



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

April 7, 2016

Mr. Marty L. Richey  
Site Vice President  
FirstEnergyNuclear 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. Richey:

By letter dated December 23, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14002A086), as supplemented by letters dated February 14, 2014; April 27, 2015; May 27, 2015; June 26, 2015; November 6, 2015; December 21, 2015; and February 24, 2016 (ADAMS Accession Nos. ML14051A499, ML15118A484, ML15147A372, ML15177A110, ML15313A306, ML15356A136, and ML16055A160, respectively), FirstEnergy Nuclear Operating Company 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 in Title 10 of the *Code of Federal Regulations*, Section 50.48(c). To complete its review, the U.S. Nuclear Regulatory Commission staff requests a response to the enclosed Request for Additional Information.

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. Please respond to the enclosed questions by May 14, 2015.

E. Larson

- 2 -

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

Sincerely,

A handwritten signature in black ink, appearing to read "Taylor A. Lamb". The signature is fluid and cursive, with the first name "Taylor" and last name "Lamb" clearly distinguishable.

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  
REGARDING LICENSE AMENDMENT REQUEST TO ADOPT  
NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805,  
"PERFORMANCE-BASED STANDARD FOR FIRE PROTECTION  
FOR LIGHT WATER REACTOR GENERATING PLANTS."  
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. ML14002A086), as supplemented by letters dated February 14, 2014; April 27, 2015; May 27, 2015; June 26, 2015; November 6, 2015; December 21, 2015; and February 24, 2016 (ADAMS Accession Nos. ML14051A499, ML15118A484, ML15147A372, ML15177A110, ML15313A306, ML15356A136, and ML16055A160, respectively), FirstEnergy Nuclear Operating Company 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* (10 CFR), 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.01.01**

The responses to RAI 01.f. and RAI 01.f.ii.01 did not provide information that the NRC staff can use to conclude that the quantitative fire risk estimates exclude the impact of unrealistically low joint human error probabilities (HEPs) consisting of pairs of HEPs and longer strings. Instead, the responses indicate that many thousands of joint HEPs with unrealistically low probabilities may be embedded within the logic sequences frequencies. These low probabilities may lead to significant underestimates of affected sequence fire risks and have an indeterminate impact on the NFPA-805 change-in-risk estimates.

The reference to "two" HEPs in RAI 01.f.ii.01 is only a reflection that a "joint" HEP must have at least two individual HEPs and assigns no significance to pairs of HEPs. Longer strings of HEPs can occur frequently, and the error associated with simply multiplying individual probabilities in these longer strings can be many orders of magnitude.

The response states, in part, that the RISKMAN structure itself precludes dependency concerns; however, this is not entirely clear to the staff.

Enclosure

The staff has accepted applications, which have used the following:

1. Minimum joint HEPs of 1E-05 within an accident sequence cutset; or
2. Using joint HEPs in accident sequence cutsets:
  - a. Identifying the number of sequences (or the fraction of core damage frequency and large early release frequency) in which joint HEP values of less than 1E-05 contribute,
  - b. Describing the range of joint HEP values in sequences where the joint HEP value is less than 1E-05, and
  - c. Confirming that a justification (e.g., narrative) for each joint HEP value below 1E-05 has been documented, consistent with the scenario, and that the justification was developed by reviewing each applicable sequence and the joint HEP(s) contributing to the sequence.

Alternately, the Beaver Valley Power Station can use an alternative method to demonstrate that every joint HEP value less than 1E-05 is evaluated within the sequence that it is used, and confirm that an evaluation for each joint HEP is documented.

Please provide adequate justification that the quantitative fire risk estimates exclude the impact of unrealistically low joint HEPs. Summarize any review of dependency, in addition to a pairwise review, that is done on longer strings of HEPs to identify if a dependency exists between the full set of actions in these longer strings within the sequence.

#### **PRA RAI 08.01.01**

The response to PRA RAI 08.01 explains that confined areas behind substantial cable tray stacks are excluded from evaluation of transient fires in the fire PRA. The response states:

These spaces are not part of any normal travel path through the plant. The crowded tray spacing and configuration completely encloses the area, making it extremely difficult to enter the space. The excluded locations in this fire compartment contain no equipment, significantly minimizing or eliminating maintenance and modification activities.

This exclusion is inconsistent with guidance in NUREG/CR-6850, "EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities, Final Report (NUREG/CR-6850, EPRI 1011989)." NUREG/CR-6850 states in Section 6.5.7.2 that areas not precluded by design or operation should be evaluated for transient fires, and although these areas are difficult to access, their access is not precluded. Additionally, transient combustibles placed in these areas could go unnoticed. NRC staff notes that Frequently Asked Question 12-0064, "Hot work/transient fire frequency: influence factors," provides guidance on the use of weighting factors for fire areas less likely to have transient combustibles. Include the evaluation of transient fires for these spaces in the integrated analysis in response to PRA RAI 03, dated March 4, 2015 (ADAMS Accession No. ML15049A507).

E. Larson

- 2 -

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

Docket Nos. 50-334 and 50-412

Enclosure:  
Request for Additional Information

cc w/enclosure: Distribution via Listserv

**DISTRIBUTION:**

**PUBLIC**

RidsACRS\_MailCTR Resource  
RidsNrrPMBeverValley Resource  
RidsNrrDraApla Resource  
SDinsmore, NRR

LPLI-2 R/F  
RidsNrrDorlDpr Resource  
RidsNrrLALRonewicz Resource  
RidsNrrDraAphb Resource  
AWu, NRR

RidsRgn1MailCenter Resource  
RidsNrrDorlLpl1-2 Resource  
RidsNrrDraAfpb Resource  
JHyslop, NRR  
LFields, NRR

**ADAMS Accession No.: ML16071A122**

OFFICE	DORL/LPLI-2/PM	DORL/LPLI-2/LA	DRA/APLA/BC	DORL/LPLI-2/BC	DORL/LPLI-2/PM
NAME	TLamb	LRonewicz	SRosenberg	DBroadus	TLamb
DATE	4/7/16	4/7/16	4/6/16	4/6/16	4/7/16

**OFFICIAL RECORD COPY**