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June 16, 2009

L-09-132

10 CFR 50.90

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT:
Beaver Valley Power Station, Unit No. 2
Docket No. 50-412, License No. NPF-73
Response to Request for Additional Information for License Amendment Request No. 07-007, Alloy 800 Steam Generator Tube Sleeving (TAC NO. MD9969)

By letter dated October 10, 2008, (Reference 1), FirstEnergy Nuclear Operating Company (FENOC) requested an amendment to the operating license for Beaver Valley Power Station (BVPS) Unit No. 2. The proposed license amendment would modify the Technical Specifications (TS) to allow an additional method of repair for steam generator tubes involving the use of Westinghouse leak limiting Alloy 800 sleeves. The proposed amendment would also clarify an existing reporting requirement concerning steam generator tube inspection. By letter dated May 19, 2009, (Reference 2), the Nuclear Regulatory Commission (NRC) staff requested additional information to complete its review of the license amendment request.

The responses to the NRC request for additional information (RAI) are provided in Attachment 1. The resolution of RAI items 2 and 3 requires a revision to the TS markups provided by Reference 1. The TS markups will be provided in a forthcoming letter. Details of the TS markups are included in Attachment 1. The responses contained in this letter have no impact on the no significant hazards consideration transmitted by Reference 1. Attachment 2 lists the regulatory commitments contained in this letter.

As stated in Reference 1, FENOC requests approval of the proposed license amendment on or before October 12, 2009, corresponding to the start of BVPS Unit No. 2 refueling outage 2R14. Implementation is planned to occur prior to achieving Mode 4 during startup from the 2R14 refueling outage.

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NRR

If there are any questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager – FENOC Fleet Licensing, at 330-761-6071.

I declare under penalty of perjury that the foregoing is true and correct. Executed on June 16, 2009.

Sincerely,

Peter P. Sena III

Attachments:
1. Response to Request for Additional Information
2. Regulatory Commitment List

References:
1. FENOC Letter L-08-307, "License Amendment Request No. 07-007, Alloy 800 Steam Generator Tube Sleeving," dated October 10, 2008
2. NRC Letter dated May 19, 2009, "Beaver Valley Power Station, Unit No. 2 – Request for Additional Information RE: The Alloy 800 Steam Generator Tube Sleeving License Amendment (TAC NO. MD9969)"

cc: NRC Region I Administrator
NRC Senior Resident Inspector
NRR Project Manager
Director BRP/DEP
Site Representative (BRP/DEP)

Attachment 1
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Response to Request For Additional Information

To complete its review, the Nuclear Regulatory Commission (NRC) staff has requested additional information regarding FirstEnergy Nuclear Operating Company (FENOC) license amendment request (LAR) No. 07-007. The staff's request is provided below in bold type followed by the FENOC response for Beaver Valley Power Station (BVPS) Unit No. 2.

1. **Page 8 of Enclosure A of Reference 1 indicates that detection capability would be established with an operational margin relative to structurally limiting flaws, and that flaws would be plugged on detection. As a result, it would not be necessary to determine flaw sizes and, thus, sizing accuracy does not need to be quantified. BVPS-2 TSs requires condition monitoring assessments to be conducted during every outage in which the SG tubes are inspected. Since operating experience, e.g., NRC Regulatory Issues Summary 2000-22 (Reference 2) has shown that significant flaws can occur, even when inspected with qualified techniques, clarify how you will demonstrate tube integrity as part of the condition monitoring assessment.**

   Response. The Enclosure submitted to the NRC with Reference 3 includes an assessment of structural characteristics of atypical sleeve-tube roll attachment joints. This assessment concluded that for the extremely conservative assumption in which the joint length adjacent to the sleeve nickel band does not add to the resistive load capabilities, the structural integrity of the sleeve-to-tube joint will be provided for all plant and performance criteria conditions. Attachment D of LAR No. 07-007 (Reference 1) includes test data that indicates 100 percent through wall (TW) axial or circumferential degradation of the parent tube in the sleeve-to-tube hardroll region does not prevent the sleeve from satisfying its intended design function. Attachment D of LAR No. 07-007 both supports and accentuates the large conservatisms inherent in the Reference 3 evaluation. Therefore, condition monitoring will be inherently satisfied as degradation of the parent tube does not affect sleeve-to-tube hardroll joint integrity. Eddy current test data shows that 100 percent TW, or near 100 percent TW parent tube degradation will be adequately detected providing for defense in depth such that postulated parent tube degradation will be detected and plugged, even though such degradation does not affect the sleeve-to-tube joint integrity.

2. **Page 17 of Reference 1 indicates that the parent tube adjacent to the nickel band will be inspected prior to sleeve installation, and implies that no time limit will be needed on how long the sleeve can remain in service. The qualification data in Enclosure D of Reference 1, for verifying the inspection technique's capability to detect flaws in the parent tube adjacent to the nickel band, consists of only four cracks in one specimen. The depths of the cracks are large, with three of the four cracks being through-wall. Given the lack of a rigorous database supporting the ability to inspect this location, discuss how**

long you intend to leave the sleeves in service and your plans for incorporating this time limit in the BVPS-2 TSs. In addition, discuss your plans to modify the BVPS-2 TSs to reflect the limited inspection capability demonstrated in the parent tube behind the nickel band.

Response. Replacement of the BVPS Unit No. 2 steam generators is currently scheduled for the spring of 2017 refueling outage (2R19). Reference 1 requested approval of the Alloy 800 sleeve to support the fall of 2009 refueling outage (2R14). Therefore, the service life of the Alloy 800 sleeve should be expected not to exceed five operating cycles if installed in the fall of 2009. This sleeve design is not applicable to the replacement steam generators and would require a separate license amendment request to install the sleeve in the replacement steam generators.

A new section (5.5.5.2.f.3) will be added to the BVPS Technical Specifications to address the service life of the Alloy 800 sleeves. The proposed wording for Technical Specification 5.5.5.2.f.3 is:

> All Alloy 800 sleeves shall be removed from service by the spring of 2017 Unit 2 refueling outage (2R19).

To address the limited inspection capability demonstrated in the parent tube behind the nickel band, it is proposed to add the following note to Technical Specification 5.5.5.2.d.

> The requirement for methods of inspection with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube does not apply to the portion of the original tube wall adjacent to the nickel band (the lower half) of the lower joint for the repair process that is discussed in Specification 5.5.5.2.f.3. However, the method of inspection in this area should be a rotating plus point (or equivalent) coil. The SG tube repair criterion of Specification 5.5.5.2.c.3 is applicable to flaws in this area.

3. **Page 4 of Reference 1 indicates that an inspection of the parent tube, at the location where the joint would be established, would be performed prior to installation of the sleeve. Reference 1 also states that any service-induced indications observed in the parent tube wall at the joint location, or within 3 inches below the lower end of the lower joint of a "TZ" sleeve, would preclude installation of the sleeve. Given the importance of verifying that no detectable degradation exists in the parent tube at the location where the sleeve joint will be established, discuss your plans to include requirements in the BVPS-2 TSs for inspecting the parent tube at the location where the sleeve joint will be established, immediately prior to the installation of the sleeve, and for allowing sleeve installation only if the inspection finds the region free from service-induced indications.**

Response. A new section (5.5.5.2.d.6) will be added to the BVPS Technical Specifications to address inspection of the parent tube prior to sleeve insulation. The proposed wording for Technical Specification 5.5.5.2.d.6 is:

> For Alloy 800 sleeves: The parent tube, in the area where the sleeve-to-tube hard roll joint (lower joint) and the sleeve-to-tube hydraulic expansion joint (upper joint) will be established, shall be examined prior to installation of the sleeve.

This will ensure that sleeve installation will proceed only if the inspection finds these regions free from service induced indications.

4. **Page 11 of Reference 1 concludes that the sleeve should not inwardly deform during operation. Enclose D (sic) of Reference 1 reviews the collapse testing performed on the Alloy 800 sleeves. The testing was limited to a few specimens and may not have bounded the entire range of possible conditions, such as the tightness variability of Alloy 800 sleeve joints, which might have shown that this type of joint could achieve leak-tight sleeve-to-tube contact pressures similar to tungsten inert gas (TIG) and laser welded sleeves. Given the operating experience cited in Reference 1, that TIG and laser welded sleeves have inwardly deformed, discuss your plans to include a TS requirement to report this condition if it were to occur. In addition, discuss your plans for providing a root cause analysis, an assessment of the integrity of the sleeve/parent tube complex, and proposed corrective actions in the event that this condition were to occur.**

   Response: Technical Specification 5.6.6.2.1 states, "A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Specification 5.5.5.2, Unit 2 Steam Generator (SG) Program." Technical Specification 5.6.6.2.1.d requires that the location, orientation and measured sizes of service induced indications be included in the 180 day report. In the rare occurrence that an Alloy 800 sleeve would inwardly deform, it would be included in the 180 day report. In addition, the incident would be entered into the BVPS Corrective Action Program. Should a steam generator tube inspection reveal an inwardly deformed Alloy 800 sleeve, FENOC will report this to the NRC within 45 days of identification of the deformed sleeve. The special report of the Alloy 800 sleeve incident will include a root cause analysis, an assessment of the integrity of the sleeve/parent tube complex and identification of the associated corrective actions. The special Alloy 800 sleeve incident report is in addition to the 180 day report that will also contain the Alloy 800 sleeve incident.

References:

1. License Amendment Request No. 07-007 "Alloy 800 Steam Generator Tube Sleeving," dated October 10, 2008 (ADAMS Accession No. ML082890823)

2. NRC Regulatory Issues Summary 2000-22, "Issues Stemming from NRC Staff Review of Recent Difficulties Experienced in Maintaining Steam Generator Tube Integrity," dated November 3, 2000 (ADAMS Accession No. ML003758988)

3. CPSES-200500155, "Comanche Peak Steam Electric Station (CPSES) Unit 1, Docket No. 50-445, Technical Basis for the Effectiveness of Current Inservice Inspection Methods in Sleeved Steam Generator Tubes," February 3, 2005 (ADAMS Accession No. ML050460281)

Attachment 2
L-09-132

Regulatory Commitment List
Page 1 of 1

The following list identifies those actions committed to by FirstEnergy Nuclear Operating Company (FENOC) for Beaver Valley Power Station (BVPS) Unit No. 2 in this submittal. Any other actions discussed in the submittal represent intended or planned actions by FENOC. They are described only as information and are not Regulatory Commitments. Please notify Mr. Thomas A. Lentz, Manager – Fleet Licensing, at (330) 761-6071 of any questions regarding this submittal or associated Regulatory Commitments.

Regulatory Commitment	Due Date
1. Should a steam generator tube inspection reveal an inwardly deformed Alloy 800 sleeve, FENOC will report this to the NRC. The special report of the Alloy 800 sleeve incident will include a root cause analysis, an assessment of the integrity of the sleeve/parent tube complex and identification of the associated corrective actions.	Within 45 days of identification of the deformed sleeve.
2. The resolution of request for additional information items 2 and 3 requires a revision to the Technical Specification markups provided by FENOC Letter L-08-307. The Technical Specification markups will be provided in a forthcoming letter. Details of the Technical Specification markups are included in Attachment 1.	Within 30 days of submittal of letter L-09-132.