



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

ACRSR-2159

October 19, 2005

Mr. Luis A. Reyes
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: INTERIM REPORT ON THE SAFETY ASPECTS OF THE LICENSE RENEWAL APPLICATION FOR THE BROWNS FERRY NUCLEAR PLANT UNITS 1, 2, AND 3

Dear Mr. Reyes:

During the 526th meeting of the Advisory Committee on Reactor Safeguards, October 6-7, 2005, we reviewed the license renewal application (LRA) for the Browns Ferry Nuclear Plant (BFN) Units 1, 2, and 3, and the associated Safety Evaluation Report (SER) with open items prepared by the NRC staff. On August 23, 2005 we visited the Browns Ferry site and reviewed activities under way for license renewal, power uprate, and restart. Our Plant Operations and Plant License Renewal Subcommittees also reviewed these matters on September 21, 2005. Our Plant License Renewal Subcommittee reviewed the LRA and the staff's associated SER on October 5, 2005. During these reviews, we had the benefit of discussions with representatives of the NRC staff, including Region II personnel, and the Tennessee Valley Authority (TVA). We also had the benefit of the documents referenced.

CONCLUSIONS AND RECOMMENDATIONS

1. We agree with the open items identified by the staff and concur with the staff's interim evaluation of the LRA for BFN Units 2 and 3.
2. The plant-specific operating experience for BFN Unit 1, by itself, does not fully meet the intent of the license renewal rule. In addition, many components have been subjected to an extended period of layup that is unusual in plant experience. The SER documents in several places how the applicant plans to compensate for the lack of plant-specific operating experience. The final SER should include a cohesive discussion of the applicability of BFN Units 2 and 3 operating experience to Unit 1 and the compensating actions taken where such experience is not sufficient.
3. The final SER should include a description of the attributes of the new Periodic Inspection Program for BFN Unit 1 components that will not be replaced before restart.
4. If the extended power uprate (EPU) is implemented, the staff should require that TVA evaluate Units 1, 2, and 3 operating experience at the uprated power level and incorporate lessons learned into their aging management programs prior to entering the period of extended operation.

BACKGROUND

TVA has requested renewal of the BFN Units 1, 2, and 3 operating licenses for 20 years beyond their current license terms, which expire on December 10, 2013, June 28, 2014, and July 2, 2016, respectively.

All three BFN units are General Electric boiling water reactors (BWR 4) with Mark I containments. Units 1 and 2 commenced operation in 1973 and 1974 respectively, and were both shut down after the March 22, 1975 fire in Unit 1. Both units were returned to service in 1976, the same year Unit 3 commenced operation. All three units operated until 1985, when they were shut down to address management, technical, and regulatory issues. Units 2 and 3 were restarted in 1991 and 1995 respectively, and have been in operation since then. Unit 1 has been shut down since 1985. The approximate durations of power operation of the three units are 10 years for Unit 1, 23 years for Unit 2, and 18 years for Unit 3. TVA plans to restart Unit 1 in 2007. As part of an extensive restart program for Unit 1, components that have been in different states of "layup" for the past 20 years will be either replaced or requalified. Layup provides a controlled environment intended to limit corrosion of plant components.

In addition to license renewal, TVA is requesting power uprates for the three units. The original power rating of the three units was 3293 MWt. Units 2 and 3 have been uprated to their current power level of 3458 MWt. TVA is implementing physical modifications in Unit 1 to support an EPU of 20%, which TVA plans to implement at restart. This will raise the Unit 1 power level to 3952 MWt. Units 2 and 3 will then be uprated to the same power level as Unit 1. However, the license renewal application is based on the current power levels, since the planned EPUs are separate licensing actions which have not yet been approved.

DISCUSSION

The multiple licensing actions involved in the implementation of TVA's strategy for BFN make this LRA more complex than usual. These actions include license renewal and EPU for all three units as well as restarting Unit 1 as the lead plant at the highest power level after having been idle for 22 years. The SER discusses the work done by the applicant on these multiple licensing actions; however, its focus is on the LRA.

We agree with the staff's interim evaluation of the LRA for BFN Units 2 and 3. We have some issues with those portions of the LRA and the SER for Unit 1.

The intent of the license renewal rule is that plants applying for license renewal accumulate substantial operating experience to disclose any plant-specific concerns with regard to age-related degradation and to ensure that the aging management programs instituted to manage aging during the license renewal period will adequately address such concerns. The Statement of Considerations of the rule clearly sets forth this intent and states that 20 years is an appropriate operating period to support license renewal. Exceptions to the 20-year time limit for filing license renewal applications have been granted, but not to the intent of the rule that substantial plant-specific operating experience be available. BFN Unit 1 does not have the substantial operating experience intended by the rule. Therefore, the applicant has relied on the BFN Units 2 and 3 operating experience, plus generic operating experience from plants of similar designs, to provide the operating experience intended by the rule.

By the time BFN Unit 1 enters the period of extended operation, the plant will have experienced 10 years of early operation, 22 years in layup conditions, major equipment replacement and requalifications to support restart, a planned EPU to 3952 MWt, and six years of operation at this new power level. It is not clear how representative the current operating experience of Units 2 and 3 is of the Unit 1 operating history. The application acknowledges this on page B-4: "During the performance of the Aging Management Review activities, there was recognition that the operating experience on Unit 1 may not be the same as the operating experience on Units 2 and 3 due to the layup program implemented on Unit 1 during its extended outage."

In several places in the SER, the staff documents how the applicant plans to compensate for the lack of plant-specific operating experience. Examples include a commitment to perform periodic inspections of components that were in layup and have been requalified without replacement, and use of Unit 3 layup experience that appears applicable to Unit 1. However, the SER does not provide a cohesive discussion of the applicability of Units 2 and 3 operating experience to Unit 1 and of the compensating actions taken where such experience is not sufficient. Without such discussion, it is not clear that the issue has been consistently recognized and evaluated.

Section 3.7 of the SER documents the staff's aging management review of Unit 1 systems that were in layup for extended outage. This section identifies several instances of deficient layup conditions during the early phase of the extended outage and raises the possibility of potential latent effects that may result in accelerated aging once the plant restarts and operates at power. In the application, the applicant proposed to perform one-time inspections of systems in layup before plant restart to address this issue. The staff concludes that these restart inspections, whose purpose is to assess conditions of components in layup prior to restart, are not equivalent to the one-time inspections used in license renewal to confirm the absence of significant degradation in areas of expected low susceptibility, but not usually subject to inspection. Furthermore, the staff concludes that for portions of Unit 1 systems that have not been replaced, there is insufficient operating history or data to conclude that one-time inspections are appropriate substitutes for periodic inspections.

In response to these concerns raised by the staff, the applicant has agreed to perform periodic inspections of certain Unit 1 systems that were kept in layup during the extended outage and will not be replaced. Restart inspections will still be performed and will provide a baseline for comparison with the subsequent periodic inspections. During our meetings, the applicant stated that targeted locations will be subjected to at least three inspections, one prior to startup, one prior to entering the period of extended operation, and one during the license renewal period. The frequency of subsequent inspections would be determined based on the results of these inspections.

We agree with the staff that periodic inspections of systems and components that were not replaced are appropriate and necessary. However, it is not clear which systems will be included in the scope of the periodic inspection program. For example, in Section 3.7 of the SER, the staff agrees with the applicant's proposal to perform only a one-time inspection of the high-pressure coolant injection system and the containment system prior to Unit 1 restart.

No further attributes of this future program have been provided in the SER. The main attributes of the program, including the intended scope, need to be defined in the final SER. Periodic inspections are the most significant compensating actions for the lack of plant-specific operating experience of BFN Unit 1. It is not possible to judge the adequacy of this important program since insufficient information has been provided. As a result of our review, the staff elevated this issue from a confirmatory item to an open item and requested the applicant to provide details of the periodic inspection program prior to issuance of the final SER.

Some restart inspections continue to be referred to as "one-time" inspections. "One-time" inspections have a specific intent and meaning when performed for license renewal purposes. To avoid confusion, the term "one-time" inspection should be used only for license-renewal-related inspections.

According to current plans, all three BFN units will be subjected to an EPU that will raise their power output to 3952 MWt prior to entering the period of extended operation. However, the license renewal application and the associated SER reflect operating experience only at the

current power level. If this EPU is implemented, the staff should require that, prior to entering the period of extended operation, TVA conduct an evaluation of operating experience of BFN Units 1, 2, and 3 at the EPU level and incorporate lessons learned into their aging management programs.

Sincerely,

/RA/

William J. Shack
Acting Chairman

References:

5. Tennessee Valley Authority, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - Application for Renewed Operating Licenses," December 31, 2003
6. Tennessee Valley Authority, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - January 28, 2004 Meeting Follow-Up - Additional Information," February 19, 2004
7. U.S. Nuclear Regulatory Commission, "Safety Evaluation Report with Open Items Related to the License Renewal of the Browns Ferry Nuclear Plant, Units 1, 2, and 3," August 2005
8. Brookhaven National Laboratory, "Audit and Review Report for Plant Aging Management Programs (AMPs) and Aging Management Reviews (AMRs), Browns Ferry Nuclear Plant Units 1, 2, and 3," April 26, 2005
9. U.S. Nuclear Regulatory Commission, "Browns Ferry Nuclear Plant - Inspection Report 05000259/2004012, 05000260/2004012, and 05000296/2004012," January 27, 2005
10. U.S. Nuclear Regulatory Commission, "10 CFR Parts 2, 50, 54, and 140, Nuclear Power Plant License Renewal," *Federal Register*, Vol. 54, No. 240, December 13, 1991, pp. 64943-64980
11. U.S. Nuclear Regulatory Commission, "10 CFR Parts 2, 51, and 54, Nuclear Power Plant License Renewal; Revisions," *Federal Register*, Vol. 60, No. 88, May 8, 1995, pp. 22461-22495

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12. Tennessee Valley Authority, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - Application for Renewed Operating Licenses," December 31, 2003
13. Tennessee Valley Authority, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - January 28, 2004 Meeting Follow-Up - Additional Information," February 19, 2004
14. U.S. Nuclear Regulatory Commission, "Safety Evaluation Report with Open Items Related to the License Renewal of the Browns Ferry Nuclear Plant, Units 1, 2, and 3," August 2005
15. Brookhaven National Laboratory, "Audit and Review Report for Plant Aging Management Programs (AMPs) and Aging Management Reviews (AMRs), Browns Ferry Nuclear Plant Units 1, 2, and 3," April 26, 2005
16. U.S. Nuclear Regulatory Commission, "Browns Ferry Nuclear Plant - Inspection Report 05000259/2004012, 05000260/2004012, and 05000296/2004012," January 27, 2005
17. U.S. Nuclear Regulatory Commission, "10 CFR Parts 2, 50, 54, and 140, Nuclear Power Plant License Renewal," *Federal Register*, Vol. 54, No. 240, December 13, 1991, pp. 64943-64980
18. U.S. Nuclear Regulatory Commission, "10 CFR Parts 2, 51, and 54, Nuclear Power Plant License Renewal; Revisions," *Federal Register*, Vol. 60, No. 88, May 8, 1995, pp. 22461-22495

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