June 4, 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, UNITS 1 and 2 (BVPS-1 AND 2) - REQUEST FOR ADDITIONAL INFORMATION RE: STEAM GENERATOR TUBE 2001-2002 OUTAGES INSPECTION REPORT (TAC NOS. MB7010 AND MB7011) AND 1R15 STEAM GENERATOR OUTAGE SUMMARY CALL (TAC NO. MB7271)

Dear Mr. Pearce:

By letter dated May 7, 2002, FirstEnergy Nuclear Operating Company, (FENOC), the licensee for BVPS-1 and 2, submitted reports summarizing the steam generator tube inspections performed during refueling outages 1R14 and 2R09, respectively. This report was submitted in accordance with each unit's Technical Specification 4.4.5.5.b. In addition to the May 7 letter, the Nuclear Regulatory Commission (NRC) staff review included the following documents related to 1R14 for Unit 1: FENOC letters dated October 4, 2001, October 11, 2001, and January 2, 2002; NRC Telephone Conference Summary dated November 30, 2001 (ADAMS accession number ML013100370), and the NRC review of the 90-day report dated October 9, 2002 (ADAMS accession number ML022820197). For Unit 2, the NRC staff reviewed the following additional documents: FENOC letter dated February 28, 2002, and NRC Telephone Conference Summary dated September 23, 2002 (ADAMS accession number ML022660611). The NRC staff has identified additional questions to enable the staff to complete its review which are documented in Enclosure 1. The NRC staff requests that you respond to these questions, and as agreed to by your staff, we request your response within 45 days of receipt of this letter.

Since BVPS-1 was in the 1R15 outage at the time of the 1R14 report review, additional questions (Enclosure 2) were provided to the licensee in support of discussions to be held during the outage. These questions supplemented prior outage questions provided to the licensee (ADAMS accession numbers ML030350082 and ML030770052). The response to the above questions will be documented in the NRC staff's steam generator outage telephone summary. Based on the conference call, the NRC staff developed additional questions related to the licensee's handling of mixed residual signals (Enclosure 3), and as agreed to by your staff, your response to those questions will be included in the 1R15 90-day outage report.

If you have any questions regarding the enclosed requests for additional information (RAIs), 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. RAI, BVPS-2, End of Cycle 9 Steam Generator Questions
2. RAI, Additional Questions for BVPS-1 1R15 Steam Generator Outage Call
3. RAI, BVPS-1, 1R15 Mixed Residual Signal Follow-up Questions

cc w/encls: See next page

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cc w/encls: See next page

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ACCESSION NO. ML031550196 *Input provided, no substantive changes.

OFFICE	PDI-1/LA	PDI-1/PM	EMCB/SC	PDI-1/SC
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DATE	6/3/03	6/2/03	04/21/03	6/3/03

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REQUEST FOR ADDITIONAL INFORMATION

BEAVER VALLEY POWER STATION, UNIT 2 (BVPS-2)

END OF CYCLE 9

STEAM GENERATOR INSPECTION REPORT

By letters dated February 28 and May 7, 2002, FirstEnergy Nuclear Operating Company, the licensee for BVPS-2, submitted reports summarizing the steam generator tube inspections performed during refueling outage 2R09. These reports were submitted in accordance with the BVPS-2 Technical Specifications, Section 4.4.5.5.a and 4.4.5.5.b. The Nuclear Regulatory Commission (NRC) staff has reviewed these reports and has developed the following questions. The NRC staff requests that the licensee respond to the following questions to permit the staff to complete its review.

1. In Enclosure 2 to the May 7, 2002, letter, the eddy current examination section indicates that the +Point™ probe was used to inspect 100% of the dents greater than 5 volts. In addition, it indicated that the +Point™ probe was used to inspect 20% of the dents and free-span dings with voltages greater than 2 volts but less than 5 volts if located between the hot leg top-of-tubesheet and the third hot leg support plate. However, in another document, (ADAMS accession number ML022670422) it was indicated that a 20% sample was performed on hot leg dents with voltages greater than 2 volts but less than 5 volts at the top of the tubesheet, 02H, 03H, and 04H. Please clarify the scope of the dent and ding examinations (for dents and dings greater than and less than 5 volts).

2. A cold leg free span indication located at R26C81 (row 26, column 81), with a 16-degree phase angle, was identified in steam generator SG21B during 2R09. Provide more details on this indication including any available historical information.

3. It was indicated that three tubes in Row 2 were plugged due to U-bend restrictions. What was the smallest probe that did not pass through the tube? Did these tubes have a prior history of denting in the U-bend region? What was the largest probe size (bobbin or rotating probe) that ever passed through the tube? Discuss what actions were taken to identify the cause and nature of the restriction.

4. Please trend the number of distorted support indications (DSIs) at tube support plate intersections over time. Provide a summary of the growth rate for those indications with time. For the DSIs that were confirmed as flaws with the +Point™ probe, discuss the history of these indications. Compare the percentage of DSI indications showing measurable voltage growth to the percentage of DSI indications that had a flaw identified by +Point™ examination. Discuss what actions, if any, have been taken to investigate the reason for the high percentage of DSIs that do not confirm as flaws during the +Point™ examination.

5. The BVPS-2 Tube Plug Special Report (L-02-018) states: “Examination of the ‘A’ steam generator (2RCS-SG21A) used to meet the Technical Specification surveillance resulted

in a total of eighteen (18) tubes being removed from service." Please clarify this statement.

6. Please explain the use of the indication codes WAR and PCT. Some tube locations have both codes while others only have a WAR or PCT code. For example, in steam generator SG21B, R34C57 at AVB2, there is both a WAR and PCT code. For R35C54 at AVB1, there is only a PCT call and for R36C63 at AVB1, there is only a WAR. In BVPS-1, there was a zero (0) PCT indication code at a cold leg support location. Please clarify this nomenclature.

REQUEST FOR ADDITIONAL INFORMATION

BEAVER VALLEY POWER STATTION, UNIT 1 (BVPS-1)

ADDITIONAL QUESTIONS PROVIDED IN SUPPORT OF BVPS-1

1R15 OUTAGE CONFERENCE CALL

1. BVPS-1 Steam Generator Examination Report dated May 7, 2002, indicates four full-length tubesheet sleeves had collapsed and were obstructing tubes during 1R14. These sleeves had been installed during 1R13. The degradation mechanism was reported to result from a “flow diode” effect. An evaluation for BVPS-1 recognized the potential for additional sleeves to collapse and concluded that the structural integrity of the sleeve weld and mechanical roll will not be jeopardized. What is the basis for this conclusion? Have more collapsed sleeves been detected during 1R15? How has the potential for tube sleeve collapse been accounted for in evaluating the percentage of total tube population plugged (which affects thermal-hydraulic analysis in the plant design/licensing basis)?

2. During the 1R14 outage, one hundred hot leg tube support plate residual signals in each steam generator with amplitudes large enough to mask a 1.0 volt indication were reexamined with +Point™ probes. For cases where the +Point™ probes identified a flaw, the bobbin coil 200 kHz frequency was used to establish a distorted support indication (DSI) amplitude in the mix channel. Please clarify how flaws at these locations were dispositioned. The Nuclear Regulatory Commission staff notes that Generic Letter (GL) 95-05, Attachment 1, paragraph 1.b.3, states the voltage-based repair criteria “do not apply to intersections at which there are mixed residual [signals] of sufficient magnitude to cause a 1.0 volt ODSCC [outer diameter stress corrosion cracking] indication (as measured with a bobbin probe) to be missed or misread.” Approximately how many residual signal indications large enough to mask a 1.0 volt indication have been detected in each generator thus far in 1R15? Within that population of indications, how many are flaw-like? How are the mixed residual indications being dispositioned?

3. BVPS-1 uses a number of data analysis codes for tube support plate indications (e.g. confirmed support indication ,CSI, DSI, and possible support indication, (PSI)). Please clarify the criteria used to differentiate between a DSI and PSI code and how each type of indication, CSI, DSI, and PSI, is dispositioned according to the criteria established in GL-95-05.

4. A 20% random sample of the cold leg top-of-tubesheet region was examined during 1R14 (presumably using 3-Coil +Point™ probes). Some indications were detected and repaired by tube plugging. Please clarify the type of indications that were found. How many tubes have been examined with the +Point™ probe at the cold leg top-of-tubesheet location during 1R15? How many and what types of cold leg top-of-tubesheet indications have been detected during the current outage?

ENCLOSURE 2

REQUEST FOR ADDITIONAL INFORMATION (RAI)

BEAVER VALLEY POWER STATION, UNIT 1 (BVPS-1)

1R15 STEAM GENERATOR OUTAGE CONFERENCE CALL

FOLLOW-UP QUESTIONS

During conference calls with the BVPS-1 licensee during the BVPS-1 March 2003 steam generator inspection, the Nuclear Regulatory Commission (NRC) staff discussed a variety of topics with the licensee's staff. A summary of the items discussed during the calls will be provided in a separate communication. The BVPS-1 approach used to detect and disposition large mix residual signals (i.e., of sufficient magnitude to cause a 1.0 volt outer diameter stress corrosion cracking indication, as measured with a bobbin probe, to be missed or misread) was reviewed in detail.

The NRC staff's understanding of the BVPS-1 mix residual data review process is as follows. In your response to this RAI, please identify any incorrect assumptions.

Support Plate Residual (SPR) Identification and Screening: Computer data screening (CDS) parameters are set to identify SPR indications with amplitudes greater than 1.5 volts at the tube support plates. SPR indications flagged by CDS undergo manual analysis to determine (1) if the SPR code is valid, (2) if further evaluation with the +Point™ probe is warranted, or (3) whether the SPR indication should be changed to a distorted support indication (DSI), in which case a +Point™ examination would not be performed (unless the bobbin flaw indication amplitude exceeded 2 volts).

Flaw Identification: Independently, primary/secondary analysts evaluate the bobbin data and identify flaws. These primary/secondary analysts do not identify SPR indications. All discrepancies between primary/secondary analysts are evaluated by a resolution analyst.

SPR +Point™ Examination: At the beginning of the outage, the +Point™ examination criteria included all SPRs greater than 2 volts, the 100 largest SPRs that could mask a flaw, and all SPRs with phase angles less than 50 degrees. These criteria were changed during the outage to all SPR's > 1.5 volts. If the +Point™ probe examination resulted in the identification of a flaw, the bobbin coil 200 kHz frequency data was reviewed to determine if an indication could be identified at that location. If a flaw is identified in the 200 kHz bobbin data, a DSI call results. Once the flaw is located on the 200 kHz channel, a reference amplitude is extracted from the 400/100 kHz mix channel (this sizing method is referred to below as the 200 kHz sizing method). If a flaw is not identified in the 200 kHz bobbin data, the tube was plugged. Flaws were also sized using a correlation between +Point amplitude and bobbin voltage (this sizing method is referred to below as the +Point correlation sizing method) for comparison to the 200 kHz method. All SPRs with flaws identified during the +Point™ probe examination with a resulting bobbin voltage greater than 1.0 volt were repaired.

To help clarify the technical basis for disposition of mix residual indications, the NRC staff requests information based on two broad concerns: 1) the ability of the analysis technique to adequately detect flaws influenced by a large mix residual signal, and (2) once detected, the ability to accurately establish the amplitude of these flaws. Please provide the following information in the BVPS-1 90-day outage report summary.

1. How many SPR indications were originally flagged by CDS during 1R15? Provide a breakdown of how these original SPR indications from CDS were dispositioned. For example, how many SPRs were dispositioned as non-valid, how many were changed to DSI calls, and how many were determined to require +Point™ examination? Of the SPR indications identified by CDS and judged to be valid SPR signals, indicate how many of these locations were called DSIs during the manual "Flaw Identification Process". Of the SPR indications subsequently called DSIs based on initial screening of the CDS data (i.e., during the SPR Identification and Screening process), indicate how many were called DSIs during the "Flaw Identification Process". Provide plots of these results. Discuss any trends in the data.

2. Please summarize the total number of SPRs identified, the number that were inspected with the +Point™ probe, and the number of flaws identified at these locations during the +Point™ probe examination. For those indications where a flaw was identified during the +Point™ probe examination, indicate whether the flaw was identifiable in the 200 kHz bobbin coil data and the resultant voltage from the mix channel. For all flaws identified with a +Point™ probe at SPRs, provide the voltage of these flaws using the +Point™ amplitude to bobbin voltage correlation.

   Provide a plot of the "resultant" bobbin probe flaw voltage as a function of SPR voltage. Discuss any trends. Plots of the "resultant" bobbin probe voltage should be from both the 200 kHz sizing method and the +Point™ correlation sizing method.

   Provide a plot of the 200 kHz sizing method flaw voltage as a function of the +Point™ correlation sizing method flaw voltage. Discuss any trends.

3. What is the percentage of total SPRs that contained flaws with a "resultant" bobbin voltage greater than 1.0 volt. Discuss how this compares to the percentage of total DSIs (with either no or negligible SPR signals) with a reference bobbin voltage greater than 1.0 volt. Note: for this question and following questions, specify how the analyst defines a negligible SPR signal or dent signal.

4. Plot the relationship between the 200 kHz bobbin amplitude and the 400/100 kHz mix amplitude for: (1) DSIs with no or negligible SPR signals (and no or negligible dent signals), and (2) DSIs associated with an SPR (or dent) signals. Compare the two graphs and discuss any trends.

5. BVPS-1 personnel indicated the evaluation process of SPRs used during 1R15 was similar to prior outages. What percentage of the SPR population that remains in service following an outage is identified as an SPR indication at the following outage? Please trend the number of SPR signals identified over time including total number of SPR

signals identified by CDS and total number of SPR signals where +Point™ identified a flaw.

6. Please provide the cycle-to-cycle voltage growth for each DSI that was associated with an SPR and was left in service. Assess the growth rate for SPR indications where the reference bobbin voltage was obtained from the 200 kHz sizing method and from the +Point™ correlation sizing method. Compare this voltage growth rate to the growth rate of all DSIs not associated with SPRs or dents.

7. Given the evaluations performed above and other historical information, what screening procedure will be used for identifying SPR indications in future outages?

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