



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

January 23, 2017

Mr. Brian D. Boles  
Site Vice President  
FirstEnergy Nuclear Operating Company  
Mail Stop A-DB-3080  
5501 North State Route 2  
Oak Harbor, OH 43449-9760

**SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1 – REQUEST FOR  
ADDITIONAL INFORMATION REGARDING LICENSE RENEWAL COMMITMENT  
NO. 42 (CAC NO. MF7626)**

Dear Mr. Boles:

By letter dated April 21, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16112A079), FirstEnergy Nuclear Operating Company (FENOC, the licensee) provided information regarding the fatigue monitoring program evaluation for Davis-Besse Nuclear Power Station, Unit No. 1. This submittal was in response to license renewal Commitment No. 42.

By email dated August 26, 2016 (ADAMS Accession No. ML16242A008), the U.S. Nuclear Regulatory Commission (NRC) staff requested additional information regarding FENOC's April 21, 2016, letter. FENOC responded to this request by letter dated September 26, 2016 (ADAMS Accession No. ML16270A447). However, this response did not fully address the staff's request.

The NRC staff has reviewed the information provided by the licensee in its April 21 and September 26, 2016, letters, and determined that additional information is required to complete its review. The NRC staff discussed this request with Gerry Wolf and other FENOC personnel on January 11, 2017. FENOC stated during the discussion that it may need 12 weeks to fully respond to the request.

A response to the enclosed request for additional information is requested to be provided within 30 days from the date of this letter. If a complete response cannot be provided within this timeframe, explain why additional time is needed and specify when the additional information will be provided.

B. Boles

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If you have any questions regarding this request please contact me at (301) 415-1380.

Sincerely,

A handwritten signature in black ink, appearing to read 'B Purnell', with a stylized, cursive flourish at the end.

Blake Purnell, Project Manager  
Plant Licensing Branch III  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosure:  
Request for Additional Information

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

LICENSE RENEWAL COMMITMENT NO. 42

FIRSTENERGY NUCLEAR OPERATING COMPANY

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

DOCKET NO. 50-346

By letter dated April 21, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16112A079), as supplemented by letter dated August 26, 2016 (ADAMS Accession No. ML16242A008), FirstEnergy Nuclear Operating Company (the licensee) provided information regarding the fatigue monitoring program evaluation for Davis-Besse Nuclear Power Station (DBNPS), Unit No. 1. This submittal was in response to license renewal Commitment No. 42.

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing your submittals and has determined that additional information is required to complete the review.

**Background**

Section 2.C(11), "License Renewal License Conditions," of Renewed Facility Operating License No. NPF-3 specifies that the Commitments in Appendix A of NUREG-2193, Supplement 1, "Safety Evaluation Report Related to the License Renewal of Davis-Besse Nuclear Power Station," published April 2016 (ADAMS Accession No. ML16104A350), are part of the DBNPS Updated Final Safety Analysis Report. License renewal Commitment No. 42 in Appendix A of NUREG-2193, Supplement 1, states the following:

Enhance the Fatigue Monitoring Program to:

- Evaluate additional plant-specific component locations in the reactor coolant pressure boundary that may be more limiting than those considered in NUREG/CR-6260<sup>[1]</sup>. This evaluation will include identification of the most limiting fatigue location exposed to reactor coolant for each material type (i.e., [carbon steel] CS, [low-alloy steel] LAS, [stainless steel] SS, and [nickel-based alloy] NBA) and that each bounding material/location will be evaluated for the effects of the reactor coolant environment on fatigue usage. Nickel-based alloy items will be evaluated using NUREG/CR-6909<sup>[2]</sup>. Submit the evaluation to the NRC 1 year prior to the period of extended operation.

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<sup>1</sup> NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components, dated February 1995, ADAMS Accession No. ML031480219.

<sup>2</sup> NUREG/CR-6909, "Effect of LWR Coolant Environments on the Fatigue Life of Reactor Materials," dated February 2007.

Enclosure

Enclosure B of the licensee's letter dated June 17, 2011 (ADAMS Accession No. ML11172A389), provides AREVA Report No. 51-9157140-001. Table 3-9 of the AREVA Report contains the environmentally-assisted fatigue (EAF) values for the NUREG/CR-6260 locations. Table 3-8 of the AREVA Report contains a summary of the reactor coolant system pressure boundary locations with environmentally-adjusted cumulative usage factor ( $CUF_{en}$ ) values that exceed the limit of 1.0.

In its April 21, 2016, letter, the licensee submitted the results of its evaluations associated with Commitment No. 42. The letter stated that locations were screened in accordance with the methodology of Electric Power Research Institute (EPRI) Technical Report 1024995, "Environmentally Assisted Fatigue Screening, Process and Technical Basis for Identifying EAF Limiting Locations," dated 2012. The letter also identified the most limiting locations for each of the four material types (i.e., CS, LAS, SS, and NBA). The  $CUF_{en}$  values are provided for two of the four limiting locations. The  $CUF_{en}$  values are not provided for the LAS and NBA locations. The LAS and NBA locations reference EPRI Technical Report 1024995.

By email dated August 26, 2016 (ADAMS Accession No. ML16242A008), the NRC staff requested additional information regarding the licensee's April 21, 2016, letter. The licensee responded to this request by letter dated September 26, 2016. However, this response did not fully address the staff's request.

In the August 26, 2016, email, the NRC staff asked for the following information in Request (1):

Describe the plant-specific methodology and criteria used to rank locations and select the most limiting locations for EAF. Describe relevant factors for each step of the process, such as thermal zones, material types, transient complexity, temperature effects, and complexity of the systems (as applicable). Justify the use of different material types to bound locations. Justify that the process is appropriately conservative.

In addition, the NRC staff asked for the following information in Request (4):

State the locations being managed by the fatigue monitoring program to maintain the  $CUF_{en}$  values below the limit of 1.0 through the period of extended operation. Provide the  $CUF_{en}$  values for the locations being managed by the fatigue monitoring program.

The licensee's response to Request (1) did not justify the use of different material types to bound locations and did not justify that the process is appropriately conservative. In Table 1 of the licensee's September 26, 2016, letter, the licensee provided information regarding the screening of initial sentinel locations. The NBA and LAS locations in Table 3-9 of AREVA Report No. 51-9157140-001 are not bounded by the locations provided in Table 1 of the September 26, 2016, letter.

The licensee's response to Request (4) states that Table 2 of the licensee's September 26, 2016, letter "lists the  $CUF_{en}$  value for the components evaluated." Table 2 appears to only include the non-NUREG/CR-6260 locations being tracked by the licensee's allowable operating transient cycle program to maintain the  $CUF_{en}$  values below the limit of 1.0 through the period of extended operation.

## Request

The numbering is continued from the NRC staff's previous request for additional information issued by email dated August 26, 2016.

- (5)
  - a. Justify the use of different material types to bound locations.
  - b. Justify the elimination of NBA and LAS locations with  $CUF_{en}$  values that are more limiting than NBA and LAS locations considered in NUREG/CR-6260.
  - c. Justify that the process is appropriately conservative if the allowable operating transient cycle program is tracking NBA and LAS locations that do not have the highest  $CUF_{en}$  values and are not bounding for the respective material types.
  - d. Provide the list of EAF locations being tracked by the fatigue monitoring program, if it is revised.
- (6) Provide both the NUREG/CR-6260 and non-NUREG/CR-6260 locations being managed by the fatigue monitoring program to maintain the  $CUF_{en}$  values below the limit of 1.0 through the period of extended operation. Provide the  $CUF_{en}$  value, American Society of Mechanical Engineers Code CUF value, material type, and environmental correction factor ( $F_{en}$ ) for each EAF location being managed by the fatigue monitoring program.
- (7) License renewal Commitment No. 23 states:

In association with the time-limited aging analysis for effects of environmentally assisted fatigue of the high-pressure injection (HPI) nozzle safe end including the associated Alloy 82/182 weld (weld that connects the safe end to the nozzle), replace the HPI nozzle safe end, including the associated Alloy 82/182 weld, for all four HPI nozzles prior to the period of extended operation. Apply the Fatigue Monitoring Program to evaluate the environmental effects and manage cumulative fatigue damage for the replacement HPI nozzle safe ends and associated welds.

In its April 21, 2016, the licensee stated that:

Due to higher than expected dose rates, the elbows immediately upstream of the HPI nozzles were not replaced as originally planned. The evaluation performed for Commitment 42 assumed these elbows would be replaced prior to entry into the period of extended operation, and therefore would have no appreciable fatigue life. The Fatigue Monitoring Program will be applied to these elbows as part of Commitment 23 to evaluate the environmental effects and manage cumulative fatigue damage for the elbows along with the replacement HPI nozzle safe ends and associated welds. This evaluation will be complete prior to October 22, 2016, as currently documented in NUREG-2193.

By letter dated November 18, 2016 (ADAMS Accession No. ML16327A066), the licensee stated that it had completed those activities noted in license renewal commitments applicable to DBNPS, which are part of the DBNPS Updated Final Safety Analysis Report.

Confirm that the elbows immediately upstream of the HPI nozzles impacted by the completion of Commitment No. 23 are bounded by the limiting EAF locations that are being tracked. Confirm that the plant-specific methodology and criteria used to rank locations and select the most limiting locations for EAF was consistently applied to these locations.

B. Boles

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If you have any questions regarding this request please contact me at (301) 415-1380.

Sincerely,

**/RA/**

Blake Purnell, Project Manager  
Plant Licensing Branch III  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosure:  
Request for Additional Information

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**ADAMS Accession No. ML16364A279**

\* by email

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