

Arkansas Nuclear One

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July 2004

April 7, 2005

Mr. Jeffrey S. Forbes  
Vice President Operations  
Arkansas Nuclear One  
Entergy Operations, Inc.  
1448 S. R. 333  
Russellville, AR 72801

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL  
INFORMATION ON PROPOSED UPGRADED EMERGENCY ACTIONS  
LEVELS (EALs) (TAC NOS. MC2244 AND MC2245)

Dear Mr. Forbes:

By letter dated February 27, 2004, you submitted proposed EALs using the methodology outlined in Nuclear Energy Institute 99-01, "Methodology for Development of Emergency Action Levels." In response to the NRC's questions that were provided to your staff on June 16, 2004, you submitted a complete revision to your initial submittal on December 16, 2004. On January 14, 2005, the NRC staff sent you a second round of questions where additional information is needed to complete the review (enclosed).

A conference call was scheduled for March 10, 2005, to discuss the second round of questions. However, your staff cancelled the call because Unit 2 was shutdown for its refueling outage earlier than expected and one of your principal participants for the EAL call would therefore not be available for several weeks. Fortunately, your staff participated on a similar phone call on the proposed EALs for Waterford on March 3, 2005, and your staff benefitted from that call, particularly on the questions that are common to both Waterford and Arkansas. Therefore, a response date of May 2, 2005, for the second round of questions was proposed by Fred Van Buskirk of your staff. Accordingly, the NRC staff requests that you provide responses to the enclosed questions by May 2, 2005.

Also, as discussed during our conference call with the Entergy South sites, please ensure consistency in your responses on generic EAL issues, as applicable. If you have any questions, please contact me at (301) 415-1326.

Sincerely,

***/RA by D.Holland for/***

Thomas W. Alexion, Project Manager, Section 1  
Project Directorate IV  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-313 and 50-368

Enclosure: As stated

cc w/encl: See next page

Mr. Jeffrey S. Forbes  
Vice President Operations  
Arkansas Nuclear One  
Entergy Operations, Inc.  
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April 7, 2005

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REQUEST FOR ADDITIONAL INFORMATION (RAI) ON RESPONSE  
TO RAIs FOR PROPOSED UPGRADED EMERGENCY ACTION LEVELS (EALs)  
USING NUCLEAR ENERGY INSTITUTE (NEI) 99-01 (REVISION 4) METHODOLOGY  
DATED DECEMBER 16, 2004 (ADAMS ACCESSION NO. ML043560265)  
ARKANSAS NUCLEAR ONE  
DOCKET NOS. 50-313 AND 50-368

ABNORMAL RADIATION LEVELS / RADIOLOGICAL EFFLUENTS CATEGORY

1. [Initiating Condition (IC) AU1 / IC AA1] The licensee included a NOTE stating, "If monitor reading is sustained for the time period indicated in the EAL AND the required assessments using procedure calculations cannot be completed within this period, declaration must be made based on the valid radiation monitor reading." The addition of this note is inconsistent with the NEI 99-01 and licensee Bases, which indicates that the Emergency Director should not wait until the designated time has elapsed, but should declare the event as soon as it is determined that the release duration has or will likely exceed the designated duration time. Resolve this inconsistency.
2. [IC AA2 / EAL 2] The licensee Basis states, "EAL #2 indicators may include instrumentation (such as water level and local area radiation monitors) . . ." Deviation to EAL 2 in Attachment 5 states, "ANO [Arkansas Nuclear One] does not have indication of water level for the spent fuel pool or refueling canal." Resolve this inconsistency.
3. [IC AA3 / EAL 1] Revise the site-specific list to address the continuous occupancy requirements for the central alarm station (CAS) and/or secondary alarm station (SAS) per the ANO Physical Security Plan, or identify that the CAS or SAS is contained within the main control room envelope.
4. [IC AA3 / EAL 2] The licensee Basis states, ". . . the single value of 10 R/hr [rem/hour] was selected because it is a value that would result in exposure control measures intended to maintain doses within normal occupational guidelines and limits . . ." However, the licensee Basis also states that Entergy establishes an administrative limit of 2000 millirem per year Total Effective Dose Equivalent, which would limit stay time to 12 minutes (at 170 mrem/minute), and thus likely require multiple entries with multiple personnel to accomplish a task. The licensee's response to Specific Comment 7.b states that Entergy procedures do not require a specific action prior to an expected dose of 5 rem and that, per Radiation Work Permit RP-105, stay times are required for activities that will result in an exposure of > 5000 mrem/entry. Provide a dose rate threshold within Entergy or station normal administrative guidelines that would reflect the need to obtain a dose extension, calculation of stay times, or additional radiation protection measures (e.g., calculation of stay times, etc.) prior to entry, thus impeding immediate access.

5. [IC AA3 / EAL 2] Clarify whether an evaluation of the site-specific areas included other areas containing safe shutdown equipment (e.g., emergency core cooling system pump rooms, remote shutdown area(s), electrical distribution panels, emergency diesel generators, etc.), which are not frequently accessed to maintain plant safety functions.
6. [IC AS1 / EAL 1 and IC AG1 / EAL 1] The licensee Basis (fifth paragraph) states, "The monitor readings in EAL #1 were determined by using the same meteorology and source term as those used for determining the monitor readings in AU1 and AA1." Per the licensee Basis for AU1 and AA1, these monitor readings were calculated based on the default source term as described in the Offsite Dose Calculation Manual, which is consistent with the NEI 99-01 guidance. However, the licensee Basis for AS1 and AG1 (sixth paragraph) continues by stating, "Monitor indications in EAL #1 are calculated using SAR [safety analysis report] source terms applicable to each monitored pathway." Resolve this inconsistency.
7. [IC AU1 / EAL 2, IC AA1 / EAL 2, IC AS1 / EAL 1 and IC AG1 / EAL 1] Provide references in the licensee Basis to the site-specific calculations performed per the NEI 99-01 guidance to determine radiation monitor thresholds.

#### FISSION PRODUCT BARRIER DEGRADATION

8. The Licensee states in Attachment 5 that the NEI 99-01 guidance for the loss and/or potential loss of barriers based on Critical Safety Function Status (CSFS) is not applicable since neither unit at ANO uses CSFS trees. Clarify whether equivalent site-specific safety function status checks, developed based on owners group guidance for ANO units, are capable of providing equivalent indications to the following CSFS tree statuses per guidance in NEI 99-01, Section 3.9:
  - Core Cooling - Red
  - Core Cooling - Orange
  - Heat Sink - Red
  - Reactor Coolant System (RCS) Integrity - Red
  - Containment - Red
9. [EAL Fuel Clad Barrier Criterion 3 (FCB3): Potential Loss] The licensee Basis states, "RVLMS [Reactor Vessel Level Monitoring System] is used as an indication of potential core uncover only if CET [Core Exit Thermocouple] indication is unavailable." This qualifier is not contained in the EAL threshold itself and is not identified as a deviation by the licensee in Attachment 5. Per the NEI 99-01 guidance, the criterion is only provided for a potential loss under Reactor Vessel Water Level, and not only if CET indication is unavailable. (The NEI 99-01 guidance already considers that a barrier loss is better covered by other fuel clad barrier Loss EALs, such as CETs.) Identify the change as a deviation and provide the technical justification in Attachment 5, or revise the basis to be consistent with the NEI 99-01 guidance.

10. [EAL FCB4: Loss] The licensee value for the containment high range monitor reading is based on approximately 2-5 percent cladding failure, instead of a specific concentration of 300 microcuries per gram (uCi/gm) dose equivalent iodine (I)-131 as identified in the NEI 99-01 guidance. Clarify why a specific concentration of 300 uCi/gm dose equivalent I-131 was not utilized. In addition, identify any deviation or difference in Attachment 5 and provide the technical justification, as applicable.
11. [EAL FCB5: Loss] The licensee established a site-specific threshold of at least 5 percent fuel clad damage. Provide further technical justification for threshold, based on the NEI 99-01 guidance which uses a specific concentration of 300 uCi/gm dose equivalent I-131 as indication of a fuel clad barrier loss. In addition, the licensee's evaluation of the NEI 99-01 Fuel Barrier Example EAL 6 (Other Site-Specific Indications) under Attachment 5 states, "A review was done which determined that other available EALs adequately address the fuel clad barrier. Therefore, this EAL was not used." Resolve the inconsistency between the statement in Attachment 5 and the site-specific threshold established in Attachments 3 and 4.
12. [EAL Reactor Coolant Barrier Criterion 3 (RCB3): Loss] Clarify whether an RCS concentration of 60 uCi/gm dose equivalent I-131 is consistent with the NEI 99-01 guidance, which identifies the use of reactor coolant and iodine inventory associated with normal operating concentrations (i.e., within technical specifications).
13. [EAL Containment Barrier Criterion 4 (CNB4)] The licensee Basis includes the following statement, which is not contained in the NEI 99-01 guidance: "This EAL is not intended to prohibit overriding containment isolation valves when directed by plant procedures. A manually overridden containment isolation valve is considered isolable until proven otherwise." Clarify whether the containment barrier would be considered lost per the NEI 99-01 EAL criterion if the isolation valves were manually overridden, with an isolation actuation signal present, creating a downstream pathway to the environment.
14. [EAL CNB4: Loss] Clarify whether the site emergency operating procedures provide for the venting of the containment during an emergency as a means of preventing catastrophic failure per the NEI 99-01 guidance. Provide a proposed site-specific change to the EAL for containment loss if intentional venting of containment is addressed in site emergency operating procedures. Your application did not indicate that site emergency operating procedures provided for venting.

#### HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

15. [IC HU6 / EAL 6 and IC HA6 / EAL 5] The intent of this EAL is to address the effect of flooding caused by internal events. Clarify whether all the areas listed in Table H-1 are susceptible to flooding due to component failures, equipment misalignment, or outage activity mishaps, and the systems and equipment are not designed to be wetted or submerged per the NEI 99-01 guidance.
16. [IC HA4 / EAL 1] The licensee's Table H1 lists areas such as the Unit 1 Health Physics Office Area and Hot Tool Room/Decon Room and Unit 2 Hot Machine Shop. Clarify whether all the areas listed contain functions and systems required for the safe shutdown of the plant per the NEI 99-01 guidance.

17. [IC HA6 / EAL 1] Clarify how the “0.1g [g = gravitational acceleration] acceleration alarm” provides indication of an earthquake exceeding the operating basis earthquake (OBE) threshold. In addition, identify the site-specific indication that could be used to quantify the earthquake as exceeding OBE threshold.

#### EVENTS RELATED TO INDEPENDENT SPENT FUEL STORAGE INSTALLATION

18. [IC E-HU1 / IC E-HU2] The mode applicability on the proposed EALs (Attachment 3) and the deviation described in Attachment 5 list all operating modes (1 thru 6 & Defuel). The mode applicability block in the proposed EAL Basis (Attachment 4) and the NEI 99-01 guidance lists “Not applicable.” Resolve this inconsistency.

#### SYSTEM MALFUNCTIONS (including Cold Shutdown/Refueling Modes)

19. [IC SU1 / IC SA1 / IC SS1 / IC SG1 / IC CU5 / IC CA5] The licensee’s criteria indicates a loss of offsite power as a loss of all unit auxiliary and start-up transformers. In its response to Specific Comment 4 (Attachment 1), the licensee indicates that the auxiliary transformer is available to supply power to Unit 1 only. The licensee’s response further states that the Unit 2 Auxiliary Transformer is not connected to the electrical distribution system, except during some outage evolutions. As written, the licensee EAL criteria infers that both the start-up and auxiliary transformers are available for Units 1 and 2, and will auto-transfer upon loss. Provide further technical justification for including the auxiliary transformer for a loss of offsite power to Unit 2, or a change consistent with the licensee response to Specific Comment 4.
20. [IC SU1 / EAL 1 and IC CU5 / EAL 1.b] Per the NEI 99-01 guidance, this EAL is intended to reflect a loss of offsite power for greater than 15 minutes with emergency generators supplying power to the essential buses, and not just one essential bus. The licensee EAL states, “At least one vital 4.16 KV [kilovolt] bus powered from an independent diesel generator.” The intent of the ALERT classification under the NEI 99-01 guidance for Modes 1 thru 4, is that an additional single failure (e.g., loss of power from diesel generator to single 4.16 KV bus) would result in a station blackout. Provide a change to EALs that meet the NEI 99-01 guidance for a Notification of Unusual Event based on a loss of offsite power, or provide further technical justification for existing EAL criterion.
21. [IC SU6 / EAL 1] In response to Specific Comments 50.a and b, the licensee states that the unit specific differences and the reference to a specific number of annunciator panels for Unit 2 were removed. However, the licensee Basis defines a loss of annunciators as 75 percent for Unit 1 and greater than nine panels for Unit 2. This difference is not identified by the licensee in Attachment 5, nor reflected in the Basis for SA6 or SS6. Clarify this inconsistency.
22. [IC SU8 / EAL 2 and IC CU8 / EAL 2] The licensee takes credit for the station radio system as a means of offsite communications under Tables M2/C2. The NEI 99-01 guidance identifies the relaying of information from radio transmissions as an extraordinary means of communication. Identify whether the use of the station radio system is identified in the station emergency plan and implementing procedures as an alternate means of notifying offsite agencies.

23. [IC SU9 / EAL 1 and IC CU4 / EAL 1] The licensee states that no site-specific monitor reading was provided for Unit 2, since there is no alarm setpoint that correlates with the technical specification limit. However, the NEI 99-01 guidance does not require a specific alarm, but rather a monitor reading. Provide a monitor reading equivalent to the technical specification limit for the Unit 2 Letdown Radiation Monitor, or provide further technical justification for deviation.
24. [IC SA6] The IC statement in the NEI 99-01 guidance states, “Compensatory Non-Alarming Indicators are Unavailable.” The licensee revised the IC statement to state, “SPDS [Safety Parameter Display System] and PMS [Parameter Monitoring System] dynamic alarming functions are unavailable.” [underlining added] Also, the licensee’s IC is inconsistent with EAL 1.b criterion, which identifies the compensatory non-alarming indications, rather than the dynamic alarming functions. Resolve this inconsistency and provide the technical justification for any deviation.

25. [IC CA1 / EAL 1] The licensee provides the following indication for a reactor pressure vessel (RPV) water level less than the bottom identifier (ID) of the RCS loop:

<u>EAL Threshold</u>	<u>Basis Discussion</u>
Unit 1: RVLMS Levels 1 through <u>8</u> DRY	Unit 1: ~RVMLS Level <u>9</u>
Unit 2: RVLMS Levels 1 through 5 DRY	Unit 2: RVMLS Level 5

Resolve this inconsistency between the EAL threshold and Basis for Unit 1 and between the units.

26. [IC CS1 / EALs 1 and 2] The licensee states that (Unit 1) RVLMS Levels 1 through 9 DRY indicates both the RPV water level at the top of active fuel and 6 inches below the bottom ID of the RCS loop. Clarify the rational for this perceived inconsistency.
27. [IC CS2 / EAL 1 and IC CG1 / EAL 2.b] The NEI 99-01 Bases for CS2 and CG1 state that calculations for Containment High Range Monitor reading should be performed to conservatively estimate a site-specific dose rate setpoint indicative of core uncover (i.e., level at top of active fuel (TOAF)). The licensee proposes a threshold of 10 R/hr, because it is sufficiently above the normal shutdown reading to avoid an unnecessary entry into the EAL and is indicative of potential fuel uncover. In its response to Specific Comment 19, the licensee further states that the containment radiation monitor alarm setpoint of 500 R/hr would be indicative of fuel uncover. Resolve this inconsistency, and provide a technical evaluation that would more accurately reflect the expected Containment High Range Monitor reading with the RPV level at the TOAF.
28. [IC CG1 / EAL 2.b] Provide the technical basis for inclusion of the site-specific criterion, “Core exit thermocouples indicate superheat.”

ADMINISTRATIVE ITEMS

29. Identify where the various NEI 99-01 terms, used in the licensee EALs, are defined by the licensee and provide the justification for any differences from the definitions in Section 5.4 to the NEI 99-01 guidance (i.e., NORMAL OPERATIONS, SIGNIFICANT TRANSIENT, RUPTURED vs. FAULTED S/G, VISIBLE DAMAGE, etc.).