-01 has no applicability to the digital indication and control system. A 75% loss scenario was considered as not being possible for a digital system.</p>
		6. Explain why "unplanned" is not in the IC.	"Unplanned" was added to to the EAL.
		7. Why list PLS and PMS indicating and monitoring functions?	PLS and PMS are the specific systems provided in the DCD, but were moved to the Developer Notes section to allow the EAL to be generic.
		8. Why is QDPS not in the list?	The Qualified Data Processing System (QDPS) is not an independent monitoring system. It is a method of displaying a subset of parameters from other I&C systems which are also available to be displayed by other means.
34	SS3	1. NEI 99-01 IC SS1 addressed a condition in which a loss of both onsite and offsite last for greater than 15 minutes. That IC	SS3 was changed to Class 1 E. This change clarifies that the IC applies to

#	EAL	NRC Comment	NEI Response
		<p>recognizes the reliance of maintaining safety functions on the availability of offsite power. In consideration of the AP1 000 design, the equivalent condition would be the loss of all Class 1E DC power for greater than 15-minutes. However, the staff finds that the language in proposed SS3 is potentially confusing and may not result in an appropriate classification. Specifically:</p> <p>a. With few changes, the proposed language of SS3 is identical to the language of NEI 99-01 SS3, which addresses the loss of DC power that powers UPS's for vital instrumentation and control power for switchgear. It needs to be clear that for AP-1000, this IC applies to all Class 1E DC power.</p>	all Class 1E DC power.
		<p>b. Contrary to the language of the threshold, the eight buses identified in the threshold are shown in the DCD as being Class 1E 120 VAC distribution panels (i.e., the output from UPS driven by DC power). The staff believes that the correct buses are IDSA-DD-1, IDSA-DK-1, IDSB-DD-1, IDSB-DK-1, IDSB-DD-2, IDSC-DD-1, IDSC-DK-1, IDSCDD-2, IDSD-DD-1, and IDSD-DK-1</p>	The busses were verified and corrected in the SS3.
		<p>c. The proposed SS3 uses the same "vital DC power" nomenclature of NEI 99-01 SS3. The DCD discussion uses "Class 1E DC" and "non-Class 1E DC."</p> <p>2. Please modify the proposed EAL and its basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.</p>	See 1a above.
35	SS1	<p>1. Why was 24-hours specifically selected? Wouldn't the normal and abnormal operating procedures run their course in attempting to restore the power in less time than 24 hours? Note that the staff is NOT stating that 24 hours is unacceptable, just that the basis for 24 hours is not provided. Please modify the proposed basis</p>	Additional clarification for the selection of 24 hours was provided in the Basis for SS3.

#	EAL	NRC Comment	NEI Response
		accordingly or provide additional justification why the as-proposed version should be considered acceptable.	
		2. The threshold refers to a "TBD" bus voltage and the basis refers to a "site-specific bus voltage." Since the AP1 000 is a certified design, why are site-specific criteria and "typical" values being denoted here? Please modify the proposed basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.	<p>The EAL reference for RAI 35.2 should have been SS3.</p> <p>This voltage will be determined for AP1000 during the design finalization process and is shown as "site-specific." A Developer Note was added to SS3.</p> <p>A voltage of 210 V was provided for ESBWR.</p>
36	SS2	1. There appears to a significant disconnect between the proposed threshold and the discussion in the 1st paragraph of the bases? How does 1.0E-8 amps on the intermediate range correspond to the 3-8% power condition identified in the 1st paragraph of the proposed bases? (Or for that matter, the 0.25% proposed for the ESBWR.) Please modify the proposed EAL and its basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.	<p>The 0.25% for ESBWR was removed and replaced with APRM ATWS Permissive.</p> <p>Eliminated "Typically 3 to 8% power" was removed from the Basis section.</p> <p>The Basis explains that the EALs use 1.0E-8 amps (AP1000) and APRM ATWS Permissive (ESBWR) as the values that indicate the reactor is shut down based on operations procedures.</p>
		2. Proposed Bases for SA2 includes a developer's note that addresses whether or not the manual pushbuttons for a Rx trip constitute a manual or automatic trip. Isn't that discussion appropriate here? Please modify the proposed basis accordingly or	The Developer Note was removed from paragraph 2.

#	EAL	NRC Comment	NEI Response
		provide additional justification why the as-proposed version should be considered acceptable.	
		3. Explain why it is necessary to state a type of trip (PMS, PLS, DAS) instead of just "trip".	The task force determined that it is not necessary to state the type of trip. Therefore the type of trip was deleted from the threshold.
37	SS6	1. Are the Protection and Safety Monitoring System (PMS), Data Acquisition System (DAS), and the Plant Control System (PLS) the only sources of parameter indication available to the control room operator?	<p>1. The PLS, PMS, and DAS are not the only sources of parameter indication available to the control room operator. Additional sources of information include, but are not limited to: the Component Interface Module breaker and other position indication information, and the potential to extract information from Ovation server drops.</p> <p>2. DAS was used as an escalation to SAE. Information on DAS has been added to the Basis section of SA4.</p> <p>3. Loss of PMS indications does not denote that the protective functions have been lost. There is independence between the protective and indication functions.</p> <p>4. The annunciator function is provided by the Base Alarm System and the Alarm Presentation System.</p>
		2. DAS was not identified as an indication capability in SA4. Why?	
		3. Does the loss of indications from PMS denote that protective functions provided by PMS are also lost?	
		4. Are the annunciation and indication functions of PMS and PLS integrated in such a manner as the loss of annunciation always denotes loss of indication and loss of indication always denotes loss of annunciation? Can the annunciation function fail and the associated indication still be available (assuming sensor is operable)?	
		5. What sources of information would the operator have available if all PMS and PLS indications were lost as postulated in the proposed threshold?	
		6. How would the operator identify a significant transient in the absence of indication?	

#	EAL	NRC Comment	NEI Response
		7. Explain the feasibility of this EAL given the advanced digital I&C designs postulated to be used.	<p>These systems are independent from PMS and PLS. Annunciator function can fail and the associated indication system still be available.</p> <p>5. At a minimum, the operator will have DAS available in addition to alternate means including local indication on panels.</p> <p>6. "Significant transient" was removed from SS6.</p> <p>7. The task force considers the feasibility of entering this EAL as very unlikely.</p> <p>8. AP 1000 response: The deterministic failure criteria (for instance, single failure) do not impact the Accident Analysis for the AP1000 with respect to the I&C platforms. This is because there are multiple, redundant and diverse paths available for the I&C systems to perform their functions, such that these failure criteria, such as single failure, do not impede their function. Chapters 26 and 29 of the AP1000 Probabilistic Risk Assessment provide failure analysis of the AP1000 I&C systems.</p> <p>ESBWR response: Given this EAL is a failure of all digital systems (beyond design</p>
		8. Explain how this EAL meets the failure analysis concerns with digital I&C from Ch 15 and Ch 16 of the FSAR?	

#	EAL	NRC Comment	NEI Response
			<p>basis), there is no applicability of digital I&C failures to Chapter 15.</p> <p>ESBWR Chapter 16 of DCD is TS and there is no applicability of digital I&C failures, other than the loss of individual functions.</p>

#	EAL	NRC Comment	NEI Response
38	SG1	<p>1. The staff questions the need for this IC.</p> <ul style="list-style-type: none"> a. The proposed SS3 addresses a loss of DC power lasting 15 minutes or longer and uses a minimum bus voltage as a threshold. The Class 1E DC buses are fed from either the battery charger or the battery bank. If the bus voltage has fallen to the minimum, it is apparent that either the batteries or the chargers have failed and that the status of power on the ECS-EA-1 and ECS-EA-2 buses is largely irrelevant. b. Since the valves which actuate the passive core and containment systems fail open on loss of power, the success of these system in maintaining the core cooling and containment functions can be monitored by the fission product barriers and the status of the power on the ECSEA-1 and ECS-EA-2 buses is largely irrelevant. c. If the passive systems have been successful in removing core and containment heat for 72 hours, a general emergency may not be warranted when the power was lost at 72+ hours if natural circulation continues to remove heat. If the passive systems operation is challenged, or if there is no means to monitor the plant, the Emergency Director judgment EAL should trigger the GE. d. Although the proposed bases address "timely" identification, it is difficult to accept anything taking 72 hours to be timely. Also, it is difficult to imagine a situation in which power could not be restored to the buses in some manner within the 24-hour threshold of proposed IC SS1, let alone 72 hours. <p>2. Please modify the proposed EAL and its basis accordingly or provide additional justification why the as-proposed version should be considered acceptable.</p>	<p>For all the reasons stated in RAI 38-1, SG1 has been deleted. If the passive systems have been successful in removing core and containment heat for 72 hours, a general emergency is not warranted when the power is lost for over 72 hours as natural circulation continues to remove heat. If the passive systems operation is challenged, or if there is no means to monitor the plant, the Emergency Director judgment EAL will trigger escalation to the GE.</p> <p>The Basis to SS1 was changed to clarify that escalation may be called for due to fission barrier degradation or Emergency Director Judgment if passive system operation is challenged.</p>
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#	EAL	NRC Comment	NEI Response
39	SG2	Explain why it is necessary to state a type of trip (PMS, PLS, DAS) instead of just "trip".	The task force determined that it is not necessary to state the type of trip. Therefore the type of trip was deleted from the threshold.