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December 2, 2005
L-05-190

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

Subject: **Beaver Valley Power Station, Unit No. 2**
BV-2 Docket No. 50-412, License No. NPF-73
Response to Request for Additional Information on
License Amendment Request regarding Revised Steam Generator
Inspection Scope (TAC No. 6768)

By letter dated April 11, 2005, the FirstEnergy Nuclear Operating Company (FENOC) submitted a License Amendment Request (LAR) that would revise Steam Generator inspection scope by using the F* methodology for Beaver Valley Power Station Unit No. 2. By letter dated October 28, 2005, the NRC requested additional information regarding the FENOC LAR. The FENOC responses to this request are provided in Attachment 1. Attachment 2 provides a list of regulatory commitments made in this submittal. Revisions to proposed technical specifications reflecting these responses will be submitted in a supplement to the LAR by January 31, 2006.

Should you have any questions or require additional information, please contact Mr. Gregory A. Dunn, Manager - Licensing, at (330) 315-7243.

I declare under penalty of perjury that the foregoing is true and correct. Executed on December 2, 2005.

Sincerely,

James H. Lash

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

A001

References:

1. Beaver Valley Unit No. 2 License Amendment Request No. 183 - Revised Steam Generator Inspection Scope, dated April 11, 2005
2. Beaver Valley Power Station, Unit No. 2 - Revised Steam Generator Inspection Scope-Request for Additional Information (TAC No. 6768), dated October 28, 2005

c: Mr. T. G. Colburn, NRR Senior Project Manager
Mr. P. C. Cataldo, NRC Senior Resident Inspector
Mr. S. J. Collins, NRC Region I Administrator
Mr. D. A. Allard, Director BRP/DEP
Mr. L. E. Ryan (BRP/DEP)

FENOC Response to Request for Additional Information
License Amendment Request 183 - Revised Steam Generator Inspection Scope
Beaver Valley Power Station Unit No. 2

By letter dated April 11, 2005 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML051040080), First Energy Nuclear Operating Company (FENOC) submitted a license amendment request (LAR) to revise the scope of steam generator tube inspections. Specifically, the amendment defined a distance called "F-star" (F*), which is measured toward the hot-leg tube end from the bottom of the roll transition. The portion of tubing in the tubesheet below the F* distance would be excluded from inspection. Technical justification for this change was provided in Westinghouse Topical Report, WCAP-16385-P, Revision. 1, "F* Tube Plugging Criterion for Tubes with Degradation in the Tubesheet Roll Expansion Region of the Beaver Valley Unit 2 Steam Generators," dated March 2005 (Attachment D to the LAR).

The Nuclear Regulatory Commission (NRC) staff reviewed the information provided and determined the following information is needed to complete its review:

1. **Your proposal includes modifying Technical Specification (TS) 4.4.5.2.e to require "rotating pancake coil inspection of the hot leg tubesheet F* distance or less than or equal to 3.0 inches below the top of the tubesheet, whichever is greater, for 100 percent of the tubes sampled." Given the NRC staff's position in Generic Letter 2004-01, "Requirements for Steam Generator Tube Inspections," it is not clear why a specific probe (rotating pancake coil) is listed in the TSs. The proposal is so specific that it will require you to use this technology even if other, more advanced probes are used to examine the hot-leg tubesheet F* distance. For example, non-rotating probe technology (e.g., array probes) could not be used to satisfy this TS. Multiple probe types may be required if, for example, a form of degradation occurs (or is postulated to occur) that cannot be reliably detected in the F* distance using a rotating pancake coil. What plans do you have to modify the TSs to avoid these limitations?**

   Response

   BVPS has and will continue to utilize properly qualified eddy current techniques available with regards to SG tube examinations. The probe design currently referenced in the LAR submittal reflects the recommendation contained within WCAP-16385-P. FENOC agrees that stating the use of a specific probe design would limit the ability to take advantage of advances in eddy current probe technology. Therefore, technical specification 4.4.5.2.e will be reworded as follows: "For implementation of the F* inspection methodology, 100% of the active hot leg tubes will be examined utilizing qualified eddy current techniques to the F* distance or less than 3.00 inches below the top of the tubesheet, whichever is greater."

2. **The proposed TS 4.4.5.2e, requires the F* inspection for "100 percent of the tubes sampled." The NRC staff does not understand the F* sampling requirements indicated by this statement, since it could either indicate: (a) that 100% of the active tubes will be inspected with a rotating probe for the entire F* distance, or (b) that 100% of the F* distance (e.g., approximately 3 inches) will be inspected for a sample of the active tubes. What plans do you have to modify the TSs to clarify the meaning of this statement?**

   Response

   Per WCAP-16385-P, the examination extent is 100% of the active hot leg tubes for the entire F* distance. The intent of the statement in the LAR submittal was to mimic this requirement. Rewording of Technical Specification 4.4.5.2.e as described in the response to RAI Item 1 will eliminate the confusion by deleting any reference to sampling of the tubes.

3. **Section 3, "Applied Inspection Length," of WCAP-16385-P, Revision 1, states there are 10 tubes with the bottom of the roll transition (BRT) located more than 1 inch below the hot-leg top of the tubesheet. It also describes an adjustment in the inspection distance to ensure an adequate length of engaged tubing below the BRT is inspected. This adjustment calls for an inspection of at least 2.22 inches below the BRT (1.97 inches F* plus a 0.25-inch non-destructive examination uncertainty).**

   Response

   All tubes will be tested to an adequate length to ensure pullout resistance. These tubes have been tested to deeper lengths for the last two outages. The selection of the 3.00 inch inspection distance was chosen to conservatively bound F* and this length includes an allowance for the BRT elevation. The specific BRT elevation for the ten tubes in question is factored into the inspection depths for these tubes.

   Section 3, "Applied Inspection Length," of WCAP-16385-P, Revision 1, also describes the use of the 95% confidence value for defining the location of the BRT and including this in the inspection distance to ensure adequate inspection of the tubes within the tubesheet. Given that all tubes must resist pullout from the tubesheet, and that TS 4.4.5.4.a.8 requires examination of the F* distance or less than or equal to 3.0 inches below the top of the tubesheet, whichever is greater, an inspection based on the 95% confidence value for the BRT location may not meet the TS requirement.

   Response

   The minimum inspection distance below the BRT is specified in WCAP-16385-P as 1.97 inches. FENOC has specified the inspection distance to be a minimum of 3.00 inches below the top of tubesheet (for all tubes except those ten tubes with BRT's greater than 1.00 inch). WCAP-16385-P includes a discussion explaining that an inspection distance of 2.50 inches below the top of tubesheet provides at least the minimum required (inspection) distance when the 95% confidence BRT is used. This analysis was included to show that the BRT variance is small. The BRT data for all hot leg tubes indicate that the lowest BRT (excluding the ten tubes at 1.00 inch or greater) is 0.61 inches. The required inspection distance for this tube is 2.83 (1.97 + 0.61 + 0.25) inches. Thus all tubes with the exception of the ten tubes with BRTs at 1.00 inch or greater will be inspected to an adequate distance using the 3.00 inches below the top of tubesheet distance.

Since implementation of your proposed TS requires knowing the location of the BRT for each tube, please confirm that your procedures will ensure the length of tubing defined in TS 4.4.5.4.a.8 will be inspected (i.e., that the length of tubing inspected is not based on a non-bounding statistical determination of the location of the BRT).

Response

The degradation assessment defines those tubes that must be inspected to distances greater than 3.00 inches below the top of tubesheet. This requirement is carried forward for all future degradation assessments. In addition, the Unit 2 SG Examination Guidelines will be revised to include a table that lists the individual tube locations for the tubes in question and the minimum required inspection depth into the tubesheet.

As noted above, TS 4.4.5.4.a.8 requires examination within the tubesheet of "only the portion of the tube within the F* distance or less than or equal to 3.0 inches below the top of the tubesheet, whichever is greater." Including the phrase, "less than or equal to" means the required inspection distance could default to the F* distance whenever the F* distance is within 3.0 inches of the top of the tubesheet. If your intent was to require an inspection of, at least, the top 3.0 inches of the length of the tube that is within the tubesheet, please clarify the wording in the proposed TS.

Response

The minimum inspection depth below the tubesheet is 3.0" except for those tubes with BRT measurements greater than 1.00". For these tubes the inspection depth will be adjusted accordingly as discussed above. TS 4.4.5.4.a.8 will be re-worded to eliminate the phrase "less than or equal to" to reduce confusion.

4. **In your evaluation (WCAP-16385-P, Revision I), was any testing or analysis performed to evaluate the effect of thermal cycling on preload? Please discuss the results or the reason this was unnecessary.**

Response

The original qualification specimens included a thermal soak after expanding the tube into the tubesheet that simulated the temperature associated with heat treatment of the tubesheet to stub barrel weld. This temperature far exceeds any operating or accident condition temperature and should address this issue. The effect of thermal cycling is not expected to adversely affect the anchorage capabilities of the tube in the tubesheet. Typical operating temperatures are not sufficient to cause a relieving of residual stresses inherent to the tube expansion process nor are they sufficient to cause a relieving of residual preload associated with the expansion process itself. This issue was previously discussed with NRC during the initial review of the F* alternate repair criterion for Farley Unit 2.

5. **WCAP-16385-P, Revision 1 determines the F* value based on 4% and 8% tube plugging. In addition, WCAP-16385-P, Revision 1 addresses the effects of plugging in excess of 8% of the tubes (refer to Section 3.1). Please provide the F* distance (using the methodology described in the WCAP) for your analyzed plugging limit for your current and EPU conditions. If this value of F* exceeds that specified in your current proposal, discuss your plans for modifying your TSs.**

   Response

   The F* distance of 1.97" remains valid for the 4%, 8% and 22% plugging limits under the current and uprated operating conditions. The comparison between 4% and 8% plugging was included to show that the F* value is virtually unaffected for this change. WCAP-16385-P includes a calculation of F* at a steam pressure (700 psia) which bounds the calculated steam pressure for 22% plugging conditions of 733 psia at the SG outlet (Section 3.1) and shows that the faulted case F* distance remains bounding for the assumed 700 psia steam pressure case. The 700 psia steam pressure case was included to address the postulated condition of greater than anticipated plugging at an outage that results in the post outage plugging exceeding 8%. Following implementation of the plant uprate, plugging will be managed with the intention of keeping the planned average tube plugging to less than 8% (including installation of tube sleeves with possible tube deplugging and sleeving). The TS Bases will be revised to describe the basis for, and intention to maintain plugging levels below approximately 8%.

6. **Regarding accident induced leakage, you indicated in your LAR that:**

   Any primary-to-secondary leakage from tube degradation below the F* length is so minimal for postulated steam line break event conditions that it will not affect offsite dose calculations and can therefore be neglected.

   WCAP-11306, Revision 2 describes a methodology for calculating leakage for cracks left in service and the justification for neglecting the total contribution of leakage through cracks below the F* distance to steamline break (SLB) consequences.

   SLB leakage is limited by leakage flow restrictions resulting from the crack and tube-to-tubesheet contact pressures that provide a restricted leakage path above the indications and also limit the degree of crack opening compared to free span indications. The total leakage (for all such tubes) meets the industry performance criterion, plus the combined leakage developed by any other alternate repair criteria, and will be maintained below the maximum allowable SLB leak rate limit.

The methodology for determining leakage provides for large margins between calculated and actual leakage values in the F* criteria.

Please provide the methodology that will be used for determining the amount of accident induced leakage as a result of implementing the F* criterion. If you will be assuming there is no accident-induced primary-to-secondary leakage as a result of implementing the F* criterion, please provide the test data and analysis supporting this approach. The test data and analysis should specifically address the effects of tubesheet bow including the maximum "no contact length" of the most-limiting tube within the tubesheet.

Response

WCAP-11306 Rev 2 (Farley Unit 2) does not describe a methodology for calculating leakage for cracks left in service. WCAP-11306 states that leakage from indications below F* is not anticipated and also states that any postulated leakage would be bounded by the leakage associated with free-span axial cracks of equal length. The applied F* distance of 1.97 inches with NDE uncertainty is judged to be sufficiently robust that no leakage is expected during a postulated SLB event.

For sound roll expansion lengths of approximately 0.50 inches, measurable leakage is not anticipated at SLB conditions. As the applied F* distance with NDE uncertainty is 1.97 inches, it is expected that no leakage will originate for postulated degradation below F*. Test data contained within WCAP-16385-P indicate that the average tube OD post roll with the collar removed is approximately 1.5 mils larger than the tubesheet hole in which the tube was installed. The combined tubesheet hole dilation at a pressure differential of 2650 psi is 4.6 mils at 2.0 inches below the top of tubesheet, and includes both hole dilation due to tubesheet bow and thermal expansion of the tubesheet material. The tube expansion due to thermal and pressure effects alone is 4.3 mils. Therefore, neglecting roll expansion effects, a diametrical gap of 0.30 mils (radial gap of 0.15 mils) can exist between the tube and tubesheet at 2.0 inches below the top of tubesheet. However, as tube OD growth due to roll expansion of 1.5 mils exceeds the difference in hole dilation and tube OD growth due to thermal and pressure effects, the tube and tubesheet will remain in contact for all plant conditions. The contact pressure associated with restraining the tube OD growth by 1.2 mils diametrically is expected to far exceed the driving pressure that may exist within the crevice at the crack face, and thus no primary to secondary leakage is anticipated.

The 4.6 mil tubesheet combined hole dilation value is calculated for the minimum tube location radius used for the tubesheet of 2.06 inches. At the largest radius location used in the analysis, 60.8 inches (i.e., near the tubesheet periphery), the bowed shape of the tubesheet results in a contraction of the tubesheet hole and the thermal expansion of the tubesheet hole is less than the thermal and pressure expansion of the tube resulting in a contact pressure of approximately 2250 psi between the tube and tubesheet, assuming no tube OD growth due to the expansion process. At the top of tubesheet location the limiting combined hole dilation (2.06 inch radius) is 5.0 mils, and a 0.7 mil diametrical gap could exist for the assumed condition of no subsequent tube OD growth due to the expansion process. At the maximum radius location the contact pressure is approximately 2090 psi assuming no tube OD growth due to the expansion process. When the expansion process tube OD growth is applied, the tube will remain in contact with the tubesheet through the entire expanded length. For the 33 inch radius location the tubesheet hole dilation effects due to bow alone are neutral. That is, for a radius of less than 33 inches the bow effects cause the hole to enlarge while for a radius of greater than 33 inches the bow effects cause the hole to contract. Note that the 4.3 mil tube OD expansion due to only pressure and temperature effects is constant for all elevations within the tubesheet and for all tube locations. The above discussion presents a basis for establishing a no leak condition for F* tubes where the flaw elevation is below the F* distance. This basis, however, does not address the impact of tubesheet hole roughness, which depending upon the severity of surface roughness, could represent a condition where leakage at SLB conditions could be postulated even for cases where contact pressures exceed the leakage driving pressure.

Additional resistance to leakage would be afforded due to interaction of the tube and tubesheet in a bowed condition. As the tubesheet bows, the horizontal plane distance at a constant elevation is decreased, even though the hole diameter along the bowed plane increases. As the tube will conform to the tubesheet and experience a radial growth due to thermal and pressure effects, the contact pressures along the horizontal, or unbowed plane, should increase, effectively wedging the tube into the tubesheet hole.

Additionally, leakage can only be associated with indications that have progressed to a 100% TW condition for substantial length, either circumferentially or axially. Revision 2 of the EPRI In Situ Pressure Test Guideline defines a flaw amplitude threshold of 3.07 volts by +Pt for indications located at the expansion transition, thus any +Pt flaw amplitude less than this amplitude would not be associated with leakage at SLB conditions. This flaw amplitude is unlikely to be experienced at BVPS-2 due to the application of shot peening prior to operation. It is possible that if a 100% TW flaw of significant length were to develop, that a small amount of primary to secondary leakage could be realized due to roughness of the tubesheet hole surface. For such cases the expected leakage is judged to be so small that no impact to offsite doses would be realized. During development of the L* alternate repair criteria (WCAP-14697, "L* Tube Plugging Criteria for Tubes with Degradation in the Tubesheet Roll Expansion Region of the Farley Unit 2 SGs," approved by NRC) elevated temperature leakage testing was performed using sixteen tubes with twelve 1/16 inch diameter holes drilled through the tube wall of each. These holes were located at a constant elevation and equally spaced around the tube. The tube was then roll expanded in a tubesheet simulant collar above the elevation of the holes, thus a gap of several mils between the tube and collar at the elevation of the holes was provided. In essence this configuration models a circumferential separation of the tube as the entire tube circumference at the bottom of the roll expansion was exposed to the flow from the holes. Roll lengths of 0.25 to 2.0 inches above the hole elevation were tested. Examination of the data shows that 3 of the 16 test specimens leaked at a pressure differential of 2250 psi, while 14 of the 16 test specimens leaked at a pressure differential of 2650 psi. Leak rates were decreased with increasing roll expanded length. As the contact pressure at the tube OD surface exceeds the driving pressure this leakage can be associated with roughness of the tubesheet hole. A total of 2 specimens each with roll expanded lengths of 1 and 2 inches were leak tested at a pressure differential of 2650 psi. Of these 4 specimens, 3 leaked with an average leak rate of 3.1 x 10-5 gpm and a maximum leak rate of 1.1 x 10-4 gpm. Although no leakage is anticipated from true PWSCC indications below the F* distance, the maximum observed leak rate of 1.1 x 10-4 gpm can conservatively be applied to any observed PWSCC degradation below F* that has a +Pt amplitude greater than 3V in the 300 kHz analysis channel. This leakage contribution will be combined with all other postulated leakage sources evaluated in the operational assessment. Taking into consideration the in-situ pressure test results which focus on the expansion transition location, and the inherent conservatism associated with application of a leakage allowance for flaws below F*, this option for leakage consideration is judged conservative.

7. **TS 4.4.5.4.a.8 addresses tube inspections. In proposed TS 4.4.5.4.a.8, you indicated that "[w]ithin the tubesheet this [inspection] includes only the portion of the tube within the F* distance or less than or equal to 3.0 inches below the top of the tubesheet, whichever is greater. The tube-to-tubesheet weld is excluded from this inspection requirement. This exclusion does not apply to tubes with sleeves installed in the tubesheet region." Please clarify this wording since it is not clear whether it was your intent to require an inspection of the tube-to-tubesheet weld when the tubes are sleeved or whether your intent was to require a full-length tube inspection when a tube is sleeved (i.e., it is not clear what exclusion is being referred to). Furthermore, the basis for eliminating the requirement to inspect the parent tube within the tubesheet at, and below, a sleeve joint, was not provided (this includes the tube-to-tubesheet weld).**

Response

The application of F* is a function of the tube elevation considered. F* has been applied to plants with both full and partial depth roll expansions. For similar plants that differ only in the depth of the tubesheet expansion, the plants with partial depth expansions have F* values less than plants with full depth roll expansions. This is due to the tubesheet bow effects below the mid-plane of the tubesheet that result in contraction of the tubesheet hole which increases the contact pressures between the tube and tubesheet and thus reduces the F* distance. F* with re-rolling has also been applied to plants with partial depth roll expansions where the F* distance is applied to the re-rolled sections of tube above the original roll. Thus, it is acceptable to apply an F* value developed for the top of tubesheet to the tube length immediately below a sleeved tube as the lower end of the sleeve exists at approximately the mid-plane elevation of the tubesheet. At this elevation, the tubesheet bow effects are essentially neutral. Thus calculation of an F* value that uses top of tubesheet bow effects is conservative. In practice, if sleeves are installed, the parent tube will be inspected for a distance of 3.00 inches below the end of the sleeve, and the tube to tubesheet weld will not be inspected.

The proposed TS will be revised to clearly address application of F* to the inspection of a tube sleeved in the tubesheet region.

TS 4.4.5.4.a.6 addresses the tube plugging or repair limit. Since proposed TS 4.4.5.4.a.8 may (see related question above) require an inspection of the entire tubesheet region for

a tube that is sleeved, it is possible that degradation could be detected in those tubes. However, proposed TS 4.4.5.4.a.6 a) 3.0 would no longer specify the plugging or repair limit for any degradation identified in the parent tube of a tube sleeved in the tubesheet region if the degradation is located below the F* distance or below 3-inches from the top of the tubesheet, whichever distance is greater. Please discuss your plans for modifying the TS repair limits to ensure that the repair limits for the parent tube (of a tube sleeved in the tubesheet region) is clearly specified.

Response

A new technical specification section that addresses repair limits for the parent tube of a tube sleeved in the tubesheet region will be provided. New technical specification section 4.4.5.4.a.6.a) 4.0 would specify that (a) service induced degradation reported in the parent tube less than or equal to 3.00 inches from the lower sleeve end will be plugged upon detection and (b) service induced degradation reported in the parent tube greater than 3.00 inches from the lower sleeve end is acceptable for continued operation.

8. **Please confirm that your operating parameters will always be bounded by the conditions for which the F* distance was determined in WCAP-16385-P, Revision 1 (e.g., temperature, pressures, etc.). If actual operating conditions may not always be bounded by what was assumed in your analysis, what controls are in place to ensure you won't operate outside the bounds of this analysis.**

Response

LTR-MPG-05-4, "Best Estimate NSSS Parameters for BVPS-2," January 2005, provides best estimate operating parameters for the BVPS-2 SGs at EPU normal operating condition of 2910 MWt and varying steam generator tube plugging (SGTP). FENOC has administratively selected an upper bound operating T_{hot} value of 611.2°F for the BVPS-2 SGs at a NSSS power level of 2910 MWt. The associated steam generator tube plugging that will provide sufficient steam mass flow for this condition is 8%. FENOC has also chosen to use sleeving as a method of controlling tube plugging at an upper bound of 8%. Both laser welded and TIG welded sleeving repair are licensed at BVPS-2. The current tube plugging level for BVPS-2 is 3.8%, the current T_{hot} is 608.5°F, the current T_{cold} is 543.3°F, and the current steam pressure at the SG outlet is 827.3 psia, with a normal operating primary to secondary pressure differential of approximately 1423 psi, based on the steam pressure at the nozzle outlet.

FENOC has chosen to administratively control steam generator tube plugging at 2910 MWt to a maximum of 8% by tube sleeving. This in turn will help to limit the T_{hot} temperature increase associated with the EPU. However, inspection transients or observation of a new degradation mechanism at a future outage could potentially result in a condition where the steam generator tube plugging prior to an outage is well below 8%, but greater than 8% after the outage. In this case the time periods involved for mobilization of sleeving equipment, preparation of procedures, training of personnel, etc, could result in a significant extension to the outage length. Therefore, the F* distance was evaluated at a bounding primary to secondary pressure differential of 1550 psi (700 psia steam pressure) to address temporary conditions where steam generator tube plugging could exceed 8%. The normal operation F* distance for this condition was calculated to be 1.81 inches, which remains bounded by the faulted condition F* distance of 1.97 inches. Therefore, temporary conditions where steam generator tube plugging exceeds 8% do not invalidate the 1.97 inch F* value provided the primary to secondary pressure differential does not exceed 1550 psi. For a Tavg of 576.2°F with 22% steam generator tube plugging, the expected steam pressure at the SG outlet nozzle is 733 psia.

The required inspection length commensurate with current operating conditions is bounded by the inspection length for EPU (2910 MWt NSSS power level) normal operating conditions. Calculation of the F* value for a NSSS power level of 2910 MWt with 4% steam generator tube plugging results in a value of 1.77 inches, which is bounded by the faulted condition value of 1.97 inches.

9. **Please discuss the expected condition of the tube-to-tubesheet joint. For example, discuss the amount of corrosion expected at the top of the tubesheet (similar to what may have been present in some of the test specimens) and whether there is sludge buildup at the top of the tubesheet.**

   Response

   FENOC routinely performs sludge lancing and visual inspections of the secondary face of the tubesheet. No conditions of corrosion have been observed or reported (at the tube-to-tubesheet interface) that would adversely affect the implementation of F*. Sludge mapping is performed each outage to track the height and range of sludge build-up. Average sludge height for those tubes with reportable sludge heights from bobbin analysis varies from 1/2 inch to approximately 1.50 inches. Approximately 250 tubes per SG have reportable sludge heights; these tubes are located in the center portion of the tubesheet grid, below the flow distribution baffle cutout region.

10. **Given the inherent assumption that neither structurally significant nor leakage-significant flaws will develop within the F* distance, and assumptions on degradation below the F* distance, please discuss your plans to provide the information listed below following each inspection. Similarly, please discuss your plans to modify the TSs to include reporting this information. Please confirm you do not expect to find structurally significant or leakage significant flaws within the F* distance.**

    a. **Number of total indications, location of each indication, orientation of each indication, severity of each indication, and whether the indications initiated from the inside or outside surface.**

    b. **The cumulative number of indications detected in the tubesheet region as a function of elevation within the tubesheet.**

c. **Projected end-of-cycle accident-induced leakage from tubesheet indications. This leakage shall be combined with the postulated end-of-cycle accident-induced leakage from all other sources. If the preliminary estimated total projected end-of-cycle accident-induced leakage from all sources exceeds the leakage limit, the NRC staff shall be notified prior to unit restart.**

Response

New technical specification 4.4.5.5.e will be provided to require the following information within 90 days after each outage (MODE 4) where the F* inspection methodology was applied:

a. Number of total indications, location of each indication, orientation of each indication, severity of each indication, and whether the indications initiated from the inside or outside surface.

b. The cumulative number of indications detected in the tubesheet region as a function of elevation within the tubesheet.

c. Since indications below the F* distance will not contribute to leakage during a postulated SLB event and indications observed within the inspection depth (into the tubesheet) will be plugged on detection, the projected end-of-cycle accident-induced leakage is considered to be zero. This zero leakage value will be combined with the postulated end-of-cycle accident-induced leakage from all other sources. If the preliminary estimated total projected end-of-cycle accident-induced leakage from all sources exceeds the leakage limit, the NRC staff shall be notified prior to unit restart.

Qualified eddy current techniques are applied in all areas of the tube bundle. Industry experience has demonstrated that repeated applications of qualified inspection technology (for this case, in the region of the tubesheet) has minimized the likelihood of finding structurally significant or leakage significant indications within the F* distance.

11. **Although the TS Bases were provided for information only, the staff notes that the Bases do not appear to acknowledge that sleeves could be installed within the tubesheet region and that different inspection and acceptance limits would apply to tubes with sleeves in the tubesheet region (i.e., F* does not apply to sleeved tubes). In addition, the staff notes that some of the Bases wording may need to be changed as a result of responding to the above questions. Please discuss your plans to modify the Bases as a result of the questions/comments above.**

Response

The proposed TS Bases would be further revised to reflect changes in proposed TS that result from NRC review. These revisions would include appropriate information associated with the application of F* when sleeves are installed in the tubesheet region. Revisions to the proposed TS and Bases will be provided to the NRC as a supplement to the LAR, by January 31, 2006.

ATTACHMENT 2 to L-05-190

Commitment List

The following list identifies those actions committed to by FENOC for Beaver Valley Power Station (BVPS) Unit No. 2 in this document. 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. Gregory A. Dunn, Manager - Licensing, at (330) 315-7243 of any questions regarding this document or associated regulatory commitments.

Commitment	Due Date
Revise and resubmit proposed Technical Specifications (TS) and Bases as a supplement to License Amendment Request 183 as follows: a. TS 4.4.5.2.e will be reworded to state, "For implementation of the F* inspection methodology, 100% of the active hot leg tubes will be examined utilizing qualified eddy current techniques to the F* distance or less than 3.00 inches below the top of the tubesheet, whichever is greater." b. TS 4.4.5.4.a.8 will be reworded to eliminate the phrase "less than or equal to". c. The proposed TS will be revised to clearly address application of F* to the inspection of a tube sleeved in the tubesheet region. d. Insert new TS section 4.4.5.4.a.6.a) 4.0 that addresses repair limits for the parent tube of a tube sleeved in the tubesheet region. This would require that (a) service induced degradation reported in the parent tube less than or equal to 3.00 inches from the lower sleeve end will be plugged upon detection and (b) service induced degradation reported in the parent tube greater than 3.00 inches from the lower sleeve end is acceptable for continued operation e. Insert new TS 4.4.5.5.e requiring reporting of information within 90 days after each outage (MODE 4) where the F* inspection methodology was applied. f. Revise proposed TS Bases to reflect changes in proposed TS that result from NRC review. These revisions would also include (1) appropriate information associated with the application of F* when sleeves are installed in the tubesheet region and (2) a description of the basis for, and intention to maintain plugging levels below approximately 8%..	01/31/2006
Revise BVPS-2 Steam Generator Examination Guidelines to include a table that lists the locations for tubes with the bottom of the roll transition located more than 1 inch below the hot-leg top of the tubesheet, and the corresponding minimum required inspection depth into the tubesheet.	By the implementation date for the F* license amendment