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

October 9, 2015

Mr. Eric A. Larson, 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 LICENSE AMENDMENT REQUEST TO ADOPT NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805 (CAC NOS. MF3301 AND MF3302)

Dear Mr. Larson:

By letter dated December 23, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14002A088), as supplemented by letters dated February 14, 2014; April 27, 2015; and June 26, 2015 (ADAMS Accession Nos. ML14051A499, ML15118A484, and ML15177A110, respectively), FirstEnergy Nuclear Operating Company (the licensee) submitted a license amendment request to change the Beaver Valley Power Station, Units 1 and 2, fire protection program to one based on the National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, as incorporated into Title 10 of the *Code of Federal Regulations*, Part 50, Section 50.48(c). To complete its review, the U.S. Nuclear Regulatory Commission staff requests a response to the enclosed questions.

The draft questions were sent to Mr. Phil Lashley to ensure that they were understandable, the regulatory basis for the questions was clear, and to determine if the information was previously docketed. Please respond to the enclosure within 30 days of the date of this letter.

If you have any questions regarding this matter, please contact me at (301) 415-7128 or Taylor.Lamb@nrc.gov.

Sincerely,

for

Taylor A. Lamb, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosure:
Request for Additional Information

cc w/enclosure: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST TO ADOPT

NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805

FIRSTENERGY NUCLEAR OPERATING COMPANY

BEAVER VALLEY POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-334 AND 50-412

By letter dated December 23, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14002A088), as supplemented by letters dated February 14, 2014; April 27, 2015; and June 26, 2015 (ADAMS Accession Nos. ML14051A499, ML15118A484, and ML15177A110, respectively), FirstEnergy Nuclear Operating Company (FENOC or the licensee) submitted a license amendment request (LAR) to change the Beaver Valley Power Station, Units 1 and 2 (BVPS-1 and BVPS-2, respectively) fire protection program to one based on the National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, as incorporated into Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.48(c). To complete its review, the U.S. Nuclear Regulatory Commission (NRC) staff requests a response to the questions below.

Probabilistic Risk Assessment (PRA) Request for Additional Information (RAI) 01.f.ii.01 – Minimum Joint Human Error Probabilities (HEPs)

In the licensee's letter dated May 27, 2015 (ADAMS Accession No. ML15147A372), the response to PRA RAI 01.f.ii provides the range of values and number of HEP pairs in the Fire PRA results for each unit, including the number of HEP pairs with joint probabilities less than 1E-05. The description explains that a team evaluation using NUREG-1921 guidance shows that HEP pairs with joint probabilities less than 1E-05 have zero dependency. For combinations of HEPs greater than two, the range of HEP values and number of joint HEPs used below 1E-05 are not provided. The NRC staff notes that the more HEPs that exist in a given cutset, the greater the chance for dependency between two or more of the HEPs, and the greater the potential impact of applying a minimum joint HEP floor.

Given that a joint HEP floor is not used in the BVPS Fire PRA, please: (1) describe the range of HEP values and number of joint HEPs with values below 1E-05 for combinations of HEPs greater than two; (2) discuss why the total number of joint HEPs below 1E-05 is reasonable for this application; and (3) confirm that a justification (e.g., narrative) for each HEP value below 1E-05 has been documented, and that the justification was developed by more than reviewing the generic dependency tree.

The NRC staff notes that one of the provided joint HEP examples is based on complete dependence and, thus, is rather a straightforward application of dependency. Please provide two additional examples of the lowest joint HEPs (i.e., with more than two HEPs) and your justification for why the assigned joint HEP is appropriate in each case.

PRA RAI 04.01 – Use of Methods Not Accepted by the NRC

In the licensee's letter dated June 26, 2015 (ADAMS Accession No. ML15177A110), the response to PRA RAI 04.01 acknowledges that the treatment of transient fires in the BVPS yard (i.e., Fire Compartment 3-YARD-1) deviates from NRC guidance but asserts that because NRC guidance is limited, FENOC developed its own approach. The response explains that transient fires (i.e., Bin 25 fires) in the yard are bounded by assuming a greater than 100-gallon fuel spill at locations that impact more than one electrical manhole or impact exterior transformers and then weighting those locations within the yard according to vehicle traffic. Locations within the yard that were determined not to be vulnerable to a fuel spill were excluded from evaluation and, therefore, no general transient fire scenarios were developed for these locations. It is not clear if assuming fires caused by large fuel spills captures the full risk from all potential transient fires, including those causing loss of a single manhole.

Justify that the FENOC approach for developing general transient fire scenarios for Fire Compartment 3-YARD-1 is sufficiently conservative, even though some locations within the yard that contain cables were not evaluated for general transient fires. If this approach cannot be justified, then model the additional general transient fires as part of the integrated analysis provided in response to PRA RAI 03.

PRA RAI 08.01 – Placement of Transient Fires

In the licensee's letter dated June 26, 2015, the response to PRA RAI 08 states that part of the criteria used to exclude certain areas of the plant from evaluation of transient fires was that fact that there is "no credible reason to expect transient material to accumulate (for example, areas on top of half-height rooms, confined areas behind a floor-to-ceiling stack of cable trays in the cable spreading room with no expected reason for access)." In contrast to this, Section 6.5.7.2 of NUREG/CR-6850, Final Report, "EPRI/NRC-RES, Fire PRA Methodology for Nuclear Power Facilities, Volume 2: Detailed Methodology," states: "It is assumed that transient fires may occur at all areas of a plant unless precluded by design and/or operation, such as inside a BWR [boiling-water reactor] drywell or torus during power operation." The examples of excluded areas provided in the response of out-of-the-way locations behind cable trays and at the top of half-height rooms do not appear to meet the definition of "precluded by design and/or operations." The NRC staff notes that such locations represent potential storage locations and locations out of normal view, where material could be left behind after maintenance activities or plant modifications.

In light of the guidance in NUREG/CR-6850, justify that these excluded locations are precluded by design or operation. Alternatively, include placement of transient fires at these excluded locations and evaluate the impact in the integrated analysis provided in response to PRA RAI 03.

PRA RAI 11.01 – Main Control Room (MCR) Abandonment Modeling for Loss of Control

In the licensee's letter dated June 26, 2015, the response to PRA RAI 11 states that a screening HEP of 0.1 is used in MCR abandonment scenarios due to loss of control (LOC) for actions to establish the transfer and for actions taken at the alternate shutdown panel for BVPS, Unit 2. The NRC staff notes that the criteria met to justify use of this screening HEP appear to be consistent with requirements presented in the most current guidance on MCR abandonment scenarios (i.e., "Supplemental Interim Technical Guidance on Main Control Room Abandonment Analysis," dated July 23, 2014 (ADAMS Accession No. ML14156A529)), except that this guidance is intended solely for MCR abandonment due to loss of habitability (LOH). The response acknowledges that one difference between MCR abandonment due to LOH and LOC is that the decision to abandon due to LOC will be more difficult. It is not clear to the NRC staff how this complexity, or the additional time that may be required, is addressed in use of the screening HEP, nor how this issue is addressed in the separately modeled recovery actions. The response states that under the new BVPS abandonment procedures, "The timing of when the MCR is abandoned is not so critical, as local actions [that] will be cued from individual fire failures." The NRC staff observes that there will be operator judgment involved in diagnosing when functionality in the MCR has deteriorated to the extent that the MCR must be abandoned. It is not clear how this complexity, which allows the possibility that MCR abandonment is delayed, is addressed using the generic screening HEP.

In light of these observations:

a) Justify how potential delay to abandon the MCR due to LOC is addressed in use of the screening HEP of 0.1. Account for the added complexity of scenarios that may occur due to an LOC driven abandonment, from the delay to evacuate, and from the additional fire damage that can occur prior to evacuation. If these additional complexities are not considered in MCR abandonment scenarios due to LOC, then address this issue in the integrated analysis provided in response to PRA RAI 03.

b) Account for the potential delay to abandon for LOC and the time for transfer to the alternate shutdown panel in the analysis of risk of the recovery actions associated with abandonment. Account for the additional complexities that arise in the scenarios because of the lesser time to respond to the plant initiator due to these delay and transfer times. If your current approach cannot be justified, replace it with an acceptable approach in the integrated analysis provided in response to PRA RAI 03.

If you have any questions regarding this matter, please contact me at (301) 415-7128 or Taylor.Lamb@nrc.gov.

Sincerely,

/RA/

Taylor A. Lamb, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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