May 18, 2005

10 CFR 54

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop: OWFN P1-35
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of	)	Docket Nos. 50-259
Tennessee Valley Authority	)	50-260
		50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 1, 2, AND 3 - LICENSE RENEWAL APPLICATION (LRA) – RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION CONCERNING THE UNIT 1 LAYUP PROGRAM (TAC NOS. MC1704, MC1705, AND MC1706)

By letter dated December 31, 2003, TVA submitted, for NRC review, an application pursuant to 10 CFR 54, to renew the operating licenses for the Browns Ferry Nuclear Plant, Units 1, 2, and 3. As part of its review of TVA's LRA, the NRC staff, through an informal request on March 29, 2005, requested additional information concerning the Unit 1 Layup Program.

This letter addresses concerns in the following areas: follow-up to RAI 3.0-9 LP, follow-up to RAI 3.0-10 LP, and water chemistry in the lay-up program at Browns Ferry. The remainder of the concerns will be addressed in separate correspondence currently scheduled to be submitted on May 27, 2005.

The enclosure to this letter contains the specific NRC request(s) for additional information and the corresponding TVA response(s).

If you have any questions regarding this information, please contact Ken Brune, Browns Ferry License Renewal Project Manager, at (423) 751-8421.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 18th day of May, 2005.

Sincerely,

Original signed by:

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cc: See page 3

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cc: continued page 4

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s://Licensing/Lic/BFN LR Clarification on Unit 1 Layup Program.doc

ENCLOSURE

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA),

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI), CONCERNING THE UNIT 1 LAYUP PROGRAM:

FOLLOW-UP TO RAI 3.0-9 LP, FOLLOW-UP TO RAI 3.0-10 LP, AND WATER CHEMISTRY IN THE LAY-UP PROGRAM AT BROWNS FERRY

(SEE ATTACHED)

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA),

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI), CONCERNING THE UNIT 1 LAYUP PROGRAM:

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NRC Follow-Up to RAI 3.0-9 LP

The applicant's response to RAI 3.0-9 LP states that Appendix F did not include all piping and components that will be replaced prior to startup. As a result, LPA Appendix F can not be used as a means to distinguish between sections of piping systems and components that have been replaced and those that have not been replaced. Although the response to RAI 3.0-9 LP identifies examples of piping systems and components that have been replaced, the staff is unable to identify specific components that have not been replaced and were subject to layup conditions. Further, the scope and results of sample inspections, including the sampling basis have not been identified, including components not subject to Section XI or VIP inspections. To identify the scope and condition of such components, the applicant should identify the sampling basis and inspection results for piping systems and components subject to layup conditions that have not been replaced. (Alternatively, the project team may perform a review of sample inspection results for a sampling of systems and component.)

TVA Response to Follow-Up to RAI 3.0-9 LP

As discussed in the LRA, a large amount of piping both inside the drywell and in the reactor building has been replaced in Unit 1; however, the majority of the piping has been inspected and determined to be acceptable for operation without replacement. The following table outlines the examination performed to verify acceptability of the existing piping which was not replaced. The inspections were performed with either ultrasonic testing (UT) for thickness or UT shear waves for welds. In addition to the examination of piping segments, the inspection of welds would include a piping area on either side of the weld. Except as noted in the table, the piping was in a dry layup condition. The location of the inspections was based upon identifying areas where water may have accumulated if the layup process was not successful (i.e., low places) or where engineering judgment indicated that service induced wear may have occurred. All piping was found to have wall thickness in excess of manufacturer's minimum nominal (i.e., >87.5% of nominal).

NDE EXAMINATIONS PERFORMED FOR ORIGINAL, NON-REPLACED PIPING (sheet 1 of 3)

SYSTEM	LR DRAWING	LOCATIONS	TYPE EXAM	COMMENTS
RHRSW (A&C loops in tunnels)	1-47E858-1-LR	8 piping areas	UT thickness	Scanned grid blocks at susceptible areas [1]
Drywell Liner		4 areas	UT thickness	Maintenance activity scheduled every 3 years during lay-up period
Fire Protection	1-47E850-5-LR	41 piping areas (~200 feet of pipe)	UT thickness	Scanned circumference of pipe at susceptible areas [2]
EECW[3]	1-47E859-1-LR	3 piping areas	UT thickness	Scanned grid blocks at susceptible areas [1]
		~30 feet of dead leg pipe	UT thickness	Scanned grid blocks at approximate 1 foot intervals [2]
RCW[3]	1-47E844-2 LR	~60 feet of dead leg pipe	UT thickness	Scanned grid blocks at approximate 1 foot intervals [2]
CRD	1-47E820-2-LR	6 welds	UT shear wave and surface exam	
	1-47E820-6-LR	6 welds	UT shear wave and surface exam	
CORE SPRAY	1-47E814-1-LR	14 welds	UT shear wave and surface exam	

NDE EXAMINATIONS PERFORMED FOR ORIGINAL, NON-REPLACED PIPING (sheet 2 of 3)

SYSTEM	LR DRAWING	LOCATIONS	TYPE EXAM	COMMENTS
FEEDWATER	1-47E803-1-LR	27 welds	UT shear wave and surface exam	
		17 piping areas	UT thickness	Scanned grid blocks at susceptible areas [1]
HPCI	1-47E812-1-LR	20 welds	UT shear wave and surface exam	
	1-47E813-1-LR	4 piping areas	UT thickness	Scanned grid blocks at susceptible areas[1]
MAIN STEAM	1-47E801-1-LR	58 welds	UT shear wave and surface exam	
		34 piping areas	UT thickness	Scanned grid blocks at susceptible areas[1]
RCIC	1-47E813-1-LR	8 welds	UT shear wave and surface exam	
		6 piping areas	UT thickness	Scanned grid blocks at susceptible areas[1]
RHR	1-47E811-1-LR	35 welds	UT shear wave and surface exam	
RBCCW[3]	1-47E822-1-LR	1 Weld	UT shear wave and surface exam	

NDE EXAMINATIONS PERFORMED FOR ORIGINAL, NON-REPLACED PIPING (sheet 3 of 3)

Notes:

1. The piping was laid out with 4” x 4” grid blocks around the circumference of the pipe. Thickness readings correspond to the lowest reading taken in each grid block.
2. The piping was scanned around the entire circumference. Thickness readings correspond to the lowest reading taken around the circumference. Readings taken at approximate 1 foot intervals.
3. The majority of this system was in service with water flow in the system during the layup period.

NRC CONCERN – Follow-Up to RAI 3.0-10 LP

In the response provided by the applicant to RAI 3.0-10 LP, the staff's concerns relevant to MIC were not addressed. Staff is concerned that various corrosion mechanisms that would not be active during operation often appear during lay-up as water chemistry controls may not be as stringent, particularly in stagnant areas. Industry documents such as EPRI NP-5580, Sourcebook for Microbiologically Influenced Corrosion in Nuclear Power Plants, indicate that additions of corrosion inhibitors and biocides made after lay-up are unlikely to be effective as distribution throughout the system is limited. EPRI NP-5580 also indicates that proper attention to lay-up is crucial to avoid MIC and during lay-up, microbial growth may proceed unimpeded as fluid forces that remove attached organisms from pipe or vessel surfaces are absent. Staff is also concerned that corrosion mechanisms that were not active during dry lay up, may become active when the systems are wetted and returned to operation. To complete its review, the staff requires additional information requested in RAI 3.0-10 LP on inspections performed or planned to determine that MIC is not a concern for systems subject to conditions that promote MIC.

TVA Response to Follow-Up to RAI 3.0-10 LP

MIC is a corrosion concern for raw water piping. As a part of the Generic Letter 89-13 raw water chemical treatment program, Browns Ferry treats the Raw Cooling Water (RCW), Raw Service Water (RSW), Emergency Equipment Cooling Water (EECW), and Residual Heat Removal Service Water (RHRSW) raw water systems for MIC. The primary method used for MIC control is routine injections of biocides (i.e., sodium bromide / sodium hypochlorite or glutaraldehyde). This treatment method, which began in 1995, is currently being used on all three units and has been shown to be effective in controlling MIC on in-service raw water piping.

For Browns Ferry Unit 1, the raw water piping systems were inspected and evaluated. Piping that has unacceptable wall thickness is being replaced. A portion of the Unit 1 raw water piping (main headers) was in operation (i.e., non-stagnant conditions) during the Unit 1 layup period and thus was receiving treatment for the prevention of MIC. The majority of the raw water piping was in a dry layup condition and has been inspected and found to have adequate wall thickness with two exceptions:

- Even though the RHRSW system Loop I was drained, it still had moisture inside the system due to being connected to

the river via underground piping. The portion of this loop inside the reactor building required replacement due to inadequate wall thickness.

- Similarly, approximately 3000 feet of large and small bore RCW piping requires replacement due to inadequate wall thickness.

NRC RAI Water Chemistry in Lay-Up Program in Browns Ferry, (1)

The applicant's response to the staff's RAI states that the components in the wet lay-up are maintained with an internal environment of flowing, air saturated, demineralized water. As is specified in Section 3.8 of the CI-13.1 chemistry program for Browns Ferry, there are several methods for treating water in different systems listed in this section. However, the applicants response to RAIs states that all the components in the wet lay-up program are maintained only in the environment of treated reactor water. Are there any systems with differently treated water which should be included in the wet lay-up program? If such systems exist, specify them and provide their description.

TVA Response to RAI Water Chemistry in Lay-Up Program in Browns Ferry, (1)

No. There were no other systems in wet lay-up other than treated reactor water for the reactor pressure vessel (RPV) / RWCU / CRD. The Unit 1 Fuel Pool Cooling, RBCCW, RCW, EECW, RHR / RHRSW Loop II and Torus systems were used to support Unit 1 (and/or the other two units) and, therefore, were not in wet lay-up.

NRC RAI Water Chemistry in Lay-Up Program in Browns Ferry, (2)

In the response to the staff's RAI, the applicant stated that the conductivity and the chemistry control limits for chloride and sulfate in the lay-up program are the same as those for cold shutdown conditions in the CI-13.1 chemistry program which is more restrictive than the corresponding values in the EPRI BWR Water Chemistry Guidelines. However, it was not specified to what extent it applies to other chemistry parameters like dissolved oxygen, copper iron, etc. Since a considerable difference exists between lay-up and cold shutdown exposure times even a small difference in these less significant chemistry parameters may introduce significant difference in aging of the components. This issue was not addressed in the applicant's submittals.

TVA Response to RAI Water Chemistry in Lay-Up Program in Browns Ferry, (2)

Under Cold Shutdown and wet lay-up conditions, reactor water is normally air-saturated with the dissolved oxygen concentration up to 8 ppm. The main sources of copper and iron input to the RPV are from feedwater. Since Unit 1 has not been operating (i.e., has had no feedwater flow), copper and iron inputs to the RPV are very low. Copper and iron are not parameters related to initiation or propagation of IGSCC in stainless steel.

From an IGSCC standpoint, the "within limit" chemistry parameters (conductivity, chloride and sulfate) given in the EPRI BWR Water Chemistry Guidelines and CI-13.1 are not time dependant. Since the IGSCC-related parameters (chloride and sulfate concentrations) are controlled at low levels and the temperature is less than 120 degrees F, there are no IGSCC concerns under these conditions and there is no dependence on exposure times (whether 10 years, 20 years or longer). As a related example, Fuel Pool systems operate under very similar chemistry and temperature conditions as the RPV in Cold Shutdown or wet lay-up conditions for much longer periods of time (i.e., the Fuel Pool systems were originally designed for 40 years and have been license renewed for 20 additional years for a total of 60 years) with no IGSCC concerns related to aging.