



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 10, 2017

Mr. Marty L. Richey, Site Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Mail Stop A-BV-SEB1
P.O. Box 4, Route 168
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2 – REQUEST FOR
ADDITIONAL INFORMATION REGARDING EMERGENCY ACTION LEVEL
SCHEME CHANGE LICENSE AMENDMENT REQUEST (CAC NOS. MF8448
AND MF8449)

Dear Mr. Richey:

By letter dated September 28, 2016 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML16277A194), FirstEnergy Nuclear Operating Company submitted a license amendment request for Beaver Valley Power Station (Beaver Valley), Units 1 and 2. FirstEnergy Nuclear Operating Company is requesting revisions to the current Beaver Valley, Units 1 and 2, Emergency Plan emergency action level scheme to one based on Nuclear Energy Institute (NEI) 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors" (ADAMS Accession No. ML12326A805). To complete its review, the U.S. Nuclear Regulatory Commission (NRC) staff requests a response to the enclosed questions.

The draft questions were sent to Mr. Phil Lashley of your staff to ensure that the questions were understandable, the regulatory basis for the questions was clear, and to determine if the information was previously docketed. Clarification calls were held on March 22, 2017, and April 6, 2017. The April 6, 2017, clarification call was related to changes to the Emergency Preparedness Program Frequently Asked Question Number: 2016-002 (ADAMS Accession No. ML17096A388) guidance discussed in NRC's public meeting with the Nuclear Energy Institute on April 4, 2017. Please respond to the enclosed final request for additional information questions within 45 days of the date of this letter.

M. Richey

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If you have any questions regarding this matter, please contact me at 301-415-2934 or Booma.Venkataraman@nrc.gov.

Sincerely,

A handwritten signature in black ink that reads "V. Boome". The signature is written in a cursive style with a long horizontal stroke extending to the right.

Booma Venkataraman, Project Manager
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosure:
Request for Additional Information

cc w/ encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST TO REVISE EMERGENCY ACTION LEVEL SCHEME

FIRSTENERGY NUCLEAR OPERATING COMPANY

BEAVER VALLEY POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-334 AND 50-412

By letter dated September 28, 2016, 2016 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML16277A194), FirstEnergy Nuclear Operating Company (the licensee) requested approval for an emergency action level (EAL) scheme change for Beaver Valley Power Station (Beaver Valley or BVPS), Units 1 and 2.

The requirements of Section 50.47(b)(4) to Title 10 of the *Code of Federal Regulations* (10 CFR) state, in part:

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...

The most recent industry EAL scheme development guidance is provided in the Nuclear Energy Institute (NEI) document NEI 99-01, "Development of Emergency Action Levels for Non-Passive Reactors" (ADAMS Accession No. ML12326A805) (hereinafter sometimes referred to as "endorsed guidance.") By letter dated March 28, 2013 (ADAMS Accession No. ML12346A463), the U.S. Nuclear Regulatory Commission (NRC) endorsed NEI 99-01, Revision 6, as acceptable, generic (i.e., non-plant-specific) EAL scheme development guidance. Beaver Valley Power Station proposes to revise its current EAL scheme to one based upon the endorsed guidance.

The requests for additional information (RAIs) listed below are necessary to facilitate the technical review being conducted by the U.S. Nuclear Regulatory Commission (NRC), Office of Nuclear Security and Incident Response, Division of Preparedness and Response, Reactor Licensing Branch. A timely and thorough response to these draft RAIs is requested in order to meet the proposed deadline requested by the licensee, specifically, 45 days from the date of the cover letter to these RAIs.

The RAIs listed are applicable to both the Beaver Valley, Units 1 and 2, EALs, unless specifically stated otherwise.

BVPS-RAI-1

NEI 99-01, Revision 6, Section 4.7, "EAL/Threshold References to AOP [Abnormal Operating Procedures] and EOP [Emergency Operating Procedures] 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," and, "Developers should verify that appropriate administrative controls are in place to ensure that a subsequent change to an AOP or EOP is screened to determine if an evaluation pursuant to 10 CFR 50.54(q) is required."

Enclosure

Please explain what controls are in place at Beaver Valley to ensure that a subsequent change to an AOP or EOP is screened to determine if an evaluation pursuant to 10 CFR 50.54(q) is required.

BVPS-RAI-2

NEI 99-01, Revision 6, Section 5.1, "General Considerations," states, in part: "For ICs [initiating conditions] and EALs that have a stipulated time duration (e.g., 15 minutes, 30 minutes, etc.), 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 condition has exceeded, or will likely exceed, the applicable time."

Beaver Valley proposed Section 3.1.7, "Emergency Action Levels with Embedded Time Requirements," states, in part: "Some EALs have embedded time requirements. Declaration must be made as soon as the Emergency Director recognizes that the conditions will not be successfully resolved within 15 minutes."

Some of the proposed Beaver Valley EALs have time requirements other than the specified 15 minutes, and the declarations should be made when the decisionmaker recognizes that the EAL specific time requirement will be exceeded.

Please revise EAL Bases, Section 3.1.7, to be consistent with endorsed guidance or please provide justification for the difference.

BVPS-RAI-3

The proposed EAL Bases are inconsistent in the title of the Bases. Most are titled, "Basis," while some are titled, "NEI 99-01 Basis" (e.g., Unit 1, CA3.2, and Unit 2, RG2.1, CA1.2, SU5.1, SU5.2, and SU7.1)

Please provide a justification for the different titles or revise the titles for consistency and clarity.

BVPS-RAI-4

The proposed EALs RA1.3 and RA1.4 (Unit 1 only) Bases include: "Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer VALID for classification purposes."

These EALs are dependent upon sample analysis results and are not associated with effluent monitors. Please remove the indicated wording from the Bases for these EALs or provide a justification for its inclusion.

BVPS-RAI-5

The NEI 99-01, Revision 6, EAL AU2, developer notes, state, in part: "Specify the mode applicability of a particular indication if it is not available in all modes."

Please verify that the instruments listed in proposed EAL RU2.1 are available in all modes. If instruments are not available in all modes, specify the mode of applicability or provide a justification for the difference from endorsed guidance.

BVPS-RAI-6

The proposed EALs RA2.1 (Unit 1 only) and RA2.2 Bases include the following statement: "Once sealed, damage to a loaded cask causing loss of the CONFINEMENT BOUNDARY is classified in accordance with IC E-HU1." The proposed EAL scheme does not include an IC E-HU1; it lists an EU1.1.

Please change the Basis to reflect the proposed EAL numbering scheme or provide justification for the difference.

BVPS-RAI-7

The proposed EALs CU1.2, CA1.2, CS1.3, and CG1.2 list only containment sumps as a location where increasing levels could indicate reactor coolant system (RCS) leakage.

Please verify that no other tanks (such as a component cooling water surge tank, refueling water storage tank, or reactor coolant drain tank) could capture and indicate RCS leakage and should be added to the EALs.

BVPS-RAI-8

The proposed EAL CU3.1 (Unit 1 only) Basis states: "This IC addresses an UNPLANNED increase in RCS temperature above the Technical Specification cold shutdown temperature limit, **or the inability to determine RCS temperature and level**, and represents a potential degradation of the level of safety of the plant." [emphasis added]

This EAL is only associated with an increase in RCS temperature. The indicated phrase is more applicable to EAL CU3.2 and should be removed from this Basis. Please remove this from the Basis or provide justification for the difference.

BVPS-RAI-9

The proposed EAL CU3.2 (Unit 2 only) Basis states: This IC addresses an **UNPLANNED increase in RCS temperature above the Technical Specification cold shutdown temperature limit**, or the inability to determine RCS temperature and level, and represents a potential degradation of the level of safety of the plant." [emphasis added]

This EAL is only associated with the loss of RCS temperature and level indications. The indicated phrase is more applicable to EAL CU3.1 and should be removed from this Basis. Please remove this from the Basis or provide justification for the difference.

BVPS-RAI-10

The proposed EAL CU3.2 Basis includes: "A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification."

This EAL involves only the loss of temperature and level indication; therefore, the above statement does not apply. Please remove this from the Basis or provide justification for the difference.

BVPS-RAI-11

The proposed EAL CU5.2 and CU5.3 Bases state that it is the cold condition equivalent of the hot condition EAL SU7.1. This is incorrect, as this EAL is the cold equivalent of the proposed hot condition EAL SU7.2.

Please correct the Basis or provide justification for the difference.

BVPS-RAI-12

The proposed EALs CA2.1, SS1.1, SG1.1, and SG1.2 include the words, "AC [alternating current] power **capability.**" [emphasis added]

Additionally, their Bases define it as, "...AC power source(s) is available to the emergency buses, whether the buses are powered from it or not." CU2.1 and SA1.1 Bases also include this definition. These differences from the endorsed guidance are not identified in Attachment 5, "Beaver Valley Power Station, Unit No. 1, NEI 99-01, Revision 6, EAL Comparison Matrix," and Attachment 6, "Beaver Valley Power Station, Unit No. 1, NEI 99-01, Revision 6, EAL Comparison Matrix."

The intent of this EAL is to ensure that an EAL is declared upon a total loss of AC power that compromises the performance of all systems requiring electric power for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal, and the ultimate heat sink. This additional criteria could prevent the EAL from being declared in a condition where the AC power sources are available, but not able to be connected to the emergency buses. The NRC staff considers the addition of this criteria to the EALs and the definition in the Basis to be a deviation from endorsed guidance

Please remove the reference to "capability" in EALs CA2.1, SS1.1, SG1.1, and SG1.2, and its definition in EALs CU2.1, CA2.1, SU1.1, SA1.1 (Unit 2 only), SS1.1, SG1.1, and SG1.2, from the Bases discussion, or explain how the addition of this condition could not potentially delay or prevent classification of a loss of AC power to emergency buses.

BVPS-RAI-13

The proposed EALs CA2.1, SS1.1, SG1.1, and SG1.2, and/or their Bases contain tables of AC power sources. A list of readily available power sources may lead to event declarations when mitigative strategies are effective in reestablishing emergency power to these buses. In other words, if a list of power sources is provided for these EALs, and those sources are unavailable, then an EAL decisionmaker would be compelled to declare events, even if mitigative strategies using other power sources are effective. It is not necessary to document these power sources for these EALs, as the EAL is not concerned with the power source as much as the power loss to the emergency bus. (See Emergency Preparedness Frequently Asked Question (EPFAQ) Number: 2015-015.)

Please remove the tables from these EALs or provide a justification for the difference from endorsed guidance.

BVPS-RAI-14

RAI deleted based on similarity to BVPS-RAI-12.

BVPS-RAI-15

The proposed EAL CA3.2 includes, "RCS temperature cannot be monitored." This conditional statement is not in NEI-99-01, Revision 6, EAL CA3(2). This is incorrectly identified as a difference instead of a deviation in Attachment 5, "Beaver Valley Power Station, Unit No. 1, NEI 99-01, Revision 6, "EAL Comparison Matrix," and Attachment 6, "Beaver Valley Power Station, Unit No. 1, NEI 99-01, Revision 6, EAL Comparison Matrix." The addition of this criteria could cause a classification of the event to be different than what is provided in the generic scheme guidance.

Please remove the above statement or provide further justification for this deviation.

BVPS-RAI-16

The proposed Unit 1 EALs CS1.3 and CG1.2 Bases include the statement: "The CRM [containment radiation monitor] threshold values have been established at 15R/hr...." The proposed Unit 2 EALs CS1.3 and CG1.2 Bases include the statement: "The **CG7/CS7** CRM threshold values have been established at 15R/hr...." [emphasis added]

Please correct this typographical error or explain the significance of CG7/CS7.

BVPS-RAI-17

The proposed EAL HU3.3 Basis includes the statement: "As used here, the term 'offsite' is meant to be areas external to the BVPS PROTECTED AREA." This definition is different from the definition for "offsite" in proposed Section 1, Definitions.

Please provide this information as a note to the EAL and the wallboard to prevent possible misclassification or provide justification for not including a note.

BVPS-RAI-18

The proposed EAL HA5.1 (Unit 2 only) Mode Applicability states: "Refers to Table 1H-2 for mode of applicability." The table provided in the EAL is Table 2H-2.

Please fix this typographical error.

BVPS-RAI-19

The proposed EAL HS1.1 Basis includes the statement: "This IC does not apply to a HOSTILE ACTION directed at an ISFSI [Independent Spent Fuel Storage Installation] PROTECTED AREA located outside the plant PROTECTED AREA; such an attack should be assessed using IC HA1."

This statement would not be applicable to Beaver Valley since the ISFSI is located within the plant protected area. Please remove this statement to avoid possible misclassification.

BVPS-RAI-20

The proposed Unit 1 EAL SS2.1 Basis states: "1VM-BAT-1.2.3.4 should be used to validate the voltage for EAL declaration." This statement does not appear in the proposed Unit 1 EAL SG1.2 or in the Unit 2 EALs SS2.1 and SG1.2.

Please describe why this validation is required for EAL declaration for Unit 1 and why it would not be applicable to SG1.2.

BVPS-RAI-21

The proposed EAL SA3.1, Table 1S-3, "Significant Transients," third bulleted transient, "Electrical load rejection \geq 25% electrical load," is not in alignment with the endorsed guidance, "Electrical load rejection \geq 25% **full** electrical load." [emphasis added]. Additionally, the proposed Basis for this EAL lists load rejections of greater than 25% **full** electrical load as a significant transient.

Please revise the EAL in alignment with the endorsed guidance or provide a justification for this difference.

BVPS-RAI-22

The proposed EAL SU5.3 Basis states, in part: "This EAL thus applies to leakage into the containment..." However, the EAL is only applicable to unisolable leakage from the RCS to a location outside containment.

To avoid a possible delay in classification due to confusion by the decisionmakers, please remove the phrase "into containment" or provide a justification for the statement as written.

BVPS-RAI-23

For the proposed EALs SU6.1, SU6.2, SA6.1, and SS6.1, a power level (greater than or equal to 5%) was added to the EALs. The intent of NEI 99-01, Revision 6, is to align the above EAL classifications with site-specific EOP criteria of a successful reactor shutdown. The consistency between EALs and EOPs would benefit the decisionmakers by providing consistent criteria. The power level provided in NEI 99-01, Revision 6, provided in the NEI 99-01, Revision 6, developer notes, is an example that represents a typical EOP indication for a generic power plant.

Please consider either using the same EOP reactor shutdown criteria in the EOPs or using wording similar to endorsed guidance.

BVPS-RAI-24

The proposed EALs SU7.2 and SU7.3 Bases state that these EALs are the hot condition equivalent of EAL CU5.1. SU 7.2 and 7.3 are actually the hot equivalent of CU 5.2 and 5.3, respectively.

Please revise the Bases to reference the correct cold condition EALs or delete these statements.

BVPS-RAI-25

The proposed EALs CA 6.1 and SA9.1 Bases state: "An EXPLOSION that degrades the performance of a SAFETY SYSTEM train or visibly damages a SAFETY SYSTEM component or structure would be classified under this EAL." This statement is not in alignment with the endorsed guidance. Please revise the Bases to reflect the endorsed guidance or consider the following additional guidance.

Note: Additional guidance has been requested by NEI in EPFAQ Number: 2016-002 related to this EAL. Please consider the guidance in the EPFAQ.

BVPS-RAI-26

Category "F" Technical Basis includes the statement: "The FISSION PRODUCT BARRIER THRESHOLDS specified within a scheme reflect plant-specific **DBNPS** design and operating characteristics." This is consistent for Units 1 and 2 EALs.

Please correct the typographical error or define the term "DBNPS."

BVPS-RAI-27

The Unit 1 Fission Product Barrier Loss/Potential Loss Matrix and Bases, Table 1F-1, "Fission Product Barrier Threshold Matrix," is not centered on the page, and the "Category" column is missing (applies to both clean and marked up copies). Please verify the table is complete and readable.

BVPS-RAI-28

NEI 99-01, Revision 6, "Fuel Clad Fission Barrier RCS Activity/Containment Radiation, Loss 3.B," Basis includes the statement: "Add this paragraph (or similar wording) to the Basis if the threshold includes a sample analysis component, 'It is recognized that sample collection and analysis of reactor coolant with highly elevated activity levels could require several hours to complete. Nonetheless, a sample-related threshold is included as a backup to other indications.'"

The proposed FC.C Loss Threshold 2 contains a sample analysis component.

Please revise the Basis to include the statement concerning the analysis component or justify this difference from endorsed guidance.

BVPS-RAI-29

Concerning the proposed Table 1F-2, "Containment Radiation - R/hr (RM-1RM-219A or B)," as it relates to RC.C Loss, Threshold 1, please address the following:

- a. The column labeled, "Time After S/D [Shutdown] (Hrs.)," contains entries for 2-8 hours and >16 hours.

There are no expected values for the time period between 2-8 hours and >16 hours. Please revise the table to reflect expected values for the period 8-16 hours after shutdown (applies to all Categories utilizing Tables 1F-2 and 2F-2).

- b. RC [Reactor Coolant] Loss column has entries of 8 R/hr (Unit 2, Table 2F-2, 11 R/hr).

Please verify that this can be determined on the instruments, as the Basis states: "The detector range is approximately 1 to 1 E8 R/hr (logarithmic scale)." Also, verify that at normal 100% power, the instruments read less than 8 R/hr (11 R/hr, Unit 2).

BVPS-RAI-30

The proposed FC.B Loss, Threshold 1, Basis for Unit 2 references the plant safety monitoring system for monitoring critical safety function status trees. Other fission product barrier threshold Bases reference the safety parameter display system for monitoring the critical safety function status trees.

Please revise the Bases to reflect the proper system for monitoring the Unit 2 critical safety function status trees.

BVPS-RAI-31

The proposed RC.A RCS or Steam Generator (SG) Tube Leakage, Potential Loss, Threshold 2, states: "[CSFT [Critical Safety Function Tree] Integrity-RED Path conditions met." This is not consistent with the Bases, which state: "CSFST **RCS** Integrity-Red Path." [emphasis added]

Please add "RCS" to the RCS or SG Tube Leakage, Potential Loss, Threshold 2, or provide a justification for the difference.

BVPS-RAI-32 (added following the clarification call)

BVPS EAL Bases, Section 3.2.6, contains the following example:

An ATWS [anticipated transient without scram] occurs and the high pressure ECCS [emergency core cooling system] systems fail to automatically start. RPV [reactor pressure vessel] level rapidly decreases and the plant enters an inadequate core cooling condition (a potential loss of both the fuel clad and RCS barriers). If an operator manually starts a high pressure ECCS system in accordance with an EOP step and clears the inadequate core cooling condition prior to an emergency declaration, then the classification should be based on the ATWS only.

This example does not correspond to the example cited in Section 5.8 of NEI 99-01, Revision 6. Additionally, in the example, starting the high pressure ECCS system would essentially be criterion for loss of the RCS barrier, whether the reactor vessel level is restored or not. The loss of the RCS barrier would result in an alert declaration, whereas the ATWS is a notification of unusual event. The alert would be the correct classification.

Please revise the EAL Basis to reflect endorsed guidance, or provide justification for this difference.

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2 – REQUEST FOR ADDITIONAL INFORMATION REGARDING EMERGENCY ACTION LEVEL SCHEME CHANGE LICENSE AMENDMENT REQUEST (CAC NOS. MF8448 AND MF8449) DATED APRIL 10, 2017

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