March 21, 2011

Mr. Barry S. Allen
Vice President, Davis-Besse Nuclear Power Station
FirstEnergy Nuclear Operating Company
5501 North State Route 2
Oak Harbor, OH 43449

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE DAVIS-BESSE NUCLEAR POWER STATION – SECTION 4.7 (TAC NUMBER ME4640)

Dear Mr. Allen:

By letter dated August 27, 2010, FirstEnergy Nuclear Operating Company submitted an application pursuant to Title 10 of the *Code of Federal Regulation* Part 54 for renewal of Operating License NPF-3 for the Davis-Besse Nuclear Power Station. The staff of the U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing this application in accordance with the guidance in NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants." During its review, the staff has identified areas where additional information is needed to complete the review. The staff's requests for additional information are included in the Enclosure. Further requests for additional information may be issued in the future.

Items in the enclosure were discussed with Cliff Custer, of your staff, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me by telephone at 301-415-2277 or by e-mail at brian.harris2@nrc.gov.

Sincerely,

/RA/

Brian K. Harris, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosure:
As stated

cc w/encl: Distribution via Listserv

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DATE	03/16/2011	03/17/2011	03/18/2011	03/21/2011

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Letter to Barry S. Allen from Brian K. Harris dated March 21, 2011

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B. Harris
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M. Mahoney

DAVIS-BESSE NUCLEAR POWER STATION
REQUEST FOR ADDITIONAL
INFORMATION

Section 4.7.1 Leak-Before-Break

Section 4.7.1.1 Fatigue Flaw Growth

RAI 4.7.1.1-1

Section 4.7.1.1 states that "…[t]he LBB analysis postulated surface flaws at the piping system locations with the highest stress coincident with the lower bound of the material properties for base metal and welds. The fatigue crack growth analysis for postulated flaws was performed to demonstrate that a surface flaw is likely to propagate in the through-wall direction and develop an identifiable leak before it will propagate circumferentially around the pipe to such an extent that it could cause a double-ended pipe rupture under faulted conditions…"

Provide the following information regarding the fatigue flaw growth analysis:

(1) discuss the number of postulated surface flaws that were analyzed for fatigue flaw growth,
(2) discuss the initial and final flaw sizes due to fatigue,
(3) identify the plant design transients and associated cycle numbers that were used in performing the fatigue flaw growth analysis,
(4) discuss how the fatigue flaw growth was calculated,
(5) identify the piping system that contains the postulated fatigue flaws,
(6) clarify whether the number of the transient cycles used in the fatigue flaw growth calculation is based on 40 years or 60 years.

RAI 4.7.1.1-2

Section 4.7.1.1 states that "…[t]he updated analysis used 1.5 times the design cycles for the reactor coolant pump suction and discharge weld overlays…"

(1) Submit the updated analysis.
(2) Identify the design cycles and associated cycle numbers.
(3) Discuss why a multiple of 1.5 times the design cycles is adequate for the period of extended operation.
(4) Discuss how many calendar years the cycles used in the updated analysis (i.e.,1.5 times the design cycles) will cover.

RAI 4.7.1.1-3

Section 4.7.1.1 mentions three analyses: the updated analysis, the fatigue flaw growth analysis, and the LBB analysis.

ENCLOSURE

It is not clear how these three analyses are related to each other and to the flaw growth calculation due to fatigue.

Explain the differences among the three analyses in terms of calculating the flaw growth due to fatigue.

RAI 4.7.1.1-4

Section 4.7.1.1 states that "…[t]he effects of fatigue flaw growth on piping approved for LBB will be managed by the Fatigue Monitoring Program for the period of extended operation…" Based on the fatigue monitoring program described in Appendix B to the license renewal application (LRA), the applicant would monitor the actual transient cycles.

(1) Describe the processes and/or procedures of how the actual transient cycles are monitored and how they are compared to the cycles used in the updated LBB analysis.
(2) Describe how and when the corrective actions will be implemented if the actual transient cycles exceed the transient cycles used in the updated LBB analysis.

Section 4.7.1.2 Thermal Aging

RAI 4.7.1.2-1

Under the Disposition heading, Section 4.7.1.2 states that the effects of thermal aging on cast austenitic stainless steel (CASS) components in the approved LBB piping is not a time limited aging analysis (TLAA) because the effects of thermal aging will be managed by the inservice inspection program for the period of extended operation. The staff believes that if an aging effect is monitored by an inspection program, 10 CFR 54.21(c)(1)(iii) may be applicable.

Explain why thermal aging of CASS component is not a TLAA if it is monitored by the inservice inspection program. The outcome of this issue may affect the conclusion in Section A.2.7.1 of the LRA.

RAI 4.7.1.2-2

The ultrasonic examination technique has not yet been qualified by the American Society of Mechanical Engineers (ASME) to detect flaws in CASS material.

Discuss the ASME-qualified inservice inspection method(s) that will be used to inspect the CASS components to monitor their thermal aging effects and discuss the associated inspection frequency (intervals).

RAI 4.7.1.2-3

It appears that Davis Besse LRA does not include an aging management program to monitor thermal aging embrittlement of CASS. GALL AMP XI.M12 provides guidance on such an aging management program and many license renewal applications have implemented such an aging management program.

Explain why this program has not been proposed to be implemented at Davis Besse for the purpose of license renewal in light of the fact that the reactor coolant pump casing is made of CASS which is susceptible to thermal aging degradation.

RAI 4.7.1.2-4

Section 4.7.1.2 states that "…The updated LBB analysis was based on saturated embrittlement of the cast austenitic stainless steel (CASS) casings such that there is no embrittlement TLAA…."

(1) Submit the updated LBB analysis. If the updated LBB analysis was previously submitted, reference the date of the submittal and identify the pages that discuss the saturated embrittlement.
(2) Demonstrate that the value of fracture toughness used in the updated LBB analysis represents the lowest and worst-case fracture toughness value for the reactor coolant pump casing.

Section 4.7.1.3 Primary Water Stress Corrosion Cracking (PWSCC)

RAI 4.7.1.3-1

Section 4.7.1.3 discusses the weld overlays to mitigate PWSCC in piping approved for LBB. Section 4.7.1.3 also states that PWSCC (or the weld overlay design) is not a TLAA. The staff disagrees with this assessment.

The staff believes that the weld overlay design is a TLAA. The design of weld overlays requires a fatigue flaw growth calculation based on a postulated or an actual detected flaw. The fatigue flaw growth calculation uses transient cycles which are time dependent. Therefore, the staff believes that the weld overlay is a TLAA.

Clarify why the subject matter in Section 4.7.1.3 is not a TLAA.

Section 4.7.2 Metal Corrosion Allowance for Pressurizer Instrument Nozzles

RAI 4.7.2-1

Section 4.7.2 states that "…[t]his resulted in an increase of the general corrosion rate of the pressurizer shell base metal in the nozzle bores from zero to 1.42 thousandths of an inch (mils) per year…The allowable radial corrosion limit, calculated per ASME Section III, is 293 mils for the level instrument nozzles, 493 mils for the sample nozzle and 495 mils for the vent and thermowell nozzles…"

(1) Discuss in detail how 1.42 thousandths of an inch, 293 mils, 493 mils, and 495 mils were obtained or submit the calculations.

(2) Discuss whether the general corrosion rate of 1.42 thousandths of an inch per year has been verified to be adequate for use for the period of extended operation. Discuss whether this corrosion rate increases as the component ages. As it is applied, this corrosion rate is assumed to be constant throughout the remaining life of the plant.