

March 13, 2012

Ms. Sue Perkins-Grew  
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SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION REVIEW OF NEI 99-01  
REVISION 6, DEVELOPMENT OF EMERGENCY ACTION LEVELS FOR  
NON-PASSIVE REACTORS, DRAFT DATED NOVEMBER 2011

Dear Ms. Perkins-Grew:

By email dated November 21, 2011 (ADAMS Accession No. ML113270260), my staff received a draft of NEI 99-01 Revision 6, dated November 2011. My staff has performed a review of this document and has developed several questions and comments that need to be addressed before we can consider endorsement. Please review and if you have any questions, please contact Don A. Johnson at (301) 415-4040.

Enclosure: NRC Staff Questions and Comments re: NEI 99-01 R6

Sincerely,

**/RA/**

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

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Proposed Revision #6

NRC Staff Questions and Comments

**DISCUSSION**

The following questions and comments were generated by the NRC Emergency Action Level (EAL) Review Team, which consists of representation from NRC licensing, inspection, and regional emergency preparedness staffs. The goal of this team is to provide the Nuclear Energy Institute's (NEI) EAL Task Force a thorough review of existing EALs, individually and in the context of the entire EAL scheme, based on the benefits of decades of the staff's emergency planning experience in the development and endorsement of this guidance.

Many of these questions and comments are for clarification purposes to ensure that any issues identified by the NRC EAL Review Team are clearly understood and to avoid any misconceptions with the NEI EAL Task Force's proposed revision. As such, these questions and comments are not formatted or treated as formal requests for additional information (RAIs) typically associated with licensee-initiated licensing actions, as this is a generic EAL scheme development guidance document.

It is expected that the NEI EAL Task Force will consider these questions and comments in the revised draft or be prepared to discuss further during the scheduled public meetings.

**FRONT SECTION**

1. As the staff is considering eliminating some notification of unusual events (NOUEs), should the Task Force need to consider whether the particular issue needs to be reported under a new 50.72 requirement? Is the issue something that doesn't warrant an emergency classification, but does warrant NRC knowledge of the condition? The staff has proposed consideration of removing, or significantly revising, EALs, however, a thorough understanding of the issues related to the particular EAL is important to ensure the overall EAL scheme is appropriate to protect the health and safety of the public.
2. Due to recent issues with instrumentation not having the range or ability to monitor EAL setpoints, the staff requests that a note or section be included that discusses the importance of ensuring that all instrumentation, setpoints, etc., are within the calibrated range of the specified equipment. In addition, the staff recommends that the following be provided: (1) examples where equipment was used for an EAL only to later discover that the setpoint, or value, was outside the calibrated range; and (2) discussion of the basis for why using a setpoint of 'below' or 'above' the scale is inappropriate for EALs as it is extremely difficult to readily ascertain if this is a result of plant conditions or the result of instrument failure.

3. Recommend that information used numerous times within the document be stated once and then referred to by step number throughout the rest of the document. For example, the paragraph near the top of page 6 that starts with “when making an emergency classification, the Emergency Director...” is used numerous times throughout the document. State it once and then refer to this statement as necessary, and if necessary.
4. Throughout the document, the inconsistent use of language related to EALs has led to misunderstanding and inconsistent application throughout the industry. The staff recommends that the front section very clearly states that for communication purposes, the term “EAL” consists of the initiating condition (IC), the operating mode applicability, the applicable notes, and the EALs.
  - a. In addition, clearly state that the IC, operating mode, note(s), EAL(s), and basis information all lead to the classification declaration, since the use of any single item may result in a misclassification. Accordingly, licensees that develop ‘wall-boards’ for their EAL decision-makers should ensure that the IC, operating mode, note(s), and EALs are on the board(s); however, technical basis information need not be on the wallboard(s) as long it is readily available to the decision-maker.
  - b. In addition, please make note that the EAL technical basis document should be immediately available to EAL decision-makers, in the area where they make these decisions, and that while they may not need to refer to the EAL technical basis document when making the classification decision, they should be responsible for the information contained in it.
5. Recommend adding guidance related to the emergency plan frequently asked question (EPFAQ) process in use by the staff.
6. Page i, last paragraph: Suggest appending the following sentence as stated. *However, such adaptations are not allowed to eliminate any initiating condition in the NRC-endorsed EAL scheme, nor modify any initiating condition or example emergency action level in a manner that deviates from the NRC-endorsed EAL IC and Basis.*
7. The symbol “§” is used differently than is the common practice in citations to the Code of Federal Regulations (CFR). “10 CFR 50.47,” but not “10 CFR §50.47”, “§50.47” may be used in subsequent citations once the full citation is made, “10 CFR Part 50,” but not “10 CFR § 50”.
8. Section 1.3: While this approach may be technically correct, the language suggests that it may be appropriate for an industry document to override a regulation without an exemption and for the staff to endorse the document.
9. Section 1.3: The last paragraph of this section should be replaced with the following to be consistent with regulations and previous versions of this document: “Recognition Category E (Events Related to *[Independent Spent Fuel Storage Installations]* ISFSI) is

applicable to licensees using their 10 CFR 50 emergency plan to fulfill the requirements of 10 CFR 72.32. Recognition Category E is not applicable to stand alone ISFSIs, Monitor Retrievable Storage Facilities (MRS), or ISFSIs that may process and/or repackage spent fuel, however, stand alone ISFSIs can consider the ISFSI EALs in this document in the development of their EALs (including security related EALs)."

10. Section 2.4: Please consider the following clarification to ensure consistency based on past issues with interpretation:
  - a. In some accident sequences, the ICs and EALs presented in the Abnormal Radiation Levels/ Radiological Effluent (A) Recognition Category will be exceeded at the same time, or shortly after, the loss of multiple fission product barriers. This redundancy is intentional as the former ICs address radioactivity releases that result in certain offsite doses from whatever cause, including events that might not be fully encompassed by fission product barriers (e.g., spent fuel pool accidents, loss of RCS and Fuel barriers events with an intact and unchallenged containment barrier (e.g., design containment leakage) ~~provides higher assurance of an appropriate emergency classification and is intentional.~~
11. When developing and/or assigning attributes per 3.1.1, add a note stating that this does not imply a redefinition of an NOUE, alert, site area emergency (SAE), or general emergency (GE), nor can these attributes be used as a basis for an EAL change. The assignment of these attributes is only used to support understanding and training, and may not be all-inclusive or sufficiently detailed.
12. Section 3.1.3.c: The release of radioactive material requires the loss of two or more fission product barriers. This language would appear to exclude significant releases from a spent fuel pool accident for which there is only one fission product barrier lost. The staff does not agree with this attribute because it is limited to those events captured under the fission product barrier matrix. As such, consider the following:
  - a. A release of radioactive materials to the environment ~~associated with the loss of two fission product barriers; that could result in~~ offsite doses will not that exceeds 10% of the EPA PAG at or beyond the site boundary.
13. Section 3.1.4.c: The release of radioactive material requires the loss of two or more fission product barriers. This language would appear to exclude significant releases from a spent fuel pool accident for which there is only one fission product barrier lost. In addition, many Design Basis Accident (DBA) Steam Generator Tube Rupture (SGTR) analyses show projected doses in excess of the Environmental Protection Agency (EPA) Protective Action Guides (PAGs), which serves as a General Emergency threshold, but only involve two fission product barriers, not the three required by §3.1.4.(C). The staff does not agree with this attribute because it is limited to those events captured under the fission product barrier matrix. Consider the following:

- a. A release of radioactive materials to the environment where ~~with the loss of all three fission product barriers~~ offsite doses will exceed an EPA PAG at or beyond the site boundary.
14. Section 3.1.5 is not entirely accurate in that probabilistic risk assessments are not used for emergency plans. The staff requests that this section be revised to ensure understanding of the concepts discussed and their relevance to emergency preparedness and EALs.
15. Section 3.2: This section discusses the degree to which an event may have caused the plant to exceed its technical specifications (tech specs) as an indicator of EAL development. While tech specs are important to the operation of the plant, they are not necessarily applicable to the development of EALs or when making emergency classifications. Please revise to ensure adequate understanding of this concept. In addition, the document should not reference tech specs, but rather equipment functionality. Operability is not the concern, but rather an emergency classification level (ECL) should reflect the ability of a system to perform its function.
16. Section 3.2: Where appropriate, please incorporate language such that it is clear that all available instrumentation needs to be considered when developing EALs, including radiological effluent monitors/instrumentation, and available instrumentation in such areas as the refuel floor. Note that it is not required that this instrumentation be controlled via site tech specs.
17. Section 3.3. This section states that not incorporating an IC is acceptable as long as the basis is clearly developed due to site-specific incompatibility. This is not entirely accurate as the ICs are generic enough that the majority of plants will have the same ICs with minor differences in EALs.
18. Section 3.4: For example EALs, consider developing better language than “readily discernible from Control Room indications.” Not all EALs use thresholds that meet this criterion.
19. Section 4.2, Critical Characteristics, 6<sup>th</sup> bullet: The staff does not consider this to be a critical characteristic as there are EALs for which an escalation path is not provided. Please revise the definition accordingly.
20. Section 4.3: Please use a word different than “interpreting” ICs and EALs. A senior reactor operator (SRO) should be adequately trained and have adequate references available such that indications need not be “interpreted.”
21. Section 4.5, Basis Document: The presentation of the information in this section may imply that the primary purpose of the EAL technical basis document is to facilitate the staff’s review, which is not accurate. The EAL technical basis document is an integral part of the EAL scheme and is considered to be a part of the required EAL

documentation. The EAL technical basis document, as well as the EAL basis information provided for each individual EAL, is intended to aid understanding, consistency and to support training.

22. Section 4.6: Consider adding a reference to the EPFAQ process.
23. Section 5.0: Consider adding guidance related to how to handle events at multiple units.
24. Section 5.0, timing: Although this section addresses an important consideration, there are other considerations related to making emergency classification. Consider adding the following:
  - a. NRC regulations require the licensee to establish and maintain the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an emergency action level has been exceeded and to promptly declare the emergency condition as soon as possible following identification of the appropriate emergency classification level. The NRC has provided additional guidance on implementing this requirement in §IV.H, "Emergency Declaration Timeliness" of NSIR-DPR-ISG-01, "Emergency Planning For Nuclear Power Plants." This guidance addresses, when the 15-minute clock starts and when it ends, the role of validation and confirmation, ICs, and EALs specifying condition durations, and when the emergency condition is declared.
25. Section 5.6: The staff does not believe this discussion or philosophy is appropriate. NUMARC/NEI specifically included explicit durations in the ICs and EALs for the potential transient events. The staff believes that this guidance may result in misuse. Please revise accordingly.

#### **ABNORMAL RADIATION LEVELS/RADIOLOGICAL EFFLUENT CATEGORY**

1. ALL: Given the omission of the previous Appendix A, which was prepared in response to questions that arose following the issuance of NUMARC/NESP-007, the basis provided for the category A ICs is generally inadequate and will not result in consistent implementation of the category A ICs/EALs.
2. ALL: All available and suitable effluent radiation monitors should be identified in these EALs regardless of whether they are used in the emergency plan or emergency dose assessment.
3. AU1: What "confirms" a sample analysis needs to be clarified? Although this terminology was in earlier versions, it is undefined.
4. AU1: The original EAL#1 was written to address releases, that for whatever reason, cause the effluent release to exceed the threshold identified in the IC. It was intended for

sites that have effluent monitors on non-routine release pathways for which a discharge permit would not be generated. This would include, for example, effluent radiation monitors on the service water discharge (possible cross-contamination by heat exchangers that cool systems containing radioactive material). The proposed EAL#1 is inadequate as it only addresses normally occurring continuous releases. Although proposed EAL#3 addresses sampling from such streams, the sampling options have always been considered a backup to the installed instrumentation given the delay in obtaining and analyzing a grab sample. Given the above comment, the proposed EAL#2 needs to address continuous releases.

5. AU1 Developer Notes: The last sentence in the 2nd paragraph should be removed. This IC applies to all monitored effluent pathways, whether addressed in the Offsite Dose Calculation Manual or not. In addition, the developer notes have another reference to tech specs. The staff does not understand the link between technical specifications and dose projection capability, since this function is required by the licensee's emergency plan and not technical specifications.
6. AU1 developer notes: The 4<sup>th</sup> paragraphs should to be appended with the following:
  - a. The effluent control regulations (e.g., 10 CFR Part 20, 10 CFR Part 50 Appendix I) implemented by the controlling document identifies several effluent thresholds that differ by isotope, receptor age, gas or liquid, receptor organ. The thresholds should be based on the applicable limiting threshold.
7. AU1/AA1/AS1/AG1: The note related to the release path being isolated, thus precluding the EAL declaration, may be misleading and could preclude appropriate classifications(e.g., What tells them that the path is isolated?). It is the staff's belief that in most effluent monitor installations, the monitor or its suction is located close to the point where the release enters the environment since isolation of a release path often occurs upstream of the monitor. The staff suggests the following wording:
  - a. If the effluent flow rate past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.
8. AU2: While the staff believes that removal of the '1000x normal' EAL is appropriate for this EAL, this particular threshold should be relocated to EAL AA3 as discussed below.
9. AA1: For the IC, the staff understands the motivation to eliminate the 200x threshold for AA1. However, it would appear that all this change will achieve is to shift the issue of an undesired overlap from the Alert → SAE interface to the NOUE → Alert interface. Please provide analyses performed by the industry that would indicate that the undesirable overlap would not be shifted.



10. AA1: Consider the addition of the following note:
  - a. If the dose assessment using actual meteorology and release data, and actual or projected duration, shows within 15 minutes of the monitor alarm that the release has not exceeded the threshold doses in the IC, the effluent monitor reading can be considered to be invalid for classification
11. AA2: For the IC, this is an incorrect reduction of the previous AA2 IC in that it has restricted the fuel damage to outside the reactor, as where the previous IC applied this restriction to the uncovering of fuel only. A dropped heavy load onto the reactor vessel during refueling that damages fuel, or in the loading of a dry storage cask, should be classified under this IC. The staff suggests that the original language from Rev. 5 be restored.
12. AA2: The staff believes that the timing caveat added to the EAL #1 is inappropriate. While a 15-minute water level drop that had the potential to uncover fuel might be appropriate, the staff is not so sanguine about the fuel being uncovered for 15 minutes. The impact of difference depends on the decay time on the fuel and the number of assemblies affected. A newly offloaded whole core has a greater impact than would a few shuffled fuel assemblies a couple of weeks into the outage. In addition, the technical specification typically requires a minimum of 20 feet of water over the fuel. If the licensee has lost control over the water level, such that the fuel is now uncovered, an Alert properly exists without waiting another 15 minutes. Also, the water level sensors in a spent fuel pool are typically located at the top of the pool, often are only bi-stable (there is water or there is not). Licensee actions to restore the water level start at that point. There are typically no sensors located at the top of the fuel racks. Should the 20 or so feet of water be lost, the dose rates above the pool and "skyshine" from the pool will prevent people from entering the area to see what the level is or take local action to restore the water level.
13. AA2: For EAL #2, the intent of this EAL is not to assess a radioactivity release to the environment, but rather the assessment of damage to the fuel. For clarity, this EAL should read:
  - a. Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by ANY of the following radiation monitors:
14. AA2: Basis: Damage while loading fuel into a dry storage cask should be included. The staff suggests to clarify proposed language:
  - a. This IC does not apply ~~applies to irradiated fuel assemblies requiring water cooling and is not intended to apply to fuel which is licensed for in dry storage.~~
15. AA2 Developer Notes: 2<sup>nd</sup> paragraph should be identified as for EAL #1.

16. AA3: This EAL has been problematic for the industry to consistently implement and/or understand since the development of the initial EAL scheme development guidance document. Numerous attempts at developing language to remove the confusion have met with limited results. The staff recommends a revision to this EAL with this proposed revision of NEI 99-01 to alleviate these conceptual errors and to ensure that the EAL is appropriate within the overall scheme. The staff recommends consideration of the following revision to this EAL:
- a. Revise the IC to read: "Radiation level that impedes access to areas required for entry to maintain safe operations or operate equipment necessary for safe shutdown and/or cooldown"
  - b. EAL #1: "Dose rate greater than or equal to 15 mR/hr in the Control Room as read on *{site specific radiation monitor}*, OR
  - c. EAL #2: "Survey indicates dose rate greater than or equal to 15 mR/hr in the Central Alarm Station (CAS), OR
  - d. EAL #3: "An unplanned event results in radiation levels approximately 1000 X normal \* AND normal access to *{site specific list of areas where entry is required to operate equipment needed for safe operations, safe shutdown, or safe cooldown}* is impeded.
17. ASI/AG1: The basis information includes reference to liquid releases. Please justify or explain the inclusion of this wording regarding the applicability of liquid releases to these EALs.
18. AS1/AG1: For the Developer Notes, the staff questions the inclusion of the wording, "...this IC could not realistically be met absent challenges to multiple fission product barriers...." The staff recommends consideration of the following:
- a. While this IC may not be met absent challenges to multiple fission product barriers, the IC provides classification diversity and may be used to classify events that would not reach the same ECL based on plant status or the fission product matrix alone. For many of the DBAs analyzed in the Updated Final Safety Analysis Report, the discriminator will not be the number of fission product barriers challenged, but rather the amount of radioactivity in the release to the environment.
19. AS1/AG1: For the Developer Notes, the staff questions the use of the term "Owner Controlled Area" based on the following considerations:
- a. The OWNER CONTROLLED AREA may have a specific definition with regard to the site security plan, which may not be appropriate for the emergency plan.

- b. The OWNER CONTROLLED AREA may be unnecessarily limiting, especially for plants located on bodies of water.
- c. The exclusion area, as defined in 10 CFR Part 100, may be a better approach in that the exclusion area can extend over property that the licensee doesn't own, but can provide control over the activities
- d. In any case, the radiation level thresholds have to be expressed in terms of "at or beyond the XXXXX area" especially at plants with significant elevated releases (typically BWRs) since highest dose may not be at the boundary if the plume is still aloft.