August 16, 2007

Mr. Mark B. Bezilla
Site Vice President
FirstEnergy Nuclear Operating Company
Davis-Besse Nuclear Power Station
Mail Stop A-DB-3080
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SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1 - REQUEST FOR ADDITIONAL INFORMATION RELATED TO RELIEF REQUEST RR-A30 REGARDING STRUCTURAL WELD OVERLAYS THIRD TEN-YEAR INTERVAL (TAC NO. MD4452)

Dear Mr. Bezilla:

By letter to the Nuclear Regulatory Commission (NRC) dated February 15, 2007, and as supplemented by letter dated June 28, 2007, FirstEnergy Nuclear Operating Company submitted a request to install structural weld overlays on pressurizer nozzle welds, for the Davis-Besse Nuclear Power Station, Unit No. 1.

The NRC staff is reviewing your submittal and has determined that additional information is required to complete the review. The specific information requested is addressed in the enclosure to this letter. During a discussion with your staff on August 7, 2007, it was agreed that you would provide a response within 45 days from the date of this letter.

The NRC staff considers that timely responses to requests for additional information help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources. If circumstances result in the need to revise the requested response date, please contact me at (301) 415-4037.

Sincerely,

/RA by S. Sands for/

Thomas J. Wengert, Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosure:
Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

DOCKET NO. 50-346

In reviewing the FirstEnergy Nuclear Operating Company's (FENOC's) submittal dated February 15, 2007, as supplemented by letter dated June 28, 2007, related to Relief Request (RR), RR-A30, regarding structural weld overlays third 10-year interval for the Davis-Besse Nuclear Power Station, (DBNPS) Unit No. 1, the NRC staff has determined that the following information is needed in order to complete its review:

1. Discuss whether the candidate welds in the proposed RR-A30 will be examined by ultrasonic testing (UT) prior to installation of weld overlays in accordance with the American Society of Mechanical Engineers (ASME) Code, Section XI.

2. The NRC staff does not find the practice of applying a new weld overlay over the top of an existing weld overlay that has been in service to be acceptable or appropriate because the material properties of the weld overlay may change with more than one weld overlay application. Discuss whether this application is included in the proposed RR-A30.

3. Regarding Section 1, *ASME Code Components Affected*, of RR-A30:

   (a) For each candidate weld, identify the material specification and P number of each affected component (e.g., nozzles, safe ends, flanges, piping, and hot leg branch connections).

   (b) Weld RC-PZR-FW22 is the similar metal weld joining the 4-inch pressurizer relief nozzle safe end and the valve flange. This weld is associated with weld RC-PZR-WP-91-W/X which joins the 3-inch W/X axis pressurizer relief nozzle and the safe end. Explain why these two welds have two different diameters even though they seem to belong to the same relief valve piping.

   (c) Provide drawings or sketches of the weld configuration of each of the components listed in Section 1 of RR-A30.

4. On page 1 of RR-A30, the licensee states that the weld overlay will be applied to the dissimilar metal welds between the pressurizer relief valve nozzles to the flanges (e.g., Weld RC-PZR-FW22). Discuss whether the weld shrinkage from the weld overlay on the flange would cause distortion resulting in leakage of the valve flange or exert unanalyzed forces on the flange bolting. Discuss whether the relief valve will be removed from the flange prior to the weld overlay installation to reduce weld shrinkage.

5. Regarding Section 2 (page 2) of RR-A30: Confirm that the code of record for the third 10-year inservice interval is the 1995 Edition through the 1996 Addenda of the ASME Code, Section XI.

6. On page 5, Item 1, of RR-A30, the licensee states that the inside diameter weld repairs will be assumed in the nozzle stress analyses to bound any actual weld repairs that may

Enclosure

have occurred in the nozzles. Explain in detail how the assumption of inside diameter weld repairs will bound the outside diameter overlay repairs in terms of component stresses.

7. Paragraph 1(d)2 of Code Case N-740 (page 18) discusses the chromium content and dilution zone. There can be sufficient variations in chemistry within a specific weld group to affect the chemical reproducibility in a field weld. To minimize the effects of chemical dilution and reproducibility between the procedure qualification record (PQR) and of a given weld layer applied in the field, the weld material specification used for the PQR should be the same weld specification used for the weld overlay. Discuss whether this practice will be maintained in accordance with the ASME Code, Section IX.

8. Paragraph 2(a) of Code Case N-740 (page 19) states that flaw characterization and evaluation requirements shall be based on the as-found flaw. However, if ultrasonic testing (UT) will not be performed on the base metal prior to installing the weld overlay, the condition of the inner 75 percent of the base metal or original weld may not be known after the weld overlay installation. This is because UT is qualified to inspect the inner 75 percent of the base metal or the original weld wall thickness after the weld overlay installation. It is not clear to the NRC staff what flaw size would be modeled in the crack growth calculation if a flaw existed in the original weld which was not inspected prior to weld overlay installation. Also, the flaw in the base metal, if it exists, may be squeezed tightly by the compressive stresses produced by the weld overlay, such that post-installation UT will be unable to detect it. With respect to the foregoing discussion regarding the limitation on the UT examination coverage, discuss the flaw size that will be used in the flaw characterization and evaluation per Paragraph 2(a).

9. Paragraph 2(b)(6) of Code Case N-740 (page 23) allows planar flaws in the weld overlay to be accepted by IWX-3640 of the ASME Code, Section XI. This is contrary to the NRC staff position that flaws detected in the weld overlay, during preservice or acceptance examination, need to satisfy the requirements of IWX-3500, not IWX-3640 because the acceptance criteria of IWX-3600 are not as conservative as the acceptance criteria of IWX-3500. Revise Paragraph 2(b)(6) or provide a technical justification for your proposed acceptance criteria.

10. Based on Paragraph 3(b)2 of Code Case N-740 (page 28), if a flaw is detected in the outer 25 percent of the base metal (or original weld) during the pre-service examination, the actual flaw size would be used for the crack growth evaluation. It is the NRC staff's position that this flaw size is not conservative for the crack growth calculation when the original weld is not examined prior to weld overlay installation. The current ultrasonic examination is qualified only to detect flaws in the outer 25 percent of the pipe base metal after a weld overlay is installed on the pipe. Therefore, the condition in the inner 75 percent of the pipe base metal would not be known. A conservative assumption for the crack growth calculation of the base metal is to assume the existence of a crack of 75 percent through-wall depth in the inner 75 percent pipe base metal plus an as-found flaw depth in the outer 25 percent of the pipe base metal. This worst case crack should be used to calculate crack growth. Discuss the basis for using the actual flaw size in the crack growth calculation of base metal.

11. Paragraph 3(c)3 of Code Case N-740 (page 29) requires that "The inservice examination acceptance standards of Table IWB-3514-2 shall be met for the weld overlay. Alternatively, for Class 1, 2, or 3 piping systems, the acceptance criteria of IWB-3600, IWC-3600, and IWD-3600, as applicable, shall be met for the weld overlay. . . ." The above requirement may cause different interpretations. The licensee should either revise this requirement to read: "The inservice examination acceptance standards of Table IWB-3514-2 shall be met for the weld overlay. If the acceptance criteria of Table IWB-3514-2 cannot be met, the acceptance criteria of IWB-3600, IWC-3600, and IWD-3600, as applicable, shall be met for the weld overlay. . .", or provide clarification of the acceptance criteria for this paragraph.

12. Regarding Paragraph 3(c)(3) of Code Case N-740 (page 29): The NRC staff does not agree that the use of IWX-3600 to accept overlay flaws that are caused by primary water stress corrosion cracking (PWSCC) is appropriate because the growth rate of PWSCC can be rapid, which would challenge the integrity of the weld. The NRC staff's position is that any PWSCC flaws in the weld overlay that are rejected by Table IWB-3514-2 per Paragraph 3(c)(3) need to be removed. The licensee should either prohibit the use of IWX-3600 for PWSCC flaws or provide technical justification for your proposed acceptance criteria.

13. Paragraph 3(e) of Appendix 1 to Code Case N-740 (page 42) requires that any of the three methods in paragraphs 3(e)(1), 3(e)(2), or 3(e)(3) may be used to determine the interpass temperature of the weld overlay. It is NRC staff's position that the temperature measurements of Paragraph 3(e)(1) (e.g., pyrometers, temperature indicating crayons, and thermocouples) should be used to the extent possible because the 3(e)(1) method provides the direct and more accurate temperature measurement than 3(e)(2) or 3(e)(3). Therefore, the licensee should either revise Paragraph 3(e)1 to read: "...If it is impractical to use interpass temperature measurements described in this paragraph due to situations where the weldment area is not accessible, such as internal bore welding or when there are extenuating radiological concerns, either Paragraphs 3(e)(2) or 3(e)(3) may be used . . . " or provide technical justification for your proposed methodology.

14. If the pressurizer surge line at DBNPS has been approved for leak-before-break, are the original leak-before-break analyses still valid and the associated acceptance criteria (e.g., the safety margin on crack size and leak rates as specified in Standard Review Plan 3.6.3) still met?