November 24, 2004

TVA-BFN-TS-448

10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Washington, D.C. 20555-0001

Gentlemen:

In the Matter of	)	Docket Nos. 50-260
Tennessee Valley Authority	)	50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 2 AND 3 - TECHNICAL SPECIFICATIONS (TS) CHANGE 448 – ONE-TIME FREQUENCY EXTENSION FOR CONTAINMENT INTEGRATED LEAKAGE RATE TEST (ILRT) INTERVAL – RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (TAC NOS. MC3745, MC3746)

This letter is in response to NRC's November 23, 2004, request for additional information regarding BFN TS change request 448. The proposed amendment, which was submitted on July 8, 2004, revises TS Section 5.5.12, "Primary Containment Leakage Rate Testing Program," to reflect a one-time deferral of the primary containment Type A (ILRT) test to no later than November 6, 2009, for Unit 2, and no later than October 10, 2013, for Unit 3. The NRC questions are repeated in the Enclosure along with the TVA responses for each question.

TVA has determined this additional information response does not change the determination in the July 8, 2004, TS-448 submittal that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and the Enclosure to the Alabama State Department of Public Health.

TVA is asking that this TS change be approved by February 8, 2005, and that the implementation of the revised TS be made within 30 days of NRC approval to support the Spring 2005 Unit 2 refueling outage during which the next ILRT would be required without approval of the TS change.

There are no regulatory commitments associated with this submittal. If you have any questions about this TS change, please contact me at (256)729-2636.

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 24, 2004.

Sincerely,

Original signed by

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Enclosure

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Enclosure

Browns Ferry Nuclear Plant (BFN)
Units 2 and 3

Technical Specifications (TS) Change 448

One-Time Frequency Extension for Containment Integrated Leakage Rate Test (ILRT) Interval

Response to Request for Additional Information

NRC Question 1

Results of the previous Type-A tests for Browns Ferry Nuclear Plant (BFN) Units 2 and 3 are presented in a table shown in page E1-6 of the Tennessee Valley Authority (TVA) application for amendment, dated July 8, 2004. The table appears to indicate that the November 6, 1995, Type-A test for Unit 3 registered a leak rate almost three time the leak rates measured for the other three tests for both Units 2 and 3 reported in the table. Please discuss plausible reasons for registering such large fluctuations in the above mentioned BFN Type-A test results.

TVA Response

The table on page E1-6 of the July 8, 2004, TS change 448 submittal provides the Containment Integrated Leak Rate Test (CILRT) results for the two most recent CILRT (Type A) performances on Units 2 and 3. As noted by NRC, the table shows that the November 1995 Type A test for Unit 3 reported a leak rate which was approximately three times the leak rate measured for the other three tests for Units 2 and 3.

The difference was primarily due to leakage identified at several instrument tubing compression fittings and packing leaks within the CILRT boundary. The relative magnitude of these leaks was small and did not preclude successful performance of the CILRT, so the leak locations were recorded and repairs deferred until after the completion of the CILRT and verification tests. Repairs were

subsequently performed during the containment depressurization period. Since no convenient provisions for quantifying these local leaks existed, no adjustments were made to the overall CILRT results to reflect improvements realized by these repairs. The subsequent Unit 3 CILRT, which was performed in 1998, was comparable with typical BFN Type A test results.

NRC Question 2

Referring to the last paragraph of page E1-6 of the July 8 submittal, "Appendix J Visual Inspections," discuss how the proposed one-time extension of the integrated leak rate test (ILRT) interval from 10 years to 15 years would impact the visual inspection plans originally scheduled for BFN containment. Specifically, provide a description of TVA's inservice inspection methods/plans for the additional 5-year extended period that would provide assurance that in the absence of an ILRT for 15 years, the containment structural and leak-tight integrity will be maintained.

TVA Response

The 10 CFR 50 Appendix J program requires visual inspections to be performed of accessible interior and exterior surfaces of the containment system for structural problems that may affect either the containment structural leakage integrity or performance of the Type A test. These examinations are conducted prior to initiating a Type A test and during two other refueling outages before the next Type A test to allow for early detection of evidence of structural deterioration. The examination of the primary containment structure is conducted in accordance with the schedule requirements of Regulatory Guide 1.163, "Performance-Based Containment Leak-Testing Program," dated September 1995.

Additionally, the plant instruction, which implements this examination, reflects a required frequency in accordance with American Society of Mechanical Engineers (ASME), Subsection IWE, and 10 CFR 50.55a(b)(2)(ix)(E), such that one examination is scheduled during each inspection period. Acceptance criteria are in accordance with 10 CFR 50 Appendix J and ASME Section XI, IWE-3000. These requirements will not be changed as a result of the proposed extended ILRT interval.

For Unit 2, a VT-3 examination will be conducted in accordance with Subsection IWE during the Unit 2 Cycle 14 (2007) refueling outage, which is in the third period of the first IWE inspection interval. The Unit 2 Cycle 15 (2009) refueling outage will be in the first period of the second IWE inspection interval. During this refueling outage, a General Visual examination will be performed as required prior to conducting the CILRT.

For Unit 3, a VT-3 examination will be conducted in accordance with Subsection IWE during the Unit 3 Cycle 12 (2006) and/or Cycle 13 (2008) refueling outages, which are in the third period of the first IWE inspection interval. The General Visual examination will be performed as required during the Unit 3 Cycle 14 (2010) refueling outage, which is in the first period of the second IWE interval. During the Unit 3 cycle 15 (2012) refueling outage, which is in the second period of the second IWE interval, a General Visual examination will also be performed as required prior to conducting the CILRT.

In addition to Containment Inservice Inspection (CISI) examinations described above, accessible portions of the drywell and torus surface are inspected during each refueling outage as required by Surveillance Instruction, 0-SI-4.7.A.2.K, Primary Containment Drywell Surface Visual Inspection and by Technical Instruction, 0-TI-417, Inspection of Service Level I, II, III Protective Coatings. These complement the periodic visual inspections of the interior and exterior of the containment structure and serve to provide added assurance of structural integrity between CISI examinations.

The inspections and examinations described above provide an additional degree of assurance of continued containment structural integrity in support of requested CILRT extension.

NRC Question 3

Regarding the Category E-A Examinations discussed on page E1-8 of the submittal, it is stated that the general visual examinations identified some mechanical damages such as pitting, gouges, dents, rust and arc strikes which were said to be evaluated and found acceptable. Discuss the

extent of the loss of the liner material that resulted from the observed mechanical damages and the technical basis for TVA's determination that the incurred damages were acceptable.

TVA Response

Two General Visual examinations have been conducted on each unit. There was no significant metal loss in areas where dents, rust, and arc strikes were noted. These conditions were not considered evidence of degradation that could affect containment structural integrity or leak tightness described in IWE-3500.1, and were addressed in the plant's 10 CFR 50 Appendix B corrective action program.

There were two conditions noted in General Visual examinations that had the potential to exceed the acceptance standards of IWE-3500. These involved pitting and gouges. Areas of pitting have been identified in the liner in the moisture seal barrier (MSB) region on both units. This pitting was found in the liner immediately above and below the seal where the seal was removed for replacement, and can be characterized as localized and sporadic pitting with pit depths ranging from less than 1/64 inches to 3/32 inches. Ultrasonic thickness (UT) readings were obtained and used to evaluate the condition of the liner in these areas. This minor surface pitting was determined not to affect the structural integrity or leak tightness of the containment vessel. The thickness of the liner in this area is greater than the minimum required thickness of 1 inch as documented in plant calculations.

A Notice of Indication was initiated during the performance of the General Visual examination during the Unit 3 Cycle 10 (2002) refueling outage when several gouges in the Unit 3 drywell liner were identified. Six gouges of varying depths were found in the Unit 3 liner at reactor building elevation 590'. It was determined these gouges were mechanical damage caused by a failed ventilation duct. The gouges were blended-out and the base metal re-coated. The remaining liner thicknesses in all but one location were greater than 90% of the nominal liner thickness. The one location that contained the deepest gouge resulted in a minimum wall thickness of 0.723 inches after the discontinuity was removed by buffing. The resulting shell thickness of 0.723 inches is slightly below 90% of the nominal thickness, which is 0.7425 inches. Engineering

reviewed the results of the VT-3 and UT examinations performed after the discontinuity was removed and concluded the underthickness was acceptable based on the allowances in ASME Section III as documented in plant calculations.

NRC Question 4

With respect to the Category E-C Examinations discussed in the first paragraph of page E1-9 of the submittal, it is indicated that VT-1 visual examinations of the interior surfaces of Units 2 and 3 torus waterline region (elevation 536' to elevation 538') identified minor localized corrosion and pitting and these degradations were evaluated to be acceptable. Discuss the extent of the loss of material that were associated with the localized corrosion and pitting observed and the technical basis for TVA's determination that the observed containment shell degradation was acceptable.

TVA Response

The extent of material loss associated with the localized corrosion and pitting observed is not significant. The most recent VT-1 examination data obtained during Unit 3 Cycle 11 (2004) outage showed small indications characterized as scratches sporadically throughout the waterline region both above and below the waterline. These indications exhibited rust bleed through and were 1/4 inches to 1/2 inches in length with virtually no metal loss (≤1/64 inches in depth). These isolated areas of pinpoint rusting and minor localized corrosion did not represent any appreciable metal loss. Most metal loss in the waterline region due to pitting is less than 3 mils, with no areas of pitting or metal loss greater than 20 mils in depth. On Unit 2, indications were found ranging from discoloration to minor localized corrosion. The condition of the base metal ranges from no oxidation to localized minor surface pitting. Most metal loss in waterline region due to pitting is less than 4 mils, with no areas of pitting or metal loss greater than 20 mils in depth. The waterline region is coated.

There were no signs of flaking, peeling, blistering, cracking or other signs of distress indicative of structural degradation found on Unit 2 or 3. The conditions noted were not considered to be defective

conditions with respect to the acceptance criteria of IWE-3512.1.

NRC Question 5

Referring to the Category E-D Examinations (Seals, Gaskets, and Moisture Barriers) discussed on page E1-9 of the submittal, discuss past BFN operating experience regarding the results of the VT-3 visual examinations of seals, gaskets and moisture barriers implemented once each inspection interval. Also, describe the extent of defects found regarding BFN's moisture seal barrier and the defective portions replaced. Considering the defects found in BFN containment's moisture barriers and its implication upon the affected liner degradation, discuss the potential negative impact of the proposed one-time ILRT interval extension upon TVA's continued ability to timely identify and dispose containment degradation and reasonably assure the leak-tightness and structural integrity of the BFN containment.

TVA Response

Prior to approval of Relief Request CISI-1, BFN conducted VT-3 examinations of seals and gaskets as required by IWE-3513.1 during the first IWE Interval. These inspections noted various defects ranging from rust, pinches, and depressions of the o-rings; none of which resulted in a failure to meet containment leak rate requirements. Following approval of Relief Request CISI-1, the only remaining Category E-D examination is the MSB. The MSB is inspected once each operating cycle by either the CISI program or plant surveillance instruction 0-SI-4.7.A.2.K.

Defects noted in the seal have ranged from wear, mechanical damage, punctures, age-related separation of the old seal, to separation of the new seal from the liner due to application problems. When defects in the seal are noted that require repair, the affected portion of the seal is removed and the liner inspected. Previous visual examinations of the liner in the area beneath the MSB have uncovered some random areas of surface pitting in the area immediately above the seal and continuing below the seal. The pitting can be characterized as localized with pit depths ranging from less than 1/64 inches to approximately 3/32 inches in depth.

Improved MSB application techniques have been subsequently incorporated and no seal defects were noted during the Unit 3 Cycle 11 (2004) refueling outage, which indicates these improved methods of preparing the surfaces for re-application of the seal have been effective. The improved performance of the MSB will prevent water from entering the concrete to steel interface and should preclude further pitting in these areas.

The routine scheduled inspections of the MSB each outage by either the CISI program or surveillance instruction 0-SI-4.7.A.2.K is unaffected by the proposed one-time CILRT interval extension. These routine inspections will identify any seal degradation and evaluate the effect on the liner. These periodic inspections will continue to provide the ability to identify and evaluate containment degradation in a timely manner, and reasonably assure that the leak-tightness and structural integrity of the BFN containment is maintained. Therefore, the proposed one-time CILRT interval extension will not adversely affect the ability to promptly identify and address degradation in these areas.

NRC Question 6

With respect to the Generic Letter 87-05 Inspections discussed on page E1-10 of the submittal, TVA stated that no significant corrosion had occurred in the sand region but there has been evidence of water leaking from the sand bed drains on both Units 2 and 3 since the 1987 inspections. Discuss the results of the ultrasonic testing thickness measurements at the sand bed region performed in September 1998 for Unit 3 and April 1999 for Unit 2, including the extent of liner thickness reductions observed and the basis for TVA's determination that the inspections verified the integrity of the liner. Also, considering the extent of the liner degradation found, discuss the potential negative impact of the proposed one-time ILRT interval extension upon TVA's continued ability to timely identify and dispose containment degradation and reasonably assure the leak-tightness and structural integrity of the BFN containment.

TVA Response

UT examinations in 1998 on Unit 3 and in 1999 for Unit 2 indicated no significant corrosion has occurred in the sand bed region. The UT examinations conducted were from the floor to the horizontal weld between the first and second courses of drywell plates. The drywell floor is at elevation 549.92' and the sand bed region extends from elevation 548.79' to 550.29'; therefore, approximately 0.37' of the sand bed region extends above the floor. Minor localized surface pitting has been observed in this area and in the liner immediately below the MSB. This localized pitting does not affect the structural integrity or leak tightness of the containment vessel. The thickness of the liner in this area is greater than the minimum required thickness of 1 inch as documented in plant calculations. In addition, when portions of the moisture seal barrier are removed for repair, the liner surfaces below the MSB are accessible for inspection.

Damaged or defective portions of the MSB have been replaced to provide an appropriate level of protection from moisture intrusion in the area below the seal. There has been no evidence of propagation of iron oxide to the concrete surface noted that would be indicative of liner corrosion below the concrete and there is no significant thinning of the liner in this region.

Routine inspections are of the sand bed region are conducted by either the CISI program, the coatings program in procedure 0-TI-417, and surveillance instruction 0-SI-4.7.A.2.K, which will not be affected by the proposed CILRT request. Hence, these routine inspections will continue to identify any degradation and evaluate the effect on the liner. These inspections continue to provide the ability to timely identify and evaluate containment degradation and reasonably assure the leak-tightness and structural integrity of the BFN containment is maintained. Therefore, the proposed one-time ILRT interval extension will not affect the ability to promptly detect and address degradation in these areas.

NRC Question 7

Discuss BFN's past operating experience regarding its use of the monitoring of the nitrogen makeup to containment as a complimentary means for assuring the leak tightness and

structural integrity of the BFN containment. Discuss why the use of this supplementary approach strengthens TVA's case for requesting a one-time extension of the BFN containment's ILRT interval.

TVA Response

During plant operation, the BFN containment is inerted with nitrogen. Drywell pressure is maintained (per a TS requirement) in the range of 1.1 to 1.35 psid positive pressure with respect to the suppression pool (torus) and consequently positive with respect to the outside atmosphere. The torus air space pressure is typically slightly positive with respect to atmosphere (about .1 psig). Although normal operating pressures in the drywell and torus atmosphere are less than that resulting from a Design Basis Accident, the fact that the containment is pressurized provides a reliable means of verifying that no large leak paths exist in the containment structure. Specifically, any substantial containment leak path will result operational difficulties in maintaining positive pressure in the containment and the condition will manifest itself in an excessive nitrogen make-up rate.

Monitoring for containment leakage is accomplished by monitoring the average daily nitrogen consumption used by the containment inerting system and is determined daily by the performance of surveillance instruction, SI-4.7.A.2.a, Primary Containment Nitrogen Consumption and Leakage. Significant containment leakage would be identified through increased nitrogen usage needed to maintain the required TS pressure, and would be investigated promptly and addressed within the scope of the plant Corrective Action Program.

Excess nitrogen consumption will also be observed if the nitrogen supply system external to the containment is not tight. There is recent operating experience following a refueling outage where excess nitrogen make-up use was documented and promptly investigated, which was then determined to be have been caused by supply side leaks. This demonstrated the efficacy of the plant Corrective Action Program in flagging excess nitrogen use and investigating the cause. Therefore, the nitrogen make-up monitoring procedure supports TVA's case for a one-time extension of the ILRT interval in that it provides an additional means of identifying conditions that would be

indicative of containment leakage, and that corrective action would be initiated in a timely manner.

NRC Question 8

Inspections of some reinforced concrete and steel containment structures have identified degradation on the uninspectable (embedded) side of the drywell steel shell and steel liner of the primary containment. These degradations cannot be found by visual (i.e., VT-1 or VT-3) examinations unless they are through the thickness of the shell or liner, or when 100 percent of the uninspectable surfaces are periodically examined by ultrasonic testing. Provide additional information addressing how these undetected potential leakages under high pressure during core-damage accidents are factored into the risk assessment implemented for justifying the proposed one-time ILRT interval extension.

TVA Response

Enclosure 3 of the July 8, 2004, submittal contains the risk assessment calculation, NDN0-06402004-0005, "Risk Assessment for Integrated Leak Rate Test (ILRT) Extension", which supports the ILRT extension request. In Section 6.11 of the calculation, an assessment of the potential impact on Large Early Release Fraction due to age-related degradation of non-inspectable areas of the containment is presented. The analysis in section 6.11 uses the quantitative approach used by other industry plants (e.g., Dresden). The industry data set and methodology were used to determine the corrosion induced non-detectible containment leakage probabilities used in the section 6.11 assessment. As discussed in the responses to questions #3, #4, and #6 above, BFN has not experienced any degradation of the steel shell and liner of primary containment which would affect the structural integrity or the leak tightness of the containment vessel, therefore, the use of the industry data set for BFN is judged to be both appropriate and conservative.