

## **NRR-PMDAPem Resource**

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**From:** Klos, John  
**Sent:** Wednesday, January 25, 2017 8:05 AM  
**To:** Garcia, Richard M.  
**Cc:** Klos, John  
**Subject:** Columbia EAL Scheme change, MF8219, requests for additional information

Dear Mr. Garcia,

By letter dated July 28, 2016, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16210A528), Energy Northwest submitted a license amendment for Columbia Generating Station (CGS). The amendment proposes to revise the current Emergency Action Level schemes to one based upon Revision 6 to the Nuclear Energy Institute (NEI) document NEI 99-01, "Development of Emergency Action Levels for Non-Passive Reactors" (ADAMS Accession Number ML12326A805).

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the submittal and determined that the requests for additional information (RAIs) below are needed to complete the technical review and make a regulatory finding regarding this license amendment request.

Energy Northwest stated on January 24, 2017 that a clarification call was not required. These RAIs are being issued formally with a response due on the close of business Friday February 24, 2017.

REQUESTS FOR ADDITIONAL INFORMATION  
LICENSE AMENDMENT REQUEST  
EMERGENCY ACTION LEVEL SCHEME CHANGE  
COLUMBIA GENERATING STATION  
DOCKET NO. 50-397 (CAC MF8219)

By letter dated July 28, 2016, Energy Northwest requested approval for an emergency action level (EAL) scheme change for Columbia Generating Station (Columbia), (Agencywide Documents Access and Management System (ADAMS) Accession Number ML16211A338 [package]). Columbia proposes to revise their current EAL scheme to one based upon Revision 6 to the Nuclear Energy Institute (NEI) document NEI 99-01, "Development of Emergency Action Levels for Non-Passive Reactors" (ADAMS Accession Number ML12326A805).

The requests for additional information (RAIs) listed below are needed to support NRC staff's continued technical review of the proposed EAL scheme change.

Note: Bracketed information references the EAL initiating condition (IC) as referenced in NEI 99-01, Revision 6, which may be different from nomenclature used in licensee submittal.

Regulatory Basis for RAIs:

Title 10 of the Code of Federal Regulations (10 CFR), Section 50.47, "Emergency plans," sets forth emergency plan requirements for nuclear power plant facilities. The regulations in 10 CFR 50.47(a)(1)(i) state, in part, that

[ ... ] no initial operating license for a nuclear power reactor will be issued unless a finding is made by the NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

Section 50.47(b) establishes the standards that the onsite and offsite emergency response plans must meet for NRC staff to make a positive finding that there is reasonable assurance that

adequate protective measures can and will be taken in the event of a radiological emergency.

Planning Standard (4) of this Section requires that onsite and offsite emergency response plans contain:

A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.

Section 50.47(b)(4) to 10 CFR emphasizes use of a standard emergency classification and action level scheme, assuring that implementation methods are relatively consistent throughout the industry for a given reactor and containment design while simultaneously providing an opportunity for a licensee to modify its EAL scheme as necessary to address plant-specific design considerations or preferences.

Section IV.B of Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50, states, in part:

The means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials shall be described, including emergency action levels that are to be used as criteria for determining the need for notification and participation of local and State agencies, the Commission, and other Federal agencies, and the emergency action levels that are to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite and offsite monitoring. By June 20, 2012, for nuclear power reactor licensees, these action levels must include hostile action that may adversely affect the nuclear power plant.

#### RAI-Columbia-1

- a. NEI 99-01, Revision 6, EALs, such as [AU1 (1)], typically consist of a site-specific list as an integral part of the threshold value for each EAL. The proposed Columbia EAL scheme references tables that are not included with the applicable EALs.

Please include the appropriate tables with each applicable EAL or provide explain how this formatting will not cause a potential delay or contribute to a misclassification of any EAL.

- b. NEI 99-01, Revision 6, EALs include applicable notes. The proposed Columbia EAL scheme references a complete table of notes that is located at the end of the bases document rather than including the notes that are applicable with each EAL.

Please include the appropriate notes with each applicable EAL or provide explain how this formatting will not cause a potential delay or contribute to a misclassification of an EAL.

- c. The proposed Columbia EAL scheme defines GE as "*General Emergency, Greater than or Equal to.*" As an example of the potential for confusion, the threshold value for EAL RG1.1 states, in part: "GT column *GE* for GE."

In addition to Columbia personnel, the dual usage of GE, which is typically used in emergency plans to indicate a General Emergency, could cause confusion to local, State, and NRC personnel responding to either a drill or actual emergency at Columbia.

Please revise the proposed bases document to eliminate the dual usage of the acronym of GE or explain how no confusion will occur with site, local, State or NRC personnel.

#### RAI-Columbia-2

NEI 99-01, Revision 6, Section 4.7, “*EAL/Threshold References to AOP [Abnormal Operating Procedure] and EOP [Emergency Operating Procedure] Setpoints/Criteria*,” states, “*As reflected in the generic guidance, the criteria/values used in several EALs and fission product barrier thresholds may be drawn from a plant’s AOPs and EOPs.*” The NRC staff expects that changes to AOPs and EOPs will be evaluated in accordance with the provisions of 10 CFR 50.54(q).

Please explain why this key guidance from NEI 99-01, Revision. 6, was omitted, or revise accordingly.

#### RAI-Columbia-3

Concerning the proposed Table 3, “*Effluent Monitor Classification Thresholds*,” as it relates to RU1.1, please address the following:

- a. The proposed turbine building exhaust (TEA-RIS-13) value in Table 3 for an Unusual Event is  $1.02\text{E-}04$   $\mu\text{Ci/cc}$  and the proposed value for an Alert is  $8.35\text{E-}04$   $\mu\text{Ci/cc}$ . The proposed radwaste building exhaust (WEA-RIS-14) value in Table 3 for an Unusual Event is  $1.98\text{E-}03$   $\mu\text{Ci/cc}$  and the proposed value for an Alert is  $3.45\text{E-}03$   $\mu\text{Ci/cc}$ . The actual dose that corresponds to an Unusual Event, as indicated on page 5.015 of Enclosure 2, ADAMS Accession No. ML 16210A530, is 6 mrem/hr thyroid for TEA-RIS-13 and 29 mrem/hr thyroid for WEA-RIS-14.

The NRC staff reviews proposed EALs for consistency, human factors engineering and user friendliness, and to ensure that the potential for emergency classification upgrade only when there is an increasing threat to public health and safety. The above values for the declaration of an Unusual Event and an Alert based on WEA-RIS-14 indications are less than a factor of two apart. Additionally, an Unusual Event declaration based on TEA-RIS-13 would correspond to 6 mrem/hr, and an Unusual Event declaration based on WEA-RIS-14 would correspond to 29 mrem/hr. Both instruments indicate that the basis for the setpoint is 2 times the Offsite Dose Calculation Manual limit.

Please revise the Table 3 Unusual Event setpoint for WEA-RIS-14 to reflect a similar threat to public health and safety as TEA-RIS-13. Additionally, please revise the Table 3 Unusual Event setpoint as necessary to provide a more appropriate difference between an Unusual Event and an Alert condition or provide a more detailed explanation for the proposed Unusual Event setpoints for WEA-RIS-14.

- b. Calculation NE-02-09-12 – CGS Emergency Action Levels Technical Bases, Item 7 on page 5.001 of Enclosure 2 states:

*The maximum allowed background for TEA-RIS-13 Channel 1 is 388 cpm ( $1.80\text{E-}5$   $\mu\text{Ci/cc}$ ). This is larger than the Alert Alarm setpoint. NE-02-08-09 [reference 80] page 5.005, TEA-RIS-13 Channel 1 and Channel 3 Alert Alarm setpoint is  $9.97\text{E-}6$   $\mu\text{Ci/cc}$ . The setpoint was established at  $4.66$  \* background as a value reasonably above expected background to indicate that an actual release may be in progress. FSAR 11.5.2.2.1.6 states that normal activity is expected to be below detectable levels. In the absence of an actual release, the Alert Alarm setpoint represents an upper bound on background variation because a spurious alarm would alert the operators to a potentially degraded condition. A spurious alarm would result in a functionality evaluation, so there is no need for a separate procedural limit on background for Channel 1. The same conclusion applies to WEA-RIS-14.*

The NRC staff expects that licensees have equipment for determining the magnitude of and for continuously assessing the release of radioactive materials to the environment. The statement on page 5.001 of Enclosure 2 indicates that operators will have to perform a functionality evaluation to discriminate a spurious alarm from an Alert or Unusual Event condition.

Please explain how a timely and accurate assessment of RU1.1 and RA1.1 can be performed when a functionality evaluation is required to determine that the alarm is not spurious.

- c. Please explain why the proposed Unusual Event value in Table 3 for TSW-RIS-5 is 3.00E-05  $\mu\text{Ci/cc}$ , while the value for TSW-RIS-5 on page 5.009 of Enclosure 2 provides a value of 2.00E-05  $\mu\text{Ci/cc}$ , or revise accordingly.

#### RAI-Columbia-4

NEI 99-01, Revision 6, EALs [CU2 (1)] and [SA1 (1)] state:

- a. *AC power capability to (site-specific emergency buses) is reduced to a single power source for 15 minutes or longer.*

AND

- b. *Any additional single power source failure will result in a loss of all AC power to SAFETY SYSTEMS.*

The intent of the above condition 'b' is to focus on the inability to energize the required SAFETY SYSTEMS and not individual bus status.

For EALs CU2.1 and MA1.1 [SA1], the condition that any additional single power source will result in a loss of all AC power to SAFETY SYSTEMS was removed from the proposed EALs and replaced with "*Any additional single power source failure will result in loss of all AC power to emergency buses SM-7 and SM-8.*"

Please explain, in greater detail, why the condition, "*Any additional single power source failure will result in a loss of all AC power to SAFETY SYSTEMS,*" was removed from the proposed EAL MA1 [SA1], or revise accordingly.

#### RAI-Columbia-5

The first three paragraphs of the proposed Columbia CA2.1 basis could imply that only Table 2 AC power sources are acceptable to provide power to buses SM-7 and SM-8. This is not consistent with the NRC response of Emergency Preparedness Frequently Asked Question (EPFAQ) 2015-15, (ADAMS Accession No. ML16166A191) which provides that the primary point of emphasis for CA2 is a complete loss of power for 15 minutes and not a particular source of power.

Please remove the Table 2 related information from CA2.1, or explain how the information related to Table 2 cannot potentially impact a timely and accurate assessment of CA2.1.

#### RAI-Columbia-6

The fourth paragraph of the proposed Columbia CA6.1 and MA8.1 basis discussion states:

*An emergency classification is required if a FIRE or EXPLOSION caused by an equipment failure damages safety system equipment that was otherwise functional or operable (i.e., equipment that was not the source/location of the failure). For example, if a FIRE or EXPLOSION resulting from the failure of a piece of safety system equipment causes damage to the other train of the affected safety system or another safety system, then an emergency declaration is required in accordance with this IC and EAL.*

The example provided in the above paragraph requires two trains of equipment to be damaged. The first train would be potentially damaged by the fire or explosion, and the second train would be damaged by the piece of safety system equipment that was on fire or exploded. It is not the intent of CA6 and MA8 to require two trains of equipment to be damaged by an explosion or fire as declaration criteria.

Please remove the provided example from the fourth paragraph of the CA6 and MA8, or explain how this example will not potentially cause a decision maker to infer that two trains of equipment must be damaged to meet the threshold value for declaration of CA6 or MA8.

## RAI-Columbia-7

The NEI 99-01, Revision 6, [SG8] initiating condition is as follows: *“Loss of all AC and Vital DC power sources for 15 minutes or longer.”* The threshold value for a loss of Vital DC power sources should be based on the site-specific minimum bus voltage necessary for adequate operation of safety system equipment and not a particular bus alignment.

The proposed Columbia technical basis for MG1.2 [SG8] states:

*PPM 5.6.1 Station Blackout, directs use of DG3, DG4 or DG5 to power vital DC battery chargers. If this is already performed, this EAL would not apply (ref. 4).*

Regardless of the DC battery charger lineup, an indicated dc voltage of less than 108 volts concurrent with a loss of all offsite and onsite AC power capability for 15 minutes or longer represents an extended loss of both AC vital DC power.

Please remove the Columbia EAL technical basis reference to disregard the threshold values for MG1.2 based on how the alignment of DG3, DG4 or DG5 buses, or explain why actual DC bus voltage is not a valid indicator of the condition of the Columbia 125 VDC bus.

## RAI-Columbia-8

Concerning MU5.1 [SU4], please address the following:

a. The proposed Columbia technical basis for MU5.1 states:

*Drain flow from the drywell equipment and floor drain sumps is monitored and recorded (EDR-FRS-623) on P632. The flow rates for identified and unidentified leakage in the EAL are equal to the full scale reading on EDR-FRS-623.*

Please explain how the operators can accurately assess MU5.1 using EDR-FRS-623, or revise accordingly. This explanation should address the ability of the operator to determine an RCS leak and to ensure that an instrument failure would not result in an unnecessary declaration.

b. The NEI 99-01, Revision 6, [SU4] and the proposed technical basis for MU5.1 states:

*The leak rate values for each threshold were selected because they are usually observable with normal Control Room indications. Lesser values typically require time-consuming calculations to determine (e.g., a mass balance calculation).*

The proposed Columbia technical basis for MU5.1 allows the licensee to delay declaration until the completion of analysis for RCS leakage not explicitly identified by installed instrumentation. Additionally, the proposed Columbia technical basis for MU5.1 allows the licensee to delay classification for leakage outside the containment until analysis to quantify the leak rate has been completed.

Please revise the Columbia RCS leakage basis discussion to remove the delays of the declaration clock to perform leak rate analyses, or provide site-specific leakage values that can be observed within the control room. Additionally, please explain why MU5.1 (1) for unidentified leakage of greater than or equal to ( $\geq$ ) 10 gpm would not be declared if the source of RCS leakage was not identified within 15 minutes while performing analyses to identify RCS leakage that is  $\geq$  25 gpm or revise accordingly.

## RAI-Columbia-9

The proposed Columbia EAL EU1.1 [E-HU1] basis states:

*CGS has casks loaded to various amendments to the Certificate of Compliance (COC) Technical Specifications with a proposed amendment coming in 2017. The numbers above reflect the most limiting Technical Specification (TS) values (Amendment 1) and can be updated using 10 CFR 50.54(q) process, if CGS adopts a common TS amendment.*

Including this statement in the basis discussion, infers that this license amendment is subject to a pending or future amendment, thereby making this

submission a linked submittal contrary to NEI 06-02, License Amendment Request (LAR) Guidelines Revision 2, October 2010. Please remove the entire statement, or modify it as necessary to clearly reflect the current status of the facility.

#### RAI-Columbia-10

The proposed Columbia RCS barrier loss due to leak rate basis discussion states, in part: “the ruptured line cannot be isolated remotely or locally, the RCS barrier Loss threshold is met.” The guidance provided in NEI 99-01, Revision 6, states, in part: “the ruptured line cannot be promptly isolated from the Control Room, the RCS barrier Loss threshold is met.” The addition of the text “locally” as shown above could delay or prevent the declaration of a RCS barrier loss because a decision maker may consider a leak with the potential for local isolation to be an isolable leak even though the leak is not actually isolated, and it may not be feasible to actually isolate the leak locally.

Please remove the reference to local isolation from the basis discussion, or explain how the addition of this condition could not potentially delay or prevent classification of a loss of the RCS barrier.

#### RAI-Columbia-11

The maximum safe operating radiation levels on PPM 5.3.1, Table 24, appear to be at the upper range of the detectors as indicated on Table 12.3-1, “Area Monitors,” of the Columbia Final Safety Analysis Report. Considering that the containment barrier loss is based on the reactor building maximum safe operating radiation level being exceeded, it is not clear to the staff how this condition can be accurately assessed. Please explain how the operators can accurately assess primary leakage that exceeds maximum safe operating radiation conditions as indicated on PPM 5.3.1, Table 24, or revise accordingly.

#### RAI-Columbia-12

The proposed Columbia technical basis for the containment fission product barrier loss due to a RCS leak rate states (page 174 of 199):

*The maximum safe operating radiation value is defined to be 10,000 mR/hr in areas other than the refueling floor. This is the maximum indication on all but the high level instruments.*

Please explain how the operators can accurately assess the Containment Fission Product Barrier for a RCS loss using radiation levels that are at the maximum indication, or revise accordingly. This explanation should address the ability of the operator to determine an RCS leak into the reactor building and to ensure that an instrument failure would not result in an unnecessary declaration.

#### RAI-Columbia-13

The proposed Columbia technical basis for the containment fission product barrier loss due to a loss of Primary Containment Integrity or Primary Containment Bypass states (page 184 of 199):

*If the main condenser is available with an unisolable main steam line, there may be releases through the steam jet air ejectors and gland seal exhausters. These pathways are monitored, however, and do not meet the intent of a nonisolable release path to the environment. These minor releases are assessed using the Category R, Abnormal Rad Release / Rad Effluent, EALs.*

The above statement infers that the ability to monitor an unisolable direct downstream pathway can be used as a basis to ignore the fact that the containment barrier has been lost. This logic could delay the declaration of a General Emergency for a loss of all three fission product barriers if leakage could be monitored as provided in the above example.

NEI 99-01, Revision 6, Section 2.4 “Fission product Barrier Threshold” states:

*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 one or more 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, design containment leakage following a LOCA, etc.).*

Please modify the basis discussion as necessary to ensure that fission product barriers properly assessed restoring the redundancy intended by NEI 99-01, Revision 6, or provide a justification for potentially delaying the classification of a General Emergency based on fission product barrier degradation.

#### RAI-Columbia-14

NEI 99-01, Revision 6, Section 4.2, "Critical Characteristics," states "ICs, EALs, Operating Mode Applicability and Note statements and formatting consider human factors and are user-friendly." The NRC staff expects that EAL bases documents meet this critical characteristic to support timely and accurate EAL assessments. Additionally, NEI 99-01, Section 4.6, "Basis Document," of Revision 6, states:

*A Basis section should not contain information that could modify the meaning or intent of the associated IC [initiating condition] or EAL. Such information should be incorporated within the IC or EAL statements, or as an EAL Note. Information in the Basis should only clarify and inform decision-making for an emergency classification.*

- a. The proposed Columbia technical bases includes the definition of intrusion (5.1.21). It does not appear that the definition of intrusion is applicable to the proposed EAL scheme.

Please consider removing the definition of intrusion (5.1.21) to prevent potential confusion for actions related to a hostile force, or provide an explanation that the definition of intrusion is applicable to the proposed EAL scheme.

- b. The proposed Columbia technical bases include a definition for the owner controlled area (5.1.24) that is not complete.

Please provide a complete definition for the owner controlled area (5.1.24).

- c. The proposed Columbia technical basis for RG1.1 threshold 1 refers to the Table 3 column "SAE" gaseous effluent release values. Considering that this reference is in relation to calculated doses of 100% of the environmental protection agency protective action guidelines, the reference should be to the "GE (General Emergency)" values.

Please ensure that RG1.1 references that appropriate Table 3 columns or justify the reference to "SAE."

- d. The proposed Columbia EALs CU1.1 and CA1.1 basis includes a discussion relative to EALs #1 and #2, followed by a discussion that applies both EALs, which is then followed by a discussion that is specific to EALs #1 and #2. There is a potential for a decision maker to assume the first discussion for EAL #1 contains all required information relative to EAL #1. As such, a decision maker could miss key basis element discussions which could result in an inaccurate and/or delayed assessment.

Please consolidate the separate EAL #1 and #2 discussions into a single EAL #1 and #2 discussion, or explain how a decision maker will not miss the key information that is contained in the second EAL #1 and #2 discussions.

- e. The proposed Columbia CS1.1 basis includes, "The difference in the specified RPV levels of CS1.1 and CS1.2 reflect that with CONTAINMENT CLOSURE established, there is a lower probability of a fission product release to the environment."

Please replace "CS1.1 and CS1.2" with CS1.1 (1) and CS1.1 (2) to reflect CGS EAL numbering system. The proposed Columbia reference to CS1.2 is not appropriate as CS1.2 does not include RPV level.

- f. The proposed Columbia technical basis for MU6.1 states:

*By procedure, operator actions include the initiation of an immediate manual scram following receipt of an automatic scram signal. If there are no clear indications that the automatic scram failed (such as a time delay following indications that a scram setpoint was exceeded), it may be difficult to determine if the reactor was shut down because of automatic scram or manual actions. If a subsequent review of the scram actuation indications reveals that the automatic scram did not cause the reactor to be shut down, then initiate a Transitory Event Notification per EPIP 13.4.1.*

The proposed Columbia technical basis for MU6.1 appears to contain an action step that is not directly related to the assessment of MU6.1.

Please remove this apparent action step from the MU6.1 basis discussion, or explain why this step is required as basis information that could support the assessment of MU6.1.

- g. The proposed Columbia EALs HU2.1, MU3.1, MU6.1 and MA6.1 bases include an escalation criteria that is based on the category designation of 'S' instead of the proposed Columbia designation of 'M.'

Please revise the HU2.1, MU3.1, MU6.1 and MA6.1 EAL bases escalation criteria to reflect the proposed 'M' EAL designation for the system malfunction category or justify using 'S' as a category designation.

**John Klos**

**DORL Callaway, Columbia Project Manager**

**U.S. NRC, Office of Nuclear Reactor Regulation,**

**Division of Operating Reactor Licensing, O8E7**

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