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Fax: 724-643-8069January 26, 2011  
L-11-026

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 Regarding Application for License  
Amendment for Revised Steam Generator Inspection Scope Using F\* Methodology  
(TAC No. ME3498)

By letter dated February 26, 2010 (Accession No. ML100630422), and supplemented by letter dated November 30, 2010 (Accession No. ML103370240), FirstEnergy Nuclear Operating Company (FENOC) submitted a license amendment request to revise the Technical Specifications for Beaver Valley Power Station, Unit No. 2 (BVPS-2), by expanding the scope of the steam generator (SG) inspections using the F\* inspection methodology to the SG cold-leg tube sheet region. By letter dated January 10, 2011 (Accession No. ML110060678), the Nuclear Regulatory Commission (NRC) staff requested additional information regarding application of proposed Technical Specification paragraph 5.5.5.2.d.6 and paragraph 5.5.5.2.c.5.b.

The attachment to this letter provides responses to the January 10, 2011 NRC staff request for additional information (RAI), as clarified during a teleconference between FENOC and NRC staff on January 7, 2011. The RAI response requires a revision to the proposed Technical Specification changes. A description and evaluation of the revision are provided in the enclosure, and this information supplements the initial submittal dated February 26, 2010. A review of the no significant hazards consideration and environmental consideration from the initial submittal confirms that these evaluations bound the revised Technical Specification changes.

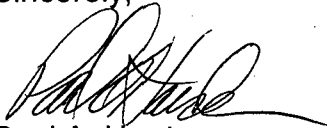
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Beaver Valley Power Station, Unit No. 2  
L-11-026  
Page 2 of 2

There are no regulatory commitments contained in this letter. If there are any questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager – Fleet Licensing, at (330) 761-6071.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 26, 2011.

Sincerely,



Paul A. Harden

Attachment:

Response to January 10, 2011 NRC Request for Additional Information

Enclosure:

Beaver Valley Power Station, Unit No. 2, Supplement to License Amendment Request  
No. 09-005, FENOC Evaluation of the Proposed Change

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

ATTACHMENT  
L-11-026

Response to January 10, 2011 NRC Request for Additional Information  
Page 1 of 2

The Nuclear Regulatory Commission (NRC) staff questions are presented below in bold type and are followed by the FirstEnergy Nuclear Operating Company (FENOC) responses.

- 1. Proposed TS 5.5.5.2.d.6 indicates that the F\* methodology shall be implemented whenever an inspection of the cold-leg tubesheet is required. However, the inspection requirement of TS 5.5.5.2.d.2 already requires 100 percent inspection of the tubes in the cold-leg every 60 effective full-power months. Since inspections at these units are typically performed every outage, one could conclude that some inspections are performed in the cold-leg tubesheet region every outage and therefore, the F\* methodology must be implemented in all SGs every outage. If this was not the intent of this statement, please discuss your plans to revise it or remove it from your proposal.**

**Proposed TS 5.5.5.2.d.6 also indicates expansion of the initial sample within the cold-leg tubesheet shall be as defined in the degradation assessment. Since the methodology for performing the degradation assessment has not been reviewed and approved by the NRC staff, please (1) discuss your plans for submitting this methodology for NRC staff approval, so that the NRC staff can conclude that there is reasonable assurance that any sampling plan developed by this methodology will ensure tube integrity for any and all conditions that could be postulated to be discovered on the cold-leg side of the SGs or (2) remove this proposed requirement from the TSs, since it is already covered by other portions of your TSs.**

Response

As discussed during a January 7, 2011 teleconference, proposed Technical Specification (TS) paragraph 5.5.5.2.d.6 is hereby removed from the proposed license amendment request. In addition, related paragraph numbering changes on TS pages 5.5-10 and 5.5-11 are hereby removed from the proposed license amendment request. These changes to the license amendment request's TS wording have been evaluated as discussed in the enclosure to FENOC letter L-11-026.

- 2. In your response to the request for additional information #7, in the November 30, 2010, letter, you indicated that the tungsten inert gas (TIG) welded sleeve and the laser welded sleeve locates the lower end of the sleeve coincident with the primary face of the tube end; therefore, there is no parent tube extending beyond the sleeve end that would require inspection. You then**

**concluded that F\* cannot be implemented with these designs. The basis for this conclusion is not evident. TS 5.5.5.2.c.5.b only requires that the tube be plugged upon detection of any flaw identified within 3.0 inches below the lower end of the lower sleeve joint and that any flaws located greater than 3.0 inches below the lower end of the lower sleeve joint may remain in service. Since there is no tubing below the lower end of the lower sleeve joint in this particular instance, it would appear that you would always satisfy this repair criterion. In addition, since no repair criteria apply, no inspections are required because the inspections are performed with the objective of satisfying the applicable tube repair criteria. In light of the above, please discuss your plans to modify your proposed TSs to not allow F\* to be applied to tubes sleeved with TIG or laser welded sleeves.**

Response

As discussed during the January 7, 2011 teleconference, paragraph 5.5.5.2.c.5.c will be added to indicate that the F\* methodology can not be applied to the tube sheet region where a laser or TIG welded sleeve has been installed. The proposed wording for TS paragraph 5.5.5.2.c.5 is hereby revised to add sub-paragraph 5.5.5.2.c.5.c as shown below. This change to the license amendment request's proposed TS wording has been evaluated as discussed in the enclosure to FENOC letter L-11-026.

- c) The F\* methodology cannot be applied to the tubesheet region where a laser or TIG welded sleeve has been installed.

**Beaver Valley Power Station, Unit No. 2  
Supplement to License Amendment Request No. 09-005**

**FENOC Evaluation of the Proposed Change  
Page 1 of 4**

Subject: Supplement to Unit No. 2 F\* (F Star) Inspection Methodology  
for the Steam Generator Cold-Leg

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
1.0	SUMMARY DESCRIPTION .....	2
2.0	DETAILED DESCRIPTION .....	2
3.0	TECHNICAL EVALUATION .....	3
4.0	REGULATORY EVALUATION.....	3
5.0	ENVIRONMENTAL CONSIDERATION.....	3
6.0	REFERENCES.....	4
7.0	ATTACHMENTS .....	4

## 1.0 SUMMARY DESCRIPTION

This evaluation supplements the evaluation presented in FirstEnergy Nuclear Operating Company's (FENOC's) request to amend Operating License NPF-73 for Beaver Valley Power Station, Unit No. 2 (BVPS-2), submitted by correspondence dated February 26, 2010 (Reference 1). The license amendment request (LAR) proposes to revise the Technical Specifications (TS) by expanding the scope of the steam generator tubesheet inspections using the F\* inspection methodology to the steam generator (SG) cold-leg tubesheet region.

The proposed changes presented in this enclosure supercede the proposed BVPS-2 TS pages 5.5-10 and 5.5-11 originally submitted in the February 26, 2010 submittal. The changes are proposed in response to a Nuclear Regulatory Commission (NRC) staff request for additional information dated January 10, 2011.

## 2.0 DETAILED DESCRIPTION

The proposed TS changes are provided in Attachment 1. Retyped TS replacement pages are provided in Attachment 2. The retyped pages show the TS pages after the proposed changes have been incorporated. There are no associated changes to the TS Bases or the BVPS-2 Licensing Requirements Manual.

The proposed changes to the TS have been prepared electronically. Deletions are shown with a strike-through, insertions are shown underlined, and revision bars identifying the changed lines of text are shown in the right page margin for pages provided in Attachment 1. This presentation allows the reviewer to readily identify the information that has been deleted, added, or changed. To meet format requirements, the TS pages will be repaginated as necessary to reflect the changes being proposed in this supplement.

Specifically, this supplement will revise proposed changes to TS 5.5.5.2, "Unit 2 Steam Generator Program." Proposed TS paragraph 5.5.5.2.d.6 and related paragraph numbering changes on TS pages 5.5-10 and 5.5-11, included in the February 26, 2010 submittal, are removed.

The proposed wording for TS paragraph 5.5.5.2.c.5 in the February 26, 2010 submittal is revised to add a new paragraph 5.5.5.2.c.5.c as shown below.

- c) The F\* methodology cannot be applied to the tubesheet region where a laser or TIG welded sleeve has been installed.

### **3.0 TECHNICAL EVALUATION**

The LAR expanding the scope of the steam generator tubesheet inspections using the F\* inspection methodology to the steam generator (SG) cold-leg tubesheet region, dated February 26, 2010, and the additional changes proposed herein, have been evaluated by FENOC to determine if the additional changes to the TS will impact the response of the plant or personnel to anticipated transients or accidents. This supplemental response is not introducing or changing any requirements that were considered in the previous submittal. Instead, this supplement removes a proposed paragraph, 5.5.5.2.d.6, which contained provisions for inspecting the cold-leg tubesheet region that are covered by other portions of the TSs. This supplement also adds a paragraph to ensure the F\* methodology cannot be applied to the tubesheet region where a laser or TIG welded sleeve has been installed. The revisions to the original proposed TS changes are bounded by the analysis submitted in the initial application.

### **4.0 REGULATORY EVALUATION**

The LAR expanding the scope of the steam generator tubesheet inspections using the F\* inspection methodology to the steam generator (SG) cold-leg tubesheet region, submitted February 26, 2010, has been evaluated by FENOC to determine if the additional changes to the TS will impact the no significant hazards consideration determination. The proposed changes to the TS are bounded by the analysis submitted in the initial application. Based on the initial no significant hazards consideration determination bounding the TS revisions in this supplement, it is concluded that the proposed license amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is acceptable.

### **5.0 ENVIRONMENTAL CONSIDERATION**

Section 10 CFR 51.22(c)(9) provides criteria for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment or environmental impact statement. A proposed amendment to a facility operating license does not require an environmental assessment or environmental impact statement if operation of the facility in accordance with the proposed amendment would not: (i) involve a significant hazards consideration, (ii) result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) result in a significant increase in individual or cumulative occupational radiation exposure.

FENOC has reviewed this license amendment application supplement and has determined that it meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the proposed license amendment.

## **6.0 REFERENCES**

1. FirstEnergy Nuclear Operating Company Letter to NRC, "License Amendment Request No. 09-005, Revised Steam Generator Inspection Scope," for Beaver Valley Power Station Unit No. 2, dated February 26, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML100630422).

## **7.0 ATTACHMENTS**

1. Revised Proposed Technical Specification Pages for Application of F\* Inspection Methodology to the Steam Generator Cold-Leg Tubesheet Region
2. Proposed Retyped Technical Specification Pages for Application of F\* Inspection Methodology to the Steam Generator Cold-Leg Tubesheet Region



**ATTACHMENT 1**

**Revised Proposed Technical Specification Pages for  
Application of F\* Inspection Methodology to the  
Steam Generator Cold-Leg Tubesheet Region**

**Two Pages Follow**

Contained in this attachment are replacement pages for the amendment application previously submitted to the NRC on February 26, 2010. The pages replace specific pages from the initial submittal.

5.5 Programs and Manuals

5.5.5.2 Unit 2 Steam Generator (SG) Program (continued)

5. The F\* methodology, as described below, may be applied to the expanded portion of the tube in the hot-leg or cold-leg tubesheet region as an alternative to the 40% depth based criteria of Specification 5.5.5.2.c.1:

a) Tubes with no portion of a lower sleeve joint in the hot-leg or cold-leg tubesheet region shall be repaired or plugged upon detection of any flaw identified within 3.0 inches below the top of the tubesheet or within 2.22 inches below the bottom of roll transition, whichever elevation is lower. Flaws located below this elevation may remain in service regardless of size.

b) Tubes which have any portion of a sleeve joint in the hot-leg or cold-leg tubesheet region shall be plugged upon detection of any flaw identified within 3.0 inches below the lower end of the lower sleeve joint. Flaws located greater than 3.0 inches below the lower end of the lower sleeve joint may remain in service regardless of size.

c) The F\* methodology cannot be applied to the tubesheet region where a laser or TIG welded sleeve has been installed.

d. Provisions for SG Tube Inspections

**-NOTE-**

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 shall 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.

Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed 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, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube repair criteria. The tube-to-tubesheet weld is not part of the tube. In tubes repaired by sleeving, the portion of the original tube wall between the sleeve's joints is not an area requiring re-inspection. In addition to meeting the requirements of d.1, d.2, d.3, d.4, d.5 and d.6 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. A degradation assessment shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

## 5.5 Programs and Manuals

5.5.5.2 Unit 2 Steam Generator (SG) Program (continued)

1. Inspect 100% of the tubes in each SG during the first refueling outage following SG replacement.
2. Inspect 100% of the tubes at sequential periods of 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. No SG shall operate for more than 24 effective full power months or one interval between refueling outages (whichever is less) without being inspected.
3. If crack indications are found in any SG tube, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one interval between refueling outages (whichever is less). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.
4. Indications left in service as a result of application of the tube support plate voltage-based repair criteria (Specification 5.5.5.2.c.4) shall be inspected by bobbin coil probe during all future refueling outages.

Implementation of the steam generator tube-to-tube support plate repair criteria requires a 100-percent bobbin coil inspection for hot-leg and cold-leg tube support plate intersections down to the lowest cold-leg tube support plate with known outside diameter stress corrosion cracking (ODSCC) indications. The determination of the lowest cold-leg tube support plate intersections having ODSCC indications shall be based on the performance of at least a 20-percent random sampling of tubes inspected over their full length.

5. When the F\* methodology has been implemented, inspect 100% of the inservice tubes in the hot-leg tubesheet region with the objective of detecting flaws that may satisfy the applicable tube repair criteria of Specification 5.5.5.2.c.5 every 24 effective full power months or one interval between refueling outages (whichever is less).
  6. 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 inspected prior to installation of the sleeve. Sleeve installation may proceed only if the inspection finds these regions free from service induced indications.
- e. Provisions for monitoring operational primary to secondary LEAKAGE

**ATTACHMENT 2**

**Proposed Retyped Technical Specification Pages for  
Application of F\* Inspection Methodology to the  
Steam Generator Cold-Leg Tubesheet Region**

**Three Pages Follow**

Contained in this attachment are replacement pages for the amendment application previously submitted to the NRC on February 26, 2010. The pages replace specific pages from the initial submittal.

5.5 Programs and Manuals

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5.5.5.2 Unit 2 Steam Generator (SG) Program (continued)

5. The F\* methodology, as described below, may be applied to the expanded portion of the tube in the hot-leg or cold-leg tubesheet region as an alternative to the 40% depth based criteria of Specification 5.5.5.2.c.1:

- a) Tubes with no portion of a lower sleeve joint in the hot-leg or cold-leg tubesheet region shall be repaired or plugged upon detection of any flaw identified within 3.0 inches below the top of the tubesheet or within 2.22 inches below the bottom of roll transition, whichever elevation is lower. Flaws located below this elevation may remain in service regardless of size.
- b) Tubes which have any portion of a sleeve joint in the hot-leg or cold-leg tubesheet region shall be plugged upon detection of any flaw identified within 3.0 inches below the lower end of the lower sleeve joint. Flaws located greater than 3.0 inches below the lower end of the lower sleeve joint may remain in service regardless of size.
- c) The F\* methodology cannot be applied to the tubesheet region where a laser or TIG welded sleeve has been installed.

d. Provisions for SG Tube Inspections

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**-NOTE-**

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 shall 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.  
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Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed 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, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube repair criteria. The tube-to-tubesheet weld is not part of the tube. In tubes repaired by sleeving, the portion of the original tube wall between the sleeve's joints is not an area requiring re-inspection. In addition to meeting the requirements of d.1, d.2, d.3, d.4, d.5, and d.6 below, the inspection

5.5 Programs and Manuals

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5.5.5.2 Unit 2 Steam Generator (SG) Program (continued)

scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. A degradation assessment shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

1. Inspect 100% of the tubes in each SG during the first refueling outage following SG replacement.
2. Inspect 100% of the tubes at sequential periods of 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. No SG shall operate for more than 24 effective full power months or one interval between refueling outages (whichever is less) without being inspected.
3. If crack indications are found in any SG tube, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one interval between refueling outages (whichever is less). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.
4. Indications left in service as a result of application of the tube support plate voltage-based repair criteria (Specification 5.5.5.2.c.4) shall be inspected by bobbin coil probe during all future refueling outages.

Implementation of the steam generator tube-to-tube support plate repair criteria requires a 100-percent bobbin coil inspection for hot-leg and cold-leg tube support plate intersections down to the lowest cold-leg tube support plate with known outside diameter stress corrosion cracking (ODSCC) indications. The determination of the lowest cold-leg tube support plate intersections having ODSCC indications shall be based on the performance of at least a 20-percent random sampling of tubes inspected over their full length.

5. When the F\* methodology has been implemented, inspect 100% of the inservice tubes in the hot-leg tubesheet region with the objective of detecting flaws that may satisfy the applicable tube repair criteria of Specification 5.5.5.2.c.5 every 24 effective full power months or one interval between refueling outages (whichever is less).

## 5.5 Programs and Manuals

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### 5.5.5.2 Unit 2 Steam Generator (SG) Program (continued)

6. 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 inspected prior to installation of the sleeve. Sleeve installation may proceed only if the inspection finds these regions free from service induced indications.
- e. Provisions for monitoring operational primary to secondary LEAKAGE
  - f. Provisions for SG Tube Repair Methods

Steam generator tube repair methods shall provide the means to reestablish the RCS pressure boundary integrity of SG tubes without removing the tube from service. For the purposes of these Specifications, tube plugging is not a repair. All acceptable tube repair methods are listed below.

1. ABB Combustion Engineering TIG welded sleeves, CEN-629-P, Revision 02 and CEN-629-P Addendum 1.
2. Westinghouse laser welded sleeves, WCAP-13483, Revision 2.
3. Westinghouse leak-limiting Alloy 800 sleeves, WCAP-15919-P, Revision 2. All Alloy 800 sleeves shall be removed from service by the spring of 2017 Unit 2 refueling outage (2R19).

### 5.5.6 Secondary Water Chemistry Program

This program provides controls for monitoring secondary water chemistry to inhibit SG tube degradation. The program shall include:

- a. Identification of a sampling schedule for the critical variables and control points for these variables,
- b. Identification of the procedures used to measure the values of the critical variables,
- c. Identification of process sampling points,
- d. Procedures for the recording and management of data,
- e. Procedures defining corrective actions for all off control point chemistry conditions, and
- f. A procedure identifying the authority responsible for the interpretation of the data and the sequence and timing of administrative events, which is required to initiate corrective action.