Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

TVA-BFN-TS-413
February 5, 2001

10 CFR 50.90
10 CFR 50.91(a)(6)
10 CFR 50 Appendix H

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of	)	Docket No. 50-260
Tennessee Valley Authority	)	

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 2 - PROPOSED REVISION TO THE UNIT 2 REACTOR PRESSURE VESSEL (RPV) MATERIAL SURVEILLANCE PROGRAM - SUPPLEMENTAL INFORMATION AND REQUEST FOR EXIGENT LICENSE AMENDMENT - TAC NO. MB0741

References:

1. TVA Letter to NRC dated January 16, 2001, Browns Ferry Nuclear Plant (BFN) - Proposed Revision To The Unit 2 Reactor Pressure Vessel Material Surveillance Program
2. Letter from Jack Strosnider (NRC) to Carl Terry (BWRVIP Chairman) dated May 16, 2000, BWR Integrated Surveillance Program (BWRVIP-78)

In accordance with the provisions of 10 CFR 50.90 and 10 CFR 50.91(a)(6), TVA is submitting a request for an exigent amendment to BFN operating license DPR-52. Approval of the proposed amendment would revise the Unit 2 RPV material surveillance program to defer the withdrawal of the second surveillance capsule for one operating cycle to coincide with the Unit 2, Cycle 12 refueling outage planned for March 2003.

In the January 16, 2001, letter (Reference 1), TVA proposed to revise the withdrawal schedule for the second Unit 2 surveillance capsule for two fuel cycles [from 14 Effective Full Power Years (EFPY) to 18 EFPY] to allow BFN to realize the benefits of participation in the Boiling Water Reactor (BWR) Owners' Group Integrated Surveillance Program (ISP) currently under review by the NRC staff. BFN's participation in the ISP is described in BWRVIP-86, BWR Integrated Surveillance Program Implementation Plan dated December 2000. The basis for the integrated program was established in BWRVIP-78, BWR

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Integrated Surveillance Program Plan. During a January 19, 2001, TVA/NRC telephone call, the staff indicated that NRC's current policy was to consider one-cycle only deferrals while the ISP was being reviewed. Consistent with this policy, the staff requested TVA to reconsider its January 16, 2001, request for a two-fuel cycle deferral and to submit supplemental information addressing the criteria contained in the Reference 2 letter which provides guidance for obtaining one-cycle deferrals. Additionally, in a January 25, 2001, telephone call, the staff stated that TVA's requested program change appeared to require a license amendment. TVA is providing herein the supplemental information requested by the staff and a request for a license amendment for the one-cycle deferral.

Enclosure 1 to this letter provides the description and evaluation of the proposed change. This includes TVA's determination that the proposed change does not involve a significant hazards consideration, and pursuant to the provisions of 10 CFR 51.22(c)(9), is exempt from environmental review. Enclosure 1 also contains a justification for the use of the exigent provisions of 10 CFR 50.91. A proposed change to the BFN Final Safety Analysis Report is contained in Enclosure 2.

The BFN Plant Operations Review Committee and the BFN Nuclear Safety Review Board have reviewed the proposed license amendment and determined that operation of BFN Unit 2 in accordance with the proposed license amendment will not endanger the health and safety of the public. Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosures to the Alabama State Department of Public Health.

NRC approval of the proposed change is requested by April 3, 2001. There are no commitments contained in this letter. If you have any questions about this request, please telephone me at (256) 729-2636.

Sincerely,

T. E. Abney
Manager of Licensing
and Industry Affairs

Subscribed and sworn to before me
on this 5th day of February 2001
Barbara A. Blanton
Notary Public
My Commission Expires 9/22/02

Enclosures cc: See page 3

Enclosures
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ENCLOSURE 1
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2

PROPOSED REVISION TO THE UNIT 2 REACTOR PRESSURE VESSEL (RPV) MATERIAL SURVEILLANCE PROGRAM AND REQUEST FOR AN EXIGENT LICENSE AMENDMENT

This information supplements the TVA letter dated January 16, 2001, Browns Ferry Nuclear Plant (BFN) - Proposed Revision To The Unit 2 Reactor Pressure Vessel Material Surveillance Program (Reference 1). The following discussion and conclusions are supported by the report contained in Enclosure 1 of the January 16 letter. This report entitled "Justification to Defer Removal of Surveillance Capsule #2 at the Browns Ferry Nuclear Plant," hereafter referred to as SIR-00-165, was prepared to justify deferral of the second capsule to 18 EFPY. The conclusions contained in SIR-00-165 conservatively bound the deferral to 16 EFPY discussed below.

I. DESCRIPTION OF THE PROPOSED CHANGE

The proposed change revises the Unit 2 RPV surveillance program to defer the withdrawal of the second surveillance capsule for one fuel cycle. The current withdrawal schedule requires BFN Unit 2 to pull the second capsule at 14 Effective Full Power Years (EFPY). The one-cycle deferral will result in an estimated capsule exposure of approximately 16 EFPY at withdrawal during the cycle 12 refueling outage. A proposed revision to the BFN Final Safety Analysis Report documenting the change is shown on Enclosure 2.

II. REASON FOR THE PROPOSED CHANGE

The proposed schedule change will allow BFN to realize the benefits of participation in the Boiling Water Reactor Vessel and Internals Project (BWRVIP) Integrated Surveillance Program (ISP) currently under review by the NRC staff. BFN's participation in the ISP is described in BWRVIP-78, Integrated Surveillance Plan. The BFN Unit 2 capsules were designated as representative material in the December 15, 2000, BWRVIP response to a staff request for additional information regarding BWRVIP-78 (Reference 3). The revised test matrix as described in BWRVIP-86, BWR Integrated Surveillance Program Implementation Plan, dated December 2000, (Reference 4) recommends withdrawal of the second Unit 2 capsule at 20 EFPY; therefore, the proposed program change is consistent with the ISP. Additionally this request preserves BFN surveillance capsules for use during a renewed license term. On June 6, 1999, TVA notified NRC of its intent to submit an application to renew the operating licenses for BFN Units 2 and 3.

III. SAFETY ANALYSIS

In a May 16, 2000 letter (Reference 2), NRC provided guidance for the submittal of one-cycle RPV material surveillance program deferrals while NRC is completing its review of the ISP. TVA's response to the three points contained in the May 16, 2000, letter follow:

1. NRC Position

   Explain how this deferral is consistent with the ISP plan submitted by the BWRVIP on December 28, 1999 (BWRVIP-78). It is the staff's understanding that the proposed ISP was not designed to be an "optimized" program regarding the removal schedule of capsules which support the ISP. Likewise, additional capsules not originally scheduled to be included in the ISP may be incorporated into later ISP designs. The licensee should address how the deferral of the removal or testing their next capsule for one cycle is either (1) an express outcome of the ISP as submitted or (2) not prohibited by the current ISP proposal (i.e., that testing of the capsule at this time is not critical to achieving data which is of particular value to the ISP).

   TVA Response

   The most recent ISP implementation plan as submitted to NRC in References 3 and 4 proposes to utilize BFN Unit 2 surveillance material as representative of itself and BFN Unit 3 for both plate and weld material. The ISP currently recommends the removal of the second Unit 2 capsule at 20 EFPY to increase the fluence and provide better shift results. Therefore, the proposed one-cycle deferral to 16 EFPY is consistent with the objectives of the ISP guidance.

2. NRC Position

   Explain how the acquisition of materials property data in accordance with the facility's plant-specific Appendix H program is not necessary at this time to ensure that the integrity for the facility's RPV will be maintained through the period of deferral. Examples of rationales which the staff would find acceptable include: (1) the materials in the facility's surveillance program lack unirradiated baseline data so that no meaningful estimation of material property shift can be made; (2) the next capsule represents the first capsule to be withdrawn by the plant so that an insufficient number of data points (<2) will be available to use the data within the Regulatory Guide 1.99, Rev. 2, "Radiation Embrittlement of Reactor Vessel Materials," Position 2 methodology for plant-specific modifications to the embrittlement correlations and the ability to monitor RPV embrittlement will not be significantly affected by a one cycle deferral; (3) the data from the capsule would not be expected to provide Charpy shift values large enough (i.e. > 56 F for welds, or > 34 F for plates or forgings) to be distinguishable from the scatter in the Charpy test method.

   TVA Response

   Figures 3-1 and 3-2 from SIR-00-165 show the predicted behavior of the BFN Unit 2 limiting plate and weld surveillance material using Regulatory Guide 1.99, Revision 2 methodology along with the measured RT_{NDT} shifts from the analysis of the first capsule withdrawn at 8.2 EFPY. As shown on Figures 3-1 and 3-2, the predicted shift for the capsule electroslag weld and plate material at 16 EFPY is 30 Deg F and 23 Deg F, respectively. Therefore,

analysis of the capsule at 14 EFPY would not be expected to yield shifts which would be discernible from the scatter in the Charpy data.

3. NRC Position

Explain how deferral of the acquisition of dosimetry data from the capsule to be tested does not affect the validity of the facilities RPV integrity assessments through the period of the deferral. This is a particularly important point for facility's which intend to defer the withdrawal or testing of their first surveillance capsule. Any potential non-conservatisms in the licensee's current methodology when compared to a methodology that would be expressly acceptable to the staff, i.e., a methodology which complies with Draft Regulatory Guide (DG) 1053 (formerly DG-1025,"Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence"), should be evaluated, quantitatively or qualitatively. In particular, the licensee should state why their facility's currently approved P-T limit curves will be adequate over the period of deferral without the assessment of the capsule's dosimeter wire data and the associated recalculation of RPV fluences. Compensatory actions, for example; utilizing 32 EFPY P-T limit curve when the actual RPV usage is much less, may also be considered as a basis for not needing to recalculate RPV fluences for the period of deferment.

TVA Response

The cumulative core exposure at the end of the upcoming Unit 2, Cycle 12 fuel cycle will be 16 EFPY. Since the period of validity for the current approved Unit 2 pressure-temperature (P-T) curves is 16 EFPY, approval of the proposed deferral will not impact their adequacy. In addition, Figures 3-1 and 3-2 of SIR-00-185 demonstrate that the measured shifts from the first capsule tests are well within the Regulatory Guide 1.99, Revision 2 shift + margin for both the Unit 2 plate and weld material. Figures 3-3 and 3-4 show the behavior of the Unit 2 surveillance materials are behaving in a manner consistent with the BWR fleet.

Conclusion

As discussed above, removal of the second capsule at 14 EFPY is not essential for continued safe operation for the following reasons:

- The deferral is consistent with the objectives of the ISP and better data will result when the capsule is analyzed at higher fluences
- The predicted RT_{NDT} shifts for the limiting capsule plate and weld materials is less than the scatter in the Charpy test data
- The approved Unit 2 P-T curves remain valid during the period of deferral
- The observed RT_{NDT} shifts of the BFN surveillance material are well-bounded by the predictions using RG 1.99, Revision 2 methodology and are consistent with the BWR fleet

IV. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The proposed amendment would revise the Browns Ferry Unit 2 reactor pressure vessel material surveillance program to allow a one operating cycle deferral of the withdrawal schedule for the second surveillance capsule.

Basis for proposed no significant hazards consideration determination: As required by 10 CFR 50.91(a), TVA has provided its analysis of the issue of no significant hazards consideration, which is presented below:

A. The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

Pressure-temperature (P/T) limits are imposed on the reactor coolant system to ensure that adequate safety margins against nonductile or rapidly propagating failure exist during normal operation, anticipated operational occurrences, and system hydrostatic tests. The P/T limits are related to the nil-ductility reference temperature, RT_{ndt}. Changes in the fracture toughness properties of Reactor Pressure Vessel (RPV) beltline materials, resulting from the neutron irradiation and the thermal environment, are monitored by a surveillance program in compliance with the requirements of 10 CFR Part 50, Appendix H. The effect of neutron fluence on the shift in the nil-ductility reference temperature of pressure vessel steel is predicted by methods given in Regulatory Guide (RG) 1.99, Revision 2. The Browns Ferry Unit 2 current P/T limits were established based on adjusted reference temperatures developed in accordance with the procedures prescribed in RG 1.99, Revision 2. Calculation of adjusted reference temperature by these procedures includes a margin term to ensure upper-bound values are used for the calculation of the P/T limits. Revision of the second capsule withdrawal schedule will not affect the P/T limits, because they will continue to be established in accordance with RG 1.99, Revision 2. This change is not related to any accidents previously evaluated. The proposed change will not affect reactor pressure vessel performance because no physical changes are involved and the RPV vessel P/T limits will remain in accordance with RG 1.99, Revision 2 requirements. The proposed change will not cause the reactor pressure vessel or interfacing safety systems to be operated outside of their design or testing limits. Also, the proposed change will not alter any assumptions previously made in evaluating the radiological consequences of accidents. Therefore, the probability or consequences of accidents previously evaluated will not be increased by the proposed change.

B. The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed change defers the second RPV material surveillance capsule withdrawal for one fuel cycle. This proposed change does not involve a modification of the design of plant structures, systems, or components. The proposed change will not impact the manner in which the plant is operated as plant operating and testing procedures will not be affected by the change. The proposed change will not degrade the reliability of structures, systems, or components important-to-safety because equipment protection

features will not be deleted or modified, equipment redundancy or independence will not be reduced, supporting system performance will not be downgraded, the frequency of operation of equipment important-to-safety will not be increased, and more severe testing of equipment important-to-safety will not be imposed. No new accident types or failure modes will be introduced as a result of the proposed change. Therefore, the proposed change does not create the possibility of a new or different kind of accident from that previously evaluated.

C. **The proposed amendment does not involve a significant reduction in a margin of safety.**

Appendices G to 10 CFR 50 describes the conditions that require P/T limits and provide the general bases for these limits. Until the results from the reactor vessel surveillance program become available, RG 1.99, Revision 2 is used to predict the amount of neutron irradiation damage. The use of operating limits based on these criteria, as defined by applicable regulations, codes, and standards, provide reasonable assurance that nonductile or rapidly propagating failure will not occur. The P/T limits are not derived from Design Basis Accident (DBA) analyses. They are prescribed during normal operation to avoid encountering pressure, temperature, and temperature rate of change conditions that might cause undetected flaws to propagate and cause nonductile failure of the reactor coolant pressure boundary (RCPB). Since the P/T limits are not derived from any DBA, there are no acceptance limits related to the P/T limits. Rather, the P/T limits are acceptance limits themselves since they preclude operation in an unanalyzed condition. The proposed change will not affect any safety limits, limiting safety system settings, or limiting conditions of operation. The proposed change does not represent a change in initial conditions, or in a system response time, or in any other parameter affecting the course of an accident analysis supporting the Bases of any Technical Specification. The proposed change does not involve revision of the P/T limits, but rather a revision of the withdrawal time for the second surveillance capsule. The current P/T limits were established based on adjusted reference temperatures for vessel beltline materials calculated in accordance with of RG 1.99, Revision 2. P/T limits will continue to be revised, as necessary, for changes in adjusted reference temperature due to changes in fluence when two or more credible surveillance data sets become available. When two or more credible surveillance data sets become available, P/T limits will be revised as prescribed by RG 1.99, Revision 2, or other NRC-approved guidance. Therefore, the proposed changes do not involve a significant reduction in any margins of safety.

V. ENVIRONMENTAL IMPACT CONSIDERATION

The proposed amendment does not involve a significant hazards consideration, a significant change in the types of or significant increase in the amounts of any effluents that may be released offsite, or a significant increase in individual or cumulative occupational radiation exposure. Therefore, the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9), and pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed amendment is not required.

VI. JUSTIFICATION FOR THE USE OF THE EXIGENT PROVISIONS OF 10 CFR 50.91

TVA believes exigent circumstances exist for this request. BWRVIP-86, BWR Integrated Surveillance Program Implementation Plan, Final Report was submitted to NRC on December 22, 2000. The December 2000 issuance of BWRVIP-86 revised the Integrated Surveillance Program test program to designate the second Browns Ferry Unit 2 RPV surveillance capsule as a representative capsule. The revised test schedule proposed withdrawal in 2007 to allow for increased fluence which is expected to provide better shift data. Approval of this request prior to March 18, 2001, the beginning of the Unit 2, Cycle 11 refueling outage, is needed to prevent the withdrawal and analysis of the second capsule at an accumulated fluence which is not expected to yield useful results.

REFERENCES

1. TVA Letter to NRC dated January 16, 2001, Browns Ferry Nuclear Plant (BFN) - Proposed Revision To The Unit 2 Reactor Pressure Vessel Material Surveillance Program [Structural Integrity Associates Report No. SIR-00-165]
2. Letter from Jack Strosnider (NRC) to Carl Terry (BWRVIP Chairman) dated May 16, 2000, BWR Integrated Surveillance Program (BWRVIP-78)
3. Letter from Carl Terry (BWRVIP Chairman) to NRC dated December 15, 2000, Project No. 704 - BWRVIP Response to NRC Request for Additional Information Regarding BWRVIP-78
4. Letter from Carl Terry (BWRVIP Chairman) to NRC dated December 22, 2000, BWRVIP-86, BWR Integrated Surveillance Program Implementation Plan
5. TVA letter to NRC dated December 15, 1998, Browns Ferry Nuclear Plant (BFN) - Units 2 and 3 - Technical Specification Change No. 393, Supplement 1 - Pressure-Temperature (P-T) Update

ENCLOSURE 2
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2

PROPOSED REVISION TO THE UNIT 2 REACTOR PRESSURE VESSEL MATERIAL SURVEILLANCE PROGRAM AND REQUEST FOR AN EXIGENT LICENSE AMENDMENT

I. AFFECTED PAGE LIST

FSAR page 4.2-16

II. MARKED-UP PAGE

See attached (Added text is indicated by ***bold italics*** font).

No weak direction specimens were included in the reactor vessel material surveillance program. All Charpy V-notch specimens were taken parallel to the direction of rolling. The majority of developmental work on radiation effects has been with longitudinal specimens. This is considered the best specimen to be used for determination of changes in transition temperature. At the low neutron fluence levels of BWR plants, no change in transverse shelf level is expected and transition temperature changes are minimal.

The specimens and neutron monitor wires were placed near core midheight adjacent to the reactor vessel wall where the neutron exposure is similar to that of the vessel wall (see Subsection 3.3). The specimens were installed at startup or just prior to full-power operation. Selected groups of specimens may be removed at intervals over the lifetime of the reactor and can be tested to compare mechanical properties with the properties of control specimens which are not irradiated. ***The current reactor vessel material surveillance program conforms to ASTM E185-82. NRC review of the surveillance program is documented by NRC Safety Evaluations dated September 20, 1999 (L44 990927 001) and [insert NRC response to this submittal].***