

July 24, 2012

Ms. Sue Perkins-Grew  
Director, Emergency Preparedness  
Nuclear Generation  
Nuclear Energy Institute (NEI)  
1776 I Street, NW, Suite 400  
Washington, DC 20006-3708

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION REVIEW OF THE PROPOSED  
REVISION 6 TO THE NUCLEAR ENERGY INSTITUTE (NEI) NEI 99-01,  
“DEVELOPMENT OF EMERGENCY ACTION LEVELS FOR  
NON-PASSIVE REACTORS,” DATED NOVEMBER 2011

Dear Ms. Perkins-Grew:

My staff has performed a review of the Fission Barrier Matrix and the Hot (S) and Cold (C) System Malfunction Sections to the proposed Revision 6 of NEI 99-01 dated November 2011 (ADAMS Accession No. ML113270260). Enclosures 1 and 2, along with previous letters to NEI dated March 13, 2012, and May 2, 2012 (ADAMS Accession Nos. ML12066A113 and ML12115A119 respectively), identify the staff's comments that need to be addressed by the NEI Emergency Action Level (EAL) Task Force before further staff consideration for endorsement.

Based on our review, the staff has also provided a proposed fire EAL, HU2 (Enclosure 3)) as well as a proposed set of EALs for a loss of spent fuel pool water level (Enclosure 4). Please review the proposed EALs and incorporate, or provide an alternative to the proposed EALs, in the next draft to Revision 6 of NEI 99-01 submitted for staff endorsement. In addition, the staff requires a separate evaluation document be provided in support of its review that evaluates each EAL within the context of the applicable EAL set and the overall EAL scheme.

Finally, the staff is suggesting that consideration be given during the next revision of the document to developing of guidance related to EAL classification retraction as well as cyber-security events.

Any questions regarding this review should be referred to the Lead Technical Reviewer, Don A. Johnson, at (301) 415-4040.

Sincerely,

***/RA/***

Joseph D. Anderson, Chief  
Operating Reactor Licensing and Outreach Branch  
Division of Preparedness and Response  
Office of Nuclear Security and Incident Response

Enclosures:

1. NRC Staff Questions and Comments – Fission Product Barrier Matrix Section
2. NRC Staff Questions and Comments – Hot (S) and Cold (C) System Malfunction Section
3. EALs for Consideration – HU2 (Fire) and HU3 (Explosion)
4. EALs for Consideration – Loss of Spent Fuel Pool Level

Any questions regarding this review should be referred to the Lead Technical Reviewer, Don A. Johnson, at (301) 415-4040.

Sincerely,

**/RA/**

Joseph D. Anderson, Chief  
Operating Reactor Licensing and Outreach Branch  
Division of Preparedness and Response  
Office of Nuclear Security and Incident Response

Enclosures:

1. NRC Staff Questions and Comments – Fission Product Barrier Matrix Section
2. NRC Staff Questions and Comments – Hot (S) and Cold (C) System Malfunction Section
3. EALs for Consideration – HU2 (Fire) and HU3 (Explosion)
4. EALs for Consideration – Loss of Spent Fuel Pool Level

Distribution:

DPR Reading File D. Johnson, NSIR M. Norris, NSIR J. Anderson, NSIR M. Thaggard, NSIR

**ADAMS Accession Number: ML12199A351**

OFFICE	NSIR:DPR	TL:NSIR:DPR	ADMIN:NSIR	BC:NSIR:DPR
NAME	DJOHNSON	MNORRIS	STucker	JAnderson
DATE	07/24/12	07/24/12	07/24/12	07/24/12

**OFFICIAL RECORD COPY**

## **ENCLOSURE 1**

Proposed Revision 6 to NEI 99-01

### **NRC Staff Questions and Comments**

#### **FISSION BARRIER MATRIX SECTION**

##### **1. NOTES (Table 9-F-1: Recognition Category “F” Initiating Condition Matrix)**

- a. With the omission of FU1, the second bullet is unnecessary since no emergency classification would result based on the containment barrier being lost or potentially lost with no other barrier affected. If the containment and another barrier are lost or potentially lost, the logic for FS1 properly requires the declaration of a Site Area Emergency (SAE) classification.
- b. The second bullet in the NEI 99-01 Revision 5 notes should not be deleted to enforce the understanding that the fission product barrier matrix cannot stand alone, and that dose assessment may be necessary to differentiate between a SAE and a General Emergency (GE) classification.

For example, consider a steam generator tube rupture (SGTR) scenario in a pressurized water reactor (PWR). Per the matrix, only a SAE classification would be warranted. However, if the SGTR causes an accident induced iodine spike, the assessed doses may warrant a GE classification. The earliest threshold for the fuel clad barrier was set at 300  $\mu\text{Ci/gm}$ . Iodine spikes of about 60  $\mu\text{Ci/gm}$  are typically assumed in design basis analysis (DBA) accidents, which although stylized are credible.

##### **2. Boiling Water Reactor (BWR)**

- a. **Fuel Clad Barrier Potential Loss 2.A and Reactor Coolant System (RCS) Barrier Loss 2.A:** Provide further justification to support the inclusion of “...following depressurization...” Specifically, explain how this term impacts classification timeliness (i.e., Does this added term have on the classification once reactor pressure vessel (RPV) water level cannot be restored and maintained above the threshold?).
- b. **Containment Barrier Loss 3.C:** The staff suggest that consideration be given to returning the phrase “outside primary containment” back into the threshold for clarity. If leakage is not outside the containment, it would not be considered a loss of the containment.
- c. **Fuel Clad Barrier Loss 1.A:** The unit  $\mu\text{Ci/gm}$  is independent of process stream density. Therefore, if the site-specific value is expressed in units of  $\mu\text{Ci/cc}$ , does the this value need to be corrected as the density of the RCS changes throughout an event? Please explain or revise accordingly.

- d. **Fuel Clad Barrier Loss 4.A:** While the corresponding note language in NEI 99-01 Revision 5 directs the developer to at least consider the issue of shine and develop with an alternative, the developer note in NEI 99-01 does not. A valid significant increase in the reading of this monitor, whether it is from piping shine or cloud shine, can only be explained as an increase in core damage, since this threshold is intended to address fuel clad failure. While the admonition may have bearing on the radiation monitoring system (RMS) threshold for the RCS or Containment barriers, it does not on the Fuel Clad barrier. Please justify or revise accordingly.
- e. **Containment Barrier Potential Loss 4.A:** The developer notes do not include the note regarding the sensitivity and location that was provided for the other two RMS thresholds. Please justify or revise accordingly.

### 3. **PWR**

- a. The removal of the thresholds related to the critical safety function status tree (CSFST) requires further justification. Specifically, explain why licensees who adopted this format should not be required to use them in this EAL matrix. Please justify or revise accordingly.
- b. **Containment Barrier Loss 1.A:** The phrase “leaking SG [*steam generator*]” is undefined, and thresholds are more subjective than those previously provided in NEI 99-01 Revision 5. Guidance needs to clarify whether “leaking SG” applies to 500 gpd. Also, will the user realize that a steam release might be involved? Please justify or revise accordingly.
- c. **Containment Barrier Potential Loss 2.B:** Explain why this is not the same as provided in Containment Barrier Loss 2.A with the corresponding thresholds from NEI 99-01 Revision 5. Please justify or revise accordingly.
- d. **Containment Barrier Loss 4:** None of the thresholds provided address the conditions identified in Loss 2.A, Loss 2.B, and Loss 5.A under NEI 99-01 Revision 5. Given the large expanse of the containment surface, not all bypass paths would be captured by radiation monitors or readily identified as an UNISOLABLE pathway to the environment. Please justify or revise accordingly.
- e. **Containment Barrier Loss 4.B:** This threshold appears to be subjective. As such, this threshold is setting up a dichotomy of treatment on RCS leakage as shown in this threshold, versus the RCS leakage thresholds under Category S, where many have inappropriately determined that RCS leakage is limited to the technical specification (TS) definition of RCS.

- f. **Developer notes, paragraph number 4:** Explain why the Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERGs) should be voluntary. The staff does not believe that the proposed alternatives capture all of the systematic and prioritized aspects of the WOG ERGs. For example, the CSFST for heat sink, considers feedwater flow, narrow range SG level, and SG pressure in determining if the heat sink is challenged and by how much. The CSFST for core cooling considers core exit thermocouples, reactor coolant pump (RCP) status, and Reactor Vessel Level Indicating System (RVLIS) levels in determining if the core cooling is challenged and by how much. In all of the CSFSTs, the items being considered are objective, most from direct instrumentation. Compare this to the less objective “Inadequate RCS heat removal capability via steam generators.” Unless the site-specific indications address all of the conditions considered in the CSFST, the staff considers them to be less effective. Please justify or revise accordingly.

## **ENCLOSURE 2**

Proposed Revision 6 to NEI 99-01

### **NRC Staff Questions and Comments**

#### **HOT (S) AND COLD (C) SYSTEM MALFUNCTION SECTIONS**

##### **SYSTEMS MALFUNCTIONS – HOT (S)**

1. **EAL SU1:**

- a. Please add the word “all” to the initiating condition (IC).
- b. The staff suggests adding the following as a replacement for the last sentence in the developer notes as it is less ambiguous, “AC [*Alternating Current*] power obtained from a companion unit at a multiple unit site may be credited only if the all affected units can continue to power all equipment required to be operable by the TS operating mode at each of the units.”

2. **EAL SU2:**

- a. There are other annunciators that are associated with potential degradation of the level of safety of the plant beyond those that are typically called ‘safety-related’, such as radiation monitoring. The staff suggests reconsideration of the use of the term “safety system” in the IC as this automatically discounts other annunciators that reflect a potential degradation in the level of safety of the plant.
- b. Explain how the failure of annunciators panels outside the Control Room that cause a ‘trouble alarm’ in the Control Room, would be classified if these panels were included.
- c. Waiting until “all” the annunciators have failed is not the expectation of the staff. However, an arbitrary and inconsistent counting of annunciators is also not the goal. The staff suggests that consideration be given to developing an EAL, proposal as below. Note that this is a rough proposal and may be revised as appropriate {*suggest a modification of the table provided in EAL SA2, with the inclusion of additional systems as listed below*}.

*Unplanned loss of >1 annunciation panel for 15 minutes or longer for any of the following systems:*

- *Reactivity control*
- *Core cooling (PWR)*
- *RPV water level (BWR)*
- *RCS heat removal*
- *Fuel pool level*
- *Radiation monitoring*
- *Effluent monitoring*
- *Fire monitoring*

- d. Basis information, 1<sup>st</sup> paragraph: The last sentence does not appear to be entirely correct. The purpose of annunciators is to provide operators with system status information, such that the operator can seek out on other instrumentation what the affected parameter values are.
  - e. Please add information to the developers notes for licensees that implement digital instrumentation and controls (I&C), including digital annunciation control.
3. **EAL SU3.2:** There are several reactor coolant activity limits given in TS, including a graph of values at many PWRs. The EAL#2 language is more specific as it explicitly identifies the TS limit for transient iodine spiking. The staff suggests that consideration be given to declaration at each value (i.e., at 1.0  $\mu\text{Ci/gm}$ , or 60 or higher  $\mu\text{Ci/gm}$  as stated in the TS). Please justify or revise accordingly.
4. **EAL SU4:** The intent of this IC was to focus on a loss of RCS mass (reactor coolant). The developers of the EAL scheme, outlined in NUMARC/NESP-007 [*Nuclear Management and Resources Counsel, Inc. / National Environmental Studies Project*], deliberately broke the link with TS leakage limiting conditions of operation (LCOs) by specifying values significantly greater than TS (i.e., The leakage equal to the TS LCO was to be addressed by the IC addressing inability to place the plant in the correct operating mode by the TS action statement). Unfortunately, the authors used the TS language "Unidentified Leakage," "pressure boundary leakage," and "identified leakage." As a result, licensees have focused on TS definitions of these terms and have lost sight that the intent was to address the loss of RCS mass and not to focus on what side of the class break the leak is on.

In both PWRs and BWRs, there are systems that interface with the RCS and represent a potential pathway for the loss of RCS mass. Most, if not all, of these systems, are isolated from the RCS by air-operated valves, motor-operated valves, check valves, etc. However, a significant leak on one of these systems that is not isolated from the RCS will result in the loss of RCS mass. The staff suggests that such leakage should be considered as RCS leakage for this EAL.

At a minimum, the staff suggests that EAL #2 be reworded (with conforming changes to the basis) to state: *"RCS unidentified leakage, including leakage from non-isolated interfacing systems greater than (site specific value) for 15 minutes or longer."*

5. **EAL SU5:** The intent of this EAL is to declare an Notification of Unusual Event (NOUE) for when an automatic scram (trip) did not occur BUT actions taken at the reactor control console (ATWS actions typically) ARE successful in achieving subcriticality (shutdown). While the reduction in the classification level from previous revisions is understandable, the IC and the EAL, as proposed in this proposed revision, is unacceptable as written. Please revise the IC and the EAL accordingly to the language as stated in NEI 99-01 Revision 5, or provide further justification. In addition, all of the basis and developer information would need to be revised accordingly.
6. **EAL SU6:** The 6<sup>th</sup> paragraph in the basis section is not appropriate for inclusion in NEI 99-01. This is information that is applicable to NEI 99-02, "Regulatory Assessment of Performance Indicator Guideline." This EAL deals with a loss of communication methods, not the actual performance indicator for 15-minute notifications.



7. **EAL SA1:**

- a. The IC language is inconsistent with the language used in EALs SS1 and SG1. Please justify or revise accordingly.
- b. Add a note to the EAL that the number of power sources is the minimum required by TS for the current operating mode. In addition, revise "...single power source..." in the EAL to "...*site specific minimum required* power source..." as there are sites that requires more than one power source at a minimum. In addition, add guidance in the developer notes for what "minimum required" means.
- c. The staff suggests that consideration be given to restoring the omitted conditional text "...*such that an additional single failure will result in a blackout.*" Without this phrase, there could be possible alignments credited that rely on non-independent power sources. For example, the basis refers to using a cross-tie to get offsite power from a companion unit as a redundant source. If one emergency bus was being power by offsite power, then offsite power from a companion unit via cross connect would not be redundant, as a loss of offsite power (grid failure) could result in a station blackout. Although the regulations call for two physically redundant circuits, these circuits have a common mode failure, namely loss of the AC power grid. Given the Midwest blackout of 2003, the Southwest blackout of 2011, and the experience of Fukushima, the staff suggests that consideration be given to addressing a grid blackout event.
- d. Add to the basis information that this EAL includes failures that prevent the critical loads from receiving power.
- e. Developer notes, paragraph 3: Append the following to this paragraph, "*Such alternative power sources should generally meet the requirements identified in 10 CFR 50.2, 'Alternate AC Power Source.'*"
- f. Developer notes, paragraph 5: Append the following to this paragraph, "*AC power obtained from a companion unit at a multiple unit site may be credited only if the all affected units can continue to power all equipment required to be operable by the TS operating mode at each of the units.*" 10 CFR 50 Appendix A, General Design Criterion 5, "Sharing of Structures, Systems, and Components," prohibits such sharing if it would impair the ability of systems to perform their safety functions in the event of an accident. A loss of offsite power is an analyzed accident. Please justify or revise accordingly.
- g. Developer notes, paragraph 6: The safety system required to be operable vary by plant operating mode. The staff suggests that consideration be given to revising the last sentence to read as less ambiguous: "*These systems include all equipment required to be operable by the current TS operating mode.*"

8. **EAL SA2:** The condition, as proposed, is actually more applicable to the SAE classification. The intent of this EAL should be to declare an event when annunciation is lost and compensatory indications are unavailable. A simultaneous significant transient would result in the SAE classification. Previous revisions of this EAL set have not been as clear and unambiguous as they could have been. The staff suggests that consideration be given to developing an EAL that uses the proposed table (with the inclusion of radiation monitoring, effluent monitoring, fire monitoring, and spent fuel pool level monitoring) AND compensatory indications are unavailable. In addition, remove reference to a significant transient and add information to the developers notes for licensees that implement digital I&C, including digital annunciation control.
9. **EAL SA5:** The intent of this EAL is to declare an Alert for when an automatic scram (trip) did not occur AND actions taken at the reactor control console (anticipated transient without scram (ATWS) actions typically) ARE NOT successful in achieving subcriticality (shutdown). While the reduction in the classification level from previous revisions is understandable, the IC and the EAL, as proposed in this proposed revision, is unacceptable as written. Revise accordingly to return the IC and the EAL to the language as stated in NEI 99-01 Revision 5, or provide further justification for change. In addition, all of the basis and developer information would need to be revised accordingly. Escalation to a SAE would be when indications of plant issues occur.
10. **EAL SS1:**
  - a. Please add to the basis information that this EAL includes failures that prevent the critical loads from receiving power.
  - b. Developer notes, paragraph 3: Append the following to this paragraph, “*“Such alternative power sources should generally meet the requirements identified in 10 CFR 50.2, ‘Alternate AC Power Source.’”*”
  - c. Developer notes, paragraph 4: Append the following to this paragraph, “*“AC power obtained from a companion unit at a multiple unit site may be credited only if the all affected units can continue to power all equipment required to be operable by the TS operating mode at each of the units.”* Please justify or revise accordingly.
  - d. Developer notes, paragraph 5: The safety system required to be operable vary by plant operating mode. The staff suggests that consideration be given to revising the last sentence to read as less ambiguous: “*These systems include all equipment required to be operable by the current TS operating mode.*”
11. **EAL SS2:**
  - a. The focus appears to be a “total” loss of required of direct current (DC) power. If the batteries are charged to 125 VDC, but DC loads cannot be supplied because of distribution panel problems, would this IC be declared? Is the concern voltage on the bus or the ability to supply DC power to the safety related equipment? Please explain or revise accordingly.
  - b. The safety systems required to be operable vary by plant operating mode. The staff suggests that consideration be given to revising the last sentence to: “*These safety systems include those required to be operable for the current TS operating mode and any systems that support that operability.*”

12. **EAL SS5:** The intent of this EAL is to declare an Alert for when an automatic scram (trip) did not occur, ALL actions taken ARE NOT successful in achieving subcriticality (shutdown), AND site specific indications of challenges exist (as listed). While the reduction in the classification level from previous revisions is understandable, the IC and the EAL, as proposed in this proposed revision, is unacceptable as written. Please return the IC and the EAL to the language as stated in NEI 99-01 Revision 5, or provide further justification for change. Escalation to a SAE would be when indications of plant issues occur. In addition, all of the basis and developer information would need to be revised accordingly. Note in the basis section that this EAL may be redundant with those from the fission barrier matrix for the SAE classification, and escalation would be via EALs FG1 or AG1.
13. **EAL SG1:**
- a. The staff suggests that the use of “*severely challenged*” will cause confusion considering the terms “*lost barrier*” and “*potential loss barrier*” in the fission product barrier. Please justify or revise accordingly.
  - b. Developer notes, 1<sup>st</sup> paragraph: The staff suggests that the second sentence is potentially confusing. Is it your intent that the developer will adjust the plant’s coping time for emergency response time and evacuation time? The emergency response allowance is available when SG1 is declared. Although the licensee will have evacuation time estimates (ETE), there will be different scenarios, there may also be unexpected impediments to evacuation that were not evaluated in the ETE. The staff suggests deleting the sentence.
  - c. Developer notes for EAL 1.b: For the BWR, clarify why RPV level alone is specified. Is level alone sufficient if the suppression pool temperature cannot be maintained below the Heat Capacity Temperature Limit (HCTL)? Regardless of level, can the core be cooled without an ultimate heat sink? Please justify or revise accordingly.
14. The staff suggest that reconsideration be given to the deletion of EAL SU2 (from NEI 99-01 Revision 5) for failure to reach the required operating mode with the required TS time as this places the plant outside its analyzed design basis, which is a potential degradation in the level of safety of the plant.

## **SYSTEMS MALFUNCTIONS – COLD (C)**

1. **EAL CU1:** Please consider revising the IC to “Unplanned loss of RCS/RPV inventory for 15 minutes or longer.” The phrase “RCS leakage” may exclude other paths of leakage that could nonetheless affect the water inventory to cool the core, which is the concern. Is the failure of a SG dam used during mid-loop operations “RCS leakage?” In a PWR, is leakage from the residual heat removal (RHR) system, when aligned for removing decay heat, considered “RCS leakage?” The use is also inconsistent with the first sentence in the basis that states that the IC addresses the inability to restore and maintain water level.” Also, the staff suggests that consideration be given to providing examples of what “site specific sump and/or tank” means for a typical BWR and a typical PWR in the developer notes.

## 2. EAL CU2:

- a. Add a note to the EAL that the number of power sources is the minimum required by TS for the current operating mode. In addition, revise "...single power source..." in the EAL to "...*site specific minimum required* power source..." as there are sites that requires more than one power source at a minimum. In addition, add guidance in the developer notes for what "minimum required" means.
- b. The staff suggests that consideration be given to restoring the omitted conditional text "...*such that an additional single failure will result in a blackout.*" Without this phrase, there could be possible alignments credited that rely on non-independent power sources. For example, the basis refers to using a cross-tie to get offsite power from a companion unit as a redundant source. If one emergency bus was being power by offsite power, then offsite power from a companion unit via cross connect would not be redundant, as a loss of offsite power (grid failure) could result in a station blackout. Although the regulations call for two physically redundant circuits, these circuits have a common mode failure, namely loss of the AC power grid. Given the Midwest blackout of 2003, the Southwest blackout of 2011, and the experience of Fukushima, the staff suggests that consideration be given to addressing a grid blackout event.
- c. Add to the basis information that this EAL includes failures that prevent the critical loads from receiving power.
- d. Developer notes, paragraph 3: Append the following to this paragraph, "*Such alternative power sources should generally meet the requirements identified in 10 CFR 50.2, 'Alternate AC Power Source.'*"
- e. Developer notes, paragraph 5: Append the following to this paragraph, "*AC power obtained from a companion unit at a multiple unit site may be credited only if the all affected units can continue to power all equipment required to be operable by the TS operating mode at each of the units.*"
- f. Developer notes, paragraph 6: The safety system required to be operable vary by plant operating mode. The staff suggests that consideration be given to revising the last sentence to read as less ambiguous: "*These systems include all equipment required to be operable by the current TS operating mode.*"

## 3. EAL CU3:

- a. Basis, paragraph 2: Since "refueling" is a defined term in the TS, the word should not be used as a synonym for "outage." Please revise or justify accordingly.
- b. EAL #1 and #2 basis: The last sentence is true only if the reactor cavity is flooded. If the water level is at the flange, then all that is present is that in the vessel. Please justify or revise accordingly.

## 4. EAL CU4: This EAL should be based upon an inability to supply required (for the current operating mode) DC power to safety-related equipment. There is not a typical Train A – Train B design for DC power systems so the discussion in the basis section could be misleading. The staff suggests consideration be given to revising the EAL to clearly define the issue and to provide guidance related to the issue and how to develop a site-specific EAL to capture this concern. Also, the last paragraph in the developer notes section seems to be out of place for this EAL.

5. **EAL CU5:** The 6<sup>th</sup> paragraph in the basis section is not appropriate for inclusion in NEI 99-01. This is information that is applicable to NEI 99-02. This EAL deals with a loss of communication methods, not the actual performance indicator for 15-minute notifications.
6. **EAL CA1:**
  - a. Basis information, 3<sup>rd</sup> paragraph: The last sentence in this paragraph is highly dependent on the time since shutdown. The time since shutdown assumption upon which this statement is based should be included.
  - b. Developer notes, 1<sup>st</sup> paragraph: The reference to use of bottom inside diameter of RCS loop in a PWR may be inappropriate in that such a level would constitute site area emergency under CS1, as PWR decay heat removal will fail if the RHR connection to the RCS loop is not flooded. (See Generic Letter (GL) 87-12 and GL 88-17). Please evaluate and justify, or revise accordingly.
  - c. Developer notes: The staff suggests consideration be given to developing guidance for licensees with unique level indicating systems to assist in the development of site specific EALs for this concern.
7. **EAL CA2:** Please consider adding the following to the basis information: *“AC power obtained from a companion unit at a multiple unit site may be credited only if the all affected units can continue to power all equipment required to be operable by the TS operating mode at each of the units.”*
8. **EAL CA3:**
  - a. The staff suggests that consideration be given to returning the NEI 99-01 Revision 5 table as this new table is harder to understand and adds no perceived value.
  - b. Please consider revising the EAL to *“Unplanned increase in RCS temperature greater than....,”* since there is no need for the discussion of decay heat capability. If the temperature increase has caused an unplanned mode change, the EAL is met. Adding the decay heat capability condition could lead to a miss-classification if the decay heat is operating as designed but the heat load is greater than what the RHR was designed for (e.g., unexpected criticality).
  - c. The staff suggests that if the RCS is intact and Containment closure is established, there is no need for the declaration if the TS LCOs (less Containment integrity) for the higher TS operating mode are met. The staff suggests that consideration be given to adding a new footnote: *“If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, or, if the TS LCOs (less containment integrity) for the higher operating mode are met, this EAL is not applicable.”*
  - d. The staff suggest changing *“...containment barrier is not functional...”* to read *“...containment closure not established...”*, since there is not apparent need to introduce a new undefined term “functional” in this context.
9. **EALs CA1, CS1, and CG1:** The staff suggests the consideration be given to adding a developer’s note to these ICs to ensure that there is a logical, escalating, progression in the water level thresholds used in these ICs, especially for PWRs with their minimal reactor vessel level monitoring capability. For example, consider the following: *“When available level indication is not adequate to distinguish the suggested water levels, the*

*developer needs to ensure a logical, escalating, progression from ICs CA1-CS1-CG1 in the indicators and values selected.”*

10. **EAL CG1:**

- a. Basis information, 2<sup>nd</sup> paragraph: The last sentence in this paragraph is highly dependent on the time since shutdown. The time since shutdown assumption upon which this statement is based should be included.
- b. Basis information, 3<sup>rd</sup> paragraph: Although alternative indications of reactor water level will be installed to compensate for loss of direct indicating instrumentation, many of these may not indicate levels below the bottom of the hot leg piping. For most PWRs, the last sentence in this paragraph is irrelevant for this IC, which is focused on the top of active fuel.

11. Explain why there is not a set of EALs for a loss (or partial loss) of control room annunciation/indication applicable in these operating modes. While the risk to the public may not be as severe as the hot operating modes, consideration of emergency classification may still be warranted, though possibly at a lower classification level.

### **ENCLOSURE 3**

#### Proposed Revision 6 to NEI 99-01

#### **EALs for Consideration:**

#### **Fire (HU2) and Explosion (HU3)**

To aid in discussing possible revisions to these EALs, the staff has prepared an example EAL that encompasses areas for improvement that would address many issues we have seen with the development and implementation of this EAL. The staff suggests that consideration be given to revising the next draft of NEI 99-01 Revision 6 accordingly, or providing an alternative for consideration.

Note that the explosion part of the NEI 99-01 Revision 5 EAL is to be separated and on its own with no changes.

#### **HU2**

#### **Initiating Condition - NOTIFICATION OF UNUSUAL EVENT**

FIRE potentially degrading the level of safety of the plant

**Operating Mode Applicability:** All

**Example Emergency Action Level:** (1 or 2 or 3 or 4)

**Notes:** The Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the duration has exceeded, or will likely exceed, the applicable time.

Single fire alarms, without other indication(s) of a fire, may be indicative of instrument failure or a spurious trip rather than an actual fire and therefore additional time is allowed to verify the alarm. Verification is to be as soon as possible but within 30-minutes of the alarm receipt.

1. a. A FIRE is not extinguished within 15-minutes of any of the following fire detection indications:
  - Report from the field (i.e. visual observation of fire (smoke, flames, heat, etc.)
  - Receipt of multiple (more than 1) fire alarms;
  - Any other indications that a fire is occurring
  - Field confirmation of a single fire alarm

**AND**

  - b. The fire is located within any of the following plant rooms or areas (site specific list of plant rooms or areas, with possible mode applicability identified)
2. Receipt of a single fire alarm, without other indications of a fire, **not** verified within 30-minutes of alarm receipt.
3. Fire within the PROTECTED AREA **not** extinguished within 60-minutes of initial report from the field.
4. FIRE within the PROTECTED AREA of sufficient size to require support from offsite fire responders to extinguish the fire or prevent reflash.

**Table H-1**

*{Areas that contain equipment necessary for the safe operation, safe shutdown, or safe cool-down of the plant}*

**Basis:**

This EAL addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant. As used here, detection is visual observation and report by plant personnel or sensor alarm indication.

Appendix R to 10 CFR 50, states in part:

Criterion 3 of Appendix A to this part specifies that "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."

When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boil-off.

Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents.

In addition, Appendix R to 10 CFR 50, requires, among other considerations, the use of 1-hour fire barriers for the enclosure of cable and equipment and associated non-safety circuits of one redundant train (G.2.c). The 30-minutes to verify a single alarm is within this worst-case 1-hour time period.

Fires in the PROTECTED AREA may degrade the level of the safety of the plant if not extinguished within a reasonable amount of time. Fires in areas of the plant not listed in Table H-1 could potentially degrade the safety of the plant if they are of sufficient size that they cannot be extinguished within 1-hour.

Fires significant enough to require offsite fire response may cause a potential degradation of the level of safety of the plant.

EAL #1

The intent of 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering waste paper basket). The 15-minute time period begins with a credible indication that a FIRE is occurring within any of the listed plant rooms or areas. Other indications of a fire could be a drop in fire main pressure, automatic activation of a suppression system, etc.

If a single fire alarm is verified to be an actual fire, declaration is to be within 15-minutes unless the fire is extinguished.

EAL #2

This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Verification of a single fire alarm is to be performed as soon as possible.

A single fire alarm, absent other indication(s) of a FIRE, may be indicative of equipment failure or a spurious activation, and not an actual FIRE. For this reason, additional time is allowed to verify the validity of the alarm. The 30-minute period is a reasonable amount of time to determine if an actual FIRE exists; however, after that time, and absent information to the contrary, it is assumed that an actual FIRE is in progress.

If an actual FIRE is verified by a confirmation report from the field, then EAL #1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the confirmation report. If the alarm is verified to be due to an equipment failure or a spurious activation, and this verification occurs within 30-minutes of the receipt of the alarm, then this EAL is not applicable no emergency declaration is warranted.

EAL #3

A FIRE in a room or area not listed under EAL #1, but within the PROTECTED AREA, may potentially degrade the level of plant safety if not extinguished within 60-minutes.

EAL #4

If a fire within the PROTECTED AREA is of sufficient size to require offsite fire support to extinguish the fire, or to prevent reflash, then the level of safety of the plant could potentially be impacted thus warranting declaration of this EAL. Note that the dispatch of offsite fire agencies to the site does not result in this EAL unless they are needed to support fire-fighting efforts.

Escalation of this emergency classification level, if appropriate, would be based on HA2.



**Developer Notes:**

The areas to be developed for Table H-1 are to be areas that contain equipment necessary for the safe operation of the plant, the safe shutdown of the plant, and the safe cool-down of the plant. Typically, licensees define these areas as areas that contain safety-related equipment. Some of these areas may only be a concern for a particular operating mode(s). The development of this table should specifically state what operating modes are applicable for a given area.

## **ENCLOSURE 4**

Proposed Revision 6 to NEI 99-01

### **EALs for Consideration:**

#### **Loss of Spent Fuel Pool Level**

In accordance with the NRC Order EA-12-051, "Issuance of Order to Modify Licenses With Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 (ML12054A679), the staff suggests that consideration be given to developing an EAL set, to be part of the Abnormal Radiation Levels/Radiological Effluents Category, for spent fuel pool level indication. Specifically, develop an Alert EAL for Level 2 (as defined in the order), an SAE for Level 3 (as defined in the order), and a GE for a decreasing level trend (below Level 3) for 60 minutes.

Note that this supersedes the suggested EALs from previous comments related to the review of the document.

Alert – Level 2

Site Area Emergency – Level 3, or unable to monitor and site specific radiation monitoring indicative of lowering level

General Emergency – Level at or below Level 3 for 60 minutes or longer and unable to restore level, or unable to monitor and site specific radiation monitoring indicative of level below spent fuel.