December 2, 2003

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

SUBJECT: BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 (BVPS-1 AND 2) - YEAR 2001-2002 STEAM GENERATOR (SG) EXAMINATION REPORTS (TAC NOS. MB7010 AND MB7011)

Dear Mr. Pearce:

By letter dated May 7, 2002, as supplemented July 18, 2003, FirstEnergy Nuclear Operating Company), the licensee for BVPS-1 and 2, submitted reports summarizing the SG tube inspections performed during refueling outages 1R14 and 2R09, respectively, in accordance with BVPS-1 and 2 Technical Specification (TS) 4.4.5.5.b. The Nuclear Regulatory Commission (NRC) staff has reviewed these reports and related documents for BVPS-1 and 2.

The NRC staff's review of these reports and related documents is provided in Enclosures 1 (Unit 1) and 2 (Unit 2). As discussed in Enclosure 1, the NRC staff identified an issue concerning the disposition of eddy current signals containing a mix residual at the support plates in BVPS-1. The NRC developed a request for additional information and is reviewing the licensee's response separately as part of the BVPS-1 refueling outage 1R15, SG report. Other than the aforementioned mix residual issue, the NRC staff did not identify any issues for either BVPS-1 or BVPS-2 that warranted additional follow-up. The enclosed evaluations complete our review under TAC Nos. MB7010 and MB7011.

Should 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 Nos. 50-334 and 50-412

Enclosures: 1. BVPS-1 SG Report Evaluation
2. BVPS-2 SG Report Evaluation

cc w/encls: See next page

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cc w/encls: See next page

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BEAVER VALLEY POWER STATION, UNIT NO. 1 (BVPS-1)
EVALUATION OF STEAM GENERATOR (SG)
TUBE-INSPECTION REPORT

By letters dated October 4, 2001 (Agencywide Documents Access and Management System (ADAMS) accession number ML012850421), October 11, 2001 (ML020230014), January 2, 2002 (ML020420179) and May 7, 2002, (ML030030573) FirstEnergy Nuclear Operating Company (FENOC), the licensee for BVPS-1, submitted information summarizing the SG tube inspections performed during refueling outage 1R14. In addition to the FENOC letters, the Nuclear Regulatory Commission (NRC) staff review included the NRC Telephone Conference Summary dated November 30, 2001 (ML013100370), and the NRC review of the Tube-Inspection Report dated October 9, 2002 (ML02280197).

BVPS-1 has three Westinghouse Model 51 SGs. There are 3388 mill-annealed Alloy 600 tubes per SG. The tubes have an outside diameter of 7/8-inch, a wall thickness of 0.050-inch, and are supported by carbon steel tube support plates and a flow distribution baffle. The tube support plates are a drilled hole design. BVPS-1 SG tubes were expanded full length into the tubesheet using an explosive expansion process.

While reviewing the FENOC's reports in early 2003, the NRC identified several areas where additional information was needed in order to complete the review. The NRC staff requested, and FENOC agreed to address these questions during a BVPS-1, spring 2003 outage conference call. FENOC responses were subsequently documented in a July 18, 2003, letter (ML032040546).

The scope and results of the BVPS-1, 2001 SG inspections were discussed in the letters referenced above. As a result of the inspections, a total of 170 tubes were removed from service. Approximately one half of the tube repairs resulted from indications above the hot leg top-of-tubesheet.

Of particular note from the 2001 tube inspections, is that FENOC discovered four tube sleeves had collapsed and attributed this condition to a "flow diode" effect. These sleeves were installed in a previous (spring 2000) outage. The diode effect occurs when through-wall degradation permits water to enter the tube-to-sleeve crevice from the secondary side of the SG while the plant is in a cold condition. This water subsequently becomes trapped when the plant heats up. As the trapped water heats, the pressure between the sleeve and tube increases until it is sufficient to cause "collapse" of the sleeve. Visual inspection of the collapsed sleeves verified localized inward bulging but not total blockage. Industry experience indicates most of the collapsed sleeves will occur during the initial cycles following installation. Additional information about the collapsed sleeves is available in FENOC-submitted information referenced above.

During the review of the 2001 outage reports referenced above, the NRC staff identified questions concerning FENOC's practices for determination and disposition of eddy current signals containing a large mix residual at the support plates. Given that FENOC's BVPS-1, 2003 SG inspections were scheduled to begin at the time these questions were developed, and the questions were pertinent to FENOC's 2003 inspection practices, this issue was discussed during the 2003 SG outage conference call. After the 2003 SG inspection was completed, a

request for additional information (RAI) concerning BVPS-1 mix residual signals was sent to FENOC. A response to the RAI addressing mix residual signals was included in the BVPS-1, 2003 outage, Tube-Inspection Report (ML032100660) and is being reviewed separately.

Based on our review of the information provided by FENOC, the NRC staff concludes that the information required to be submitted by the technical specifications was provided. One item requiring additional follow-up, the BVPS-1 mix residual signal disposition, will be addressed as part of the BVPS-1, 2003 outage, Tube-Inspection Report review.

BEAVER VALLEY POWER STATION, UNIT NO. 2 (BVPS-2)
EVALUATION OF STEAM GENERATOR (SG)
TUBE-INSPECTION REPORT

By letters dated February 28, 2002 (Agencywide Documents Access and Management System (ADAMS) accession number ML020600485), and May 7, 2002 (ML030030573), FirstEnergy Nuclear Operating Company (FENOC), the licensee for BVPS-2, submitted reports summarizing the SG tube inspections performed during refueling outage 2R09. This information was submitted in accordance with the BVPS-2 Technical Specifications (TSs). The Nuclear Regulatory Commission (NRC) staff also reviewed the NRC Telephone Conference Summary dated September 23, 2002 (ML022660611).

BVPS-2 has three Westinghouse Model 51 SGs. There are 3388 mill-annealed Alloy 600 tubes per SG. The tubes have an outside diameter of 7/8-inch, a wall thickness of 0.050-inch, and are supported by carbon steel tube support plates and a flow distribution baffle. The tube support plates are a drilled hole design. BVPS-2 tubes were fully expanded into the tubesheet using a mechanical rolling process.

While reviewing FENOC's reports, the NRC identified several areas where additional information was needed in order to complete the review and a request for additional information (RAI) was developed. A response to the BVPS-2 RAI was submitted to the NRC by FENOC on July 18, 2003 (ML032040546).

A total of 35 tubes were removed from service by plugging as a result of the 2002 outage inspection. The most predominant degradation mechanism was outside diameter stress corrosion cracking (ODSCC) above the hot leg tubesheet.

During the 2002 SG inspection, three degradation mechanisms were observed that are considered first time occurrences at BVPS-2. Primary water stress corrosion cracking (PWSCC) was detected in one tube at the hot leg top-of-tubesheet. PWSCC was also detected in two tubes at dented hot leg support plate intersections. ODSCC occurred in one tube at a hot leg free span ding. In each case, crack orientation was in the axial direction. FENOC increased the scope of the program inspecting to include one hundred percent +Point™ inspection of all dings greater than 5 volts in SG A. No additional flaws were detected in the expanded sample.

Although FENOC is authorized to implement Generic Letter 95-05, "Alternate Repair Criteria [ARC]," FENOC chose not to use the ARC since only a small fraction of distorted support plate indications (DSI) were confirmed as flaw-like with rotating coil inspection. During the 2002 outage, +Point™ inspection identified a flaw-like signal at only 4 DSI locations. The total number of DSI's identified during the past three outages (2R07, 2R08, and 2R09), has been 277, 279, and 330, respectively. A total of 5 DSI's were confirmed as flaw-like with a rotating coil inspection during the last three outages.

Based on our review of the information provided by FENOC, the NRC staff concludes that the information required to be submitted by the BVPS-2 TSs was provided and no additional follow-up is required at this time.

ENCLOSURE 2

Beaver Valley Power Station, Unit Nos. 1 and 2

cc:

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