August 23, 2004

Mr. L. William Pearce
Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Post Office Box 4
Shippingport, PA 15077

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION (RAI) - RE: BEAVER VALLEY POWER STATION, UNIT NO. 1 (BVPS-1), ONE-CYCLE STEAM GENERATOR (SG) TUBE INSPECTION CRITERIA USING WESTINGHOUSE W* METHODOLOGY (TAC NO. MC3671)

Dear Mr. Pearce:

By letter dated June 28, 2004, (Agencywide Documents Access and Management System accession number ML041970447) FirstEnergy Nuclear Operating Company (FENOC) submitted an amendment application for BVPS-1 to allow a one-cycle approval of the use of the Westinghouse W* methodology for the SG tube inspections conducted during the fall 2004 refueling outage.

The Nuclear Regulatory Commission staff has reviewed the FENOC June 28, 2004, application and has identified the additional information in the enclosed RAI as needed to complete its review. As discussed with and agreed to by your staff, you are requested to respond within 30 days of receipt of this letter. If you have any questions, please contact me at 301-415-1402.

Sincerely,

/RA/

Timothy G. Colburn, Senior Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-334

Enclosure: RAI

cc w/encl: See next page

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ACCESSION NO. ML042310442

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DATE	8/23/04	8/23/04	8/23/04

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REQUEST FOR ADDITIONAL INFORMATION (RAI)

BEAVER VALLEY POWER STATION, UNIT NO. 1 (BVPS-1)

ONE-CYCLE APPROVAL TO USE W* METHODOLOGY

FOR STEAM GENERATOR (SG) TUBE INSPECTION

DOCKET NO. 50–334

By letter dated June 28, 2004, (Agencywide Documents Access and Management System accession number ML041970447) FirstEnergy Nuclear Operating Company, the licensee for Beaver Valley Power Station, Unit No. 1, submitted a license amendment request, "Revised Steam Generator Inspection Scope For One Cycle of Operation." In order for the Nuclear Regulatory Commission (NRC) staff to complete its review, responses to the following questions are requested:

1. The potential leak rate for a postulated circumferential separated tube below the W* distance is estimated from a correlation of leak rate to crevice depth (refer to Figure 4.3.5). At a specific crevice depth, the mean leak rate was determined to be 0.0004 gallons per minute (gpm) and the upper 90% bound was determined to be 0.0045 gpm. Please clarify the crevice depths (e.g., 0.5 inches, 0.6 inches) associated with these leak rates since a review of Figure 4.3.5 appears to indicate that the same crevice depth may not have been used.

2. Table 4.4.1 provides a summary of the axial and circumferential primary water stress corrosion cracking (PWSCC) for the last six outages at BVPS-1. For each indication detected below the top of the tubesheet (TTS) at BVPS-1, provide the axial or circumferential extent of the indications and the location of the indication relative to the TTS.

3. Figure 4.3.5 in the submittal depicts the leakage from the drilled hole specimen tests as a function of actual crevice depth. Figure 4.3.7 depicts the calculated contact pressure for the most limiting Zone A and B tubes as a function of distance below the TTS under faulted conditions. In addition, Figure 4.3.7 provides the average contact pressures for the 1.25-inch, 2-inch, and 3-inch drilled hole leak test specimens. Figure 4.3.7 relates the contact pressures for the leak test specimens to the most limiting Zone A and B tubes. Discuss the rationale for not developing a direct correlation between the drilled-hole specimen leak rates and their associated contact pressures and then determining the leak rate for a Zone B tube based on the contact pressure at 8 inches and 12 inches.

4. On page 6-4 of WCAP-14797-P, Revision 2, "Generic W* Tube Plugging Criteria for 51 Series Steam Generator Tubesheet Region WEXTEX Expansion," dated March 2003, enclosed with the June 28, 2004, application, it was indicated that the average contact pressure for the drilled-hole leak rate specimens provided in Table 6.2.3 includes the contact pressure due to differential thermal expansion and primary to secondary differential pressure. It is further indicated that the contact pressure due to the

ENCLOSURE

WEXTEX expansion is not included in the average contact pressure since it is inherent in both the test samples and in steam generator tubes in the plant. Describe how the average contact pressures shown in Table 6.2.3 were calculated and clarify the assumptions made in these calculations. If the average contact pressures presented in Table 6.2.3 (and included in Figure 4.3.7 of the license amendment request) do not include a contribution from the WEXTEX expansion process, discuss the relative conservatism of comparing these average contact pressures to those plotted in Figure 4.3.7 of the license amendment request.

For each leak test specimen, provide a summary table which shows the actual contact pressure at various elevations along the specimen. Provide similar information for the most limiting tube in Zone A and Zone B. What would be the highest contact pressure if the expansion and staking process did not result in changes in the diameter of the leak test specimens (i.e., in an "ideal" leak test specimen, please clarify the contribution to the contact pressure from pressure, temperature, and the WEXTEX expansion process, which presumably would be constant throughout the length of the expansion). Please clarify whether the average contact pressure would be identical for all the specimens if they were all tested under the same pressure and temperature conditions and the diametral expansions of all the specimens were the same.

5. Discuss the differences between the inputs (e.g., temperature, pressure, location of BWT, tube hole dilation, etc) used to develop Figure 4.3.7 in the license amendment request and Figure 6.5-1 in WCAP-14797.

6. Provide the DENTFLO predicted leak rate for indications at 8, 10, and 12 inches below the TTS for the most limiting tube in Zone B. Compare these values to the proposed values using the BVPS-1 bounding leakage methodology.

7. Confirm that the steam generator tubesheet bore roughness used to develop WCAP-14797 is applicable to the BVPS-1 SG tubesheets.

8. Given the sequence of the drilled hole leak tests, please clarify why the leak rate at 600°F and 2650 pounds per square inch for specimen W4-004 would be lower when the crevice length was 0.59 inch than when it was 1.29 inch.

9. On page 9 of Enclosure 1 of the license amendment request, there is a statement that indicates that critical regions are based on a degradation assessment where potential and active degradation is expected in SG tubes that could challenge structural and/or leakage integrity if the tubes are not taken out of service by repair. The NRC staff understands the role of the degradation assessment to identify locations susceptible to degradation and then to select the appropriate technique for inspecting these locations. This intent is consistent with the regulations (technical specifications (TSs) in conjunction with Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix B). Please clarify whether there are locations (other than in the tubesheet or where permitted by a previously approved TS amendment) where you are not using techniques capable of finding potential flaws based on your conclusion that flaws in this region will not challenge the structural and/or leakage integrity of the SG tubes.

10. On page 11 of Enclosure 1 of the license amendment request, there is a discussion regarding a lateral contraction in the axial direction. Please clarify this discussion.

11. Please discuss your plans to include in the 90-Day Report following your SG tube inspection the following information: the number of indications, the location of the indication (relative to TTS and BWT), the orientation (axial, circumferential, skewed), and an assessment of whether the results were consistent with expectations with respect to the number of flaws and flaw severity (and if not consistent a description of proposed corrective actions).

12. On page 6 of Enclosure 1 of the license amendment request, there is a statement that indicates that compliance with the TS SG tube repair limits and normal operating and accident-induced primary-to-secondary leakage limits provides reasonable assurance that SG tubing remains capable of fulfilling its specific safety function of maintaining the reactor coolant pressure boundary. This statement is incomplete since actions beyond those required by the TSs may be needed (and required by Criterion XVI of 10 CFR, Part 50, Appendix B) in some instances to ensure tube integrity. This is supported by operating experience and the industry's commitment to the voluntary SG initiative referred to as NEI 97-06. Please clarify this statement.

13. On page 8 of Enclosure 1 of the the license amendment request, there is a statement that indicates that there is no need for the "leak-before-burst leakage limit". Although the full statement appears to imply that no changes are needed in the operational leak rate limit as a result of this amendment request, the statement also seems to imply that the leakage limit in the BVPS-1 TSs will ensure the plant will be shutdown prior to "burst" for all mechanisms. This conclusion is not supported by operating experience (i.e., a tube can burst even if the leakage prior to the burst is below the TS leakage limit). Please clarify this statement.

Beaver Valley Power Station, Units 1 and 2

cc:

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