NUREG-1843
Supplement 1

Safety Evaluation Report
Related to the License Renewal of the Browns Ferry Nuclear Plant, Units 1, 2, and 3

Docket Nos. 50-259, 50-260, and 50-296

Tennessee Valley Authority

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555-0001

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Prepared by
Y. Diaz-Sanabria and R. Subbaratnam

Division of License Renewal
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
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ABSTRACT

This document is a supplemental safety evaluation report (SSER) on the application for license renewal for the Browns Ferry Nuclear Plant (BFN), as filed by Tennessee Valley Authority (TVA or the applicant). By letter dated December 31, 2003, TVA submitted its application to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for renewal of the BFN operating licenses for an additional 20 years. The NRC staff (the staff) issued a safety evaluation report (SER), dated January 12, 2006, which summarizes the results of its safety review of the renewal application for compliance with the requirements of Title 10, Part 54, of the *Code of Federal Regulations*, (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

During the 530th full committee meeting of the Advisory Committee on Reactor Safeguards, March 9, 2006, the Committee reviewed the license renewal application (LRA) for BFN Units 1, 2, and 3. The staff had closed the open items with a commitment to issue a supplemental safety evaluation report (SSER) that addresses the Committee's review comments on the SER. This SSER addresses the Committee's concerns and includes revisions and enhancements to the following aging management programs (AMPs): (1) Unit 1 Periodic Inspection Program (B.2.1.42), (2) ASME Section XI Subsection IWE Program (B.2.1.32), and (3) Open-Cycle Cooling Water System Program (B.2.1.17). This supplement also addresses the Committee's other concerns as documented in its final letter report dated March 23, 2006.

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[1] The numbering of the sections listed in this NUREG supplement is based on the numbering of the corresponding chapters and sections in NUREG-1843.

ABBREVIATIONS

ACI	American Concrete Institute
ACRS	*Advisory Committee on Reactor Safeguards*
AHC	access hole cover
AMP	aging management program
AMR	aging management review
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	anticipated transient without scram
BFN	Browns Ferry Nuclear Plant
BWR	boiling water reactor
BWRVIP	Boiling Water Reactor Vessel and Internals Project
CCW	condensate circulating water
CFR	*Code of Federal Regulations*
CLB	current licensing basis
CRD	control rod drive
EECW	emergency equipment cooling water
EPRI	Electric Power Research Institute
EPU	extended power uprate
EQ	environmental qualification
FAC	flow-accelerated corrosion
F_{en}	environmental fatigue life correction factor
FERC	Federal Energy Regulatory Commission
GALL	Generic Aging Lessons Learned Report
GL	generic letter
IGSCC	intergranular stress corrosion cracking
IRM	intermediate range monitor
ISP	Integrated Surveillance Program
LPRM	local power range monitor
LRA	license renewal application
LTOP	low temperature over-pressure
MIC	microbiologically influenced corrosion
NDE	nondestructive examination
NRC	U.S. Nuclear Regulatory Commission
NUREG	NRC technical report designation (Nuclear Regulatory Commission)
OCCW	open-cycle cooling water
RAI	request for additional information
RHRSW	residual heat removal service water

RPV	reactor pressure vessel
RPVII	reactor pressure vessel internals inspection
RWCU	reactor water cleanup
SC	structure and component
SER	Safety Evaluation Report
SRP-LR	Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants
SRV	safety relief valve
SSC	system, structure, and component
SSER	supplemental safety evaluation report
TLAA	time-limited aging analysis
TS	technical specification
TVA	Tennessee Valley Authority
UFSAR	updated final safety analysis report
UT	ultrasonic testing

SECTION 1

INTRODUCTION AND GENERAL DISCUSSION

This document is a supplemental safety evaluation report (SSER) on the application for license renewal for the Browns Ferry Nuclear Plant (BFN), as filed by Tennessee Valley Authority (TVA or the applicant). By letter dated December 31, 2003, TVA submitted its application to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for renewal of the BFN operating licenses for an additional 20 years. The NRC staff (the staff) issued a safety evaluation report (SER), dated January 12, 2006, which summarizes the results of its safety review of the renewal application for compliance with the requirements of Title 10, Part 54, of the *Code of Federal Regulations*, (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

During the 530th full committee meeting of the Advisory Committee on Reactor Safeguards, March 9, 2006, the Committee reviewed the license renewal application (LRA) for BFN Units 1, 2, and 3. The staff had closed the open items with a commitment to issue a supplemental safety evaluation report (SSER) that addresses the Committee's review comments on the SER. This SSER addresses the Committee's concerns and includes revisions and enhancements to the following aging management programs (AMPs): (1) Unit 1 Periodic Inspection Program (B.2.1.42), (2) ASME Section XI Subsection IWE Program (B.2.1.32), and (3) Open-Cycle Cooling Water System Program (B.2.1.17). This supplement also addresses the Committee's other concerns as documented in its final letter report dated March 23, 2006.

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SECTION 3

AGING MANAGEMENT REVIEW RESULTS

3.0.3 Aging Management Programs

3.0.3.2 AMPs That Are Consistent with the GALL Report with Exceptions or Enhancements

As supplemented in LRA Appendix B, the applicant identified that the following aging management programs (AMPs) were, or will be, consistent with the GALL Report, with additional enhancements:

- Open-Cycle Cooling Water System Program (B.2.1.17)
- ASME Section XI Subsection IWE Program (B.2.1.32)

In its letter dated April 4, 2006, the applicant included additional supplemental information to the LRA for the above-mentioned programs that address the Advisory Committee on Reactor Safeguards (ACRS) concerns raised in the 530th full committee meeting, as documented by letter dated March 23, 2006.

3.0.3.2.11 Open-Cycle Cooling Water System Program

Summary of Technical Information in the Application. The applicant's Open-Cycle Cooling Water (OCCW) System Program is described in LRA Section B.2.1.17, "Open-Cycle Cooling Water System Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with enhancement, with GALL AMP XI.M20, "Open-Cycle Cooling Water System."

The OCCW System Program relies on implementation of the recommendations of GL 89-13 to ensure that the effects of aging on the OCCW system will be managed for the extended period of operation. The program includes surveillance and control techniques to manage aging effects caused by biofouling, corrosion, erosion, protective coating failures, and silting in the OCCW system or structures and components serviced by the OCCW system.

During the 530th full committee meeting of the ACRS, March 9, 2006, the committee reviewed the LRA for BFN Units 1, 2, and 3. The staff had closed the open items with a commitment to issue a supplemental safety evaluation report (SSER) that would address an inspection concern on an open item on residual heat removal service water (RHRSW) system component, RHRSW pump pit suction pipe (see SSER Section 3.3.2.3.3). The aging management review (AMR) of this component required an enhancement to the OCCWS Program (see previous safety evaluation report (SER), dated January 12, 2006, SER Section 3.0.3.2.11)

In resolving the issue, by letter dated April 4, 2006, the applicant stated the following:

> In Enclosure 4 of a TVA letter to the NRC dated November 16, 2005 (ADAMS Accession No. ML053320331), TVA committed to perform a confirmatory inspection of the RHRSW

pump pit supply piping, sluice gate valves and seismic restraints in the RHRSW pump pit prior to the period of extended operation. As discussed with the ACRS on March 9, 2006, BFN will perform an additional inspection within 10 years of entering the period of extended operation.

These additional inspections require changes to the Open-Cycle Cooling Water System Program described in LRA Sections A.1.16 and B.2.1.17.

The following is to be added to the end of LRA Section A.1.16:

> In addition to the requirements of GL 89-13, the Open-Cycle Cooling Water System Program will be enhanced to perform inspections on the internal portion of one of the embedded RHRSW pipes that run between the CCW Pump Pits to the EECW / RHRSW Pump Pits, the RHRSW sluice gate valves located in the CCW pump pits, and the seismic restraints in the RHRSW pump pits. These inspections will be performed prior to the expiration of the current 40-year license, and will be conducted at least one additional time within ten years of entering the period of extended operation.

The following is being added to the LRA Section B.2.1.17 Enhancements:

> In addition to the requirements of GL 89-13, the Open-Cycle Cooling Water System Program will be enhanced to perform inspections on the internal portion of one of the embedded RHRSW pipes that run between the CCW Pump Pits to the EECW / RHRSW Pump Pits, the RHRSW sluice gate valves located in the CCW pump pits, and the seismic restraints in the RHRSW pump pits. These inspections will be performed prior to the expiration of the current 40-year license, and will be conducted at least one additional time within ten years of entering the period of extended operation.
>
> <u>Program Elements Affected:</u>
>
> Element 5 - Monitoring and Trending
>
> Inspection scope, method (e.g., visual or nondestructive examination [NDE]), and testing frequencies are in accordance with the utility commitments under NRC GL 89-13. Testing and inspections are done annually and during refueling outages. Inspections or nondestructive testing will determine the extent of biofouling, the condition of the surface coating, the magnitude of localized pitting, and the amount of MIC, if applicable. Heat transfer testing results are documented in plant test procedures and are trended and reviewed by the appropriate group.
>
> BFN Evaluation
>
> Element 5 requires that inspection scope, method (e.g., visual or nondestructive examination [NDE]), and testing frequencies are in accordance with the utility commitments under NRC GL 89-13. The inspections associated with this enhancement are in addition to the BFN commitments under NRC GL 89-13.

These inspections will provide additional assurance that there is no loss of intended function of the Open-Cycle Cooling Water System.

By letter dated November 16, 2005, the applicant committed to perform a confirmatory inspection of the RHRSW pump pit supply piping, sluice gate valves, and seismic restraints in the RHRSW pump pit prior to the period of extended operation. As discussed with the ACRS on March 9, 2006, the applicant will perform an additional inspection within 10 years of entering the period of extended operation.

Staff Evaluation. The staff agrees with the applicant's evaluation and concludes that with the proposed enhancement, the staff found the OCCW System Program is consistent with GALL. AMP XI.M20 and, therefore, acceptable. These additional inspections require changes to the OCCW System Program described in LRA Sections A.1.16 and B.2.1.17. This also closed the open item from the AMP inspection.

UFSAR Supplement. In LRA Section A.1.16, the applicant provided the UFSAR supplement for the OCCW System Program. The staff reviewed this section and determined that the information, with the above revision to the UFSAR supplement provides an adequate summary description of the program. The staff found that this section of the UFSAR supplement, with revision, met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the enhancement and confirmed that the implementation of the enhancement prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the current licensing basis (CLB) for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concluded that, with revision, it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.20 ASME Section XI Subsection IWE Program

Summary of Technical Information in the Application. The applicant's ASME Code Section XI Subsection IWE Program is described in LRA Section B.2.1.32, "ASME Section XI Subsection IWE Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with exceptions, with GALL AMP XI.S1, "ASME Section XI Subsection IWE."

During the 530th full committee meeting of the ACRS, March 9, 2006, the committee reviewed the LRA for BFN Units 1, 2, and 3. The staff had closed the open items with a commitment to issue an SSER that will address a concern that the committee had raised on an open item on drywell shell, specifically related to the aging management in the sand bed region. The AMR review of this component is discussed in the SER dated January 12, 2006, (see SER Section 3.5.2.3.1). In resolving the open item, by letter dated April 4, 2006, the applicant committed to perform an ultrasonic testing (UT) thickness measurement as an enhancement to the ASME Section XI Subsection IWE Program as follows.

These additional periodic inspections in the sand bed region require changes to the ASME Section XI Subsection IWE Program described in LRA Sections A.1.29 and B.2.1.32.

The following is to be added to the end of LRA Section A.1.29:

> The ASME Section XI Subsection IWE Program will be enhanced to require ultrasonic inspections of the Units 1, 2, and 3 drywell liner plate near the sand bed region. The first inspection on each unit will be performed prior to the period of extended operation. Subsequent periodic inspections will be performed on each unit at a period not to exceed 10 years. The results of these inspections will be reviewed to ensure that the acceptance criteria of ASME Section XI Subsection IWE-3000 are met.

The following is to be added to the LRA Section B.2.1.32 Enhancements (Note that all program elements were reviewed and only those affected by this enhancement are included in the following additions to Section B.2.1.32):

> The ASME Section XI Subsection IWE Program will be enhanced to require ultrasonic inspections of the Units 1, 2, and 3 drywell liner plate near the sand bed region. The first inspection on each unit will be performed prior to the period of extended operation. Subsequent periodic inspections will be performed on each unit at a period not to exceed 10 years. The results of these inspections will be reviewed to ensure that the acceptance criteria of ASME Section XI Subsection IWE-3000 are met.
>
> > <u>Program Elements Affected:</u>
> >
> > Element 4 – Detection of Aging Effects
> >
> > The frequency and scope of examination specified in 10 CFR 50.55a and Subsection IWE ensure that aging effects would be detected before they would compromise the design-basis requirements. As indicated in IWE-2400, inservice examinations and pressure tests are performed in accordance with one of two inspection programs, A or B, on a specified schedule. Under Inspection Program A, there are four inspection intervals (at 3, 10, 23, and 40 years) for which 100% of the required examinations must be completed. Within each interval, there are various inspection periods for which a certain percentage of the examinations are to be performed to reach 100% at the end of that interval. In addition, a general visual examination is performed once each inspection period. After 40 years of operation, any future examinations will be performed in accordance with Inspection Program B. Under Inspection Program B, starting with the time the plant is placed into service, there is an initial inspection interval of 10 years and successive inspection intervals of 10 years each, during which 100% of the required examinations are to be completed. An expedited examination of containment is required by 10 CFR 50.55a in which an inservice (baseline) examination specified for the first period of the first inspection interval for containment is to be

performed by September 9, 2001. Thereafter, subsequent examinations are performed every 10 years from the baseline examination. Regarding the extent of examination, all accessible surfaces receive a visual examination such as General Visual, VT-1, or VT-3 (see table in item 3 above). IWE-1240 requires augmented examinations (Examination Category E-C) of containment surface areas subject to degradation. A VT-1 visual examination is performed for areas accessible from both sides, and volumetric (ultrasonic thickness measurement) examination is performed for areas accessible from only one side.

BFN Evaluation

Element 4 states 'The frequency and scope of examination specified in 10 CFR 50.55a and Subsection IWE ensure that aging effects would be detected before they would compromise the design-basis requirements.' The inspections associated with this enhancement are of the inaccessible area of the drywell shell liner plate and are in addition to the current BFN ASME Section XI, Subsection IWE procedural requirements. These inspections will provide additional assurance that there is no loss of intended function of the drywell shell.

Element 5 - Monitoring and Trending

With the exception of inaccessible areas, all surfaces are monitored by virtue of the examination requirements on a scheduled basis. When component examination results require evaluation of flaws, evaluation of areas of degradation, or repairs, and the component is found to be acceptable for continued service, the areas containing such flaws, degradation, or repairs shall be reexamined during the next inspection period, in accordance with Examination Category E-C. When these reexaminations reveal that the flaws, areas of degradation, or repairs remain essentially unchanged for three consecutive inspection periods, these areas no longer require augmented examination in accordance with Examination Category E-C.

BFN Evaluation

Element 5 states 'With the exception of inaccessible areas, all surfaces are monitored by virtue of the examination requirements on a scheduled basis.' The inspections associated with this enhancement are of the inaccessible area of the drywell shell liner plate and are in addition to the current BFN ASME Section XI, Subsection IWE procedural requirements. These inspections will provide additional assurance that there is no loss of intended function of the drywell shell.

Element 6 - Acceptance Criteria

IWE-3000 provides acceptance standards for components of steel containments and liners of concrete containments. Table IWE-3410-1

presents criteria to evaluate the acceptability of the containment components for service following the preservice examination and each inservice examination. This table specifies the acceptance standard for each examination category. Most of the acceptance standards rely on visual examinations. Areas that are suspect require an engineering evaluation or require correction by repair or replacement. For some examinations, numerical values are specified for the acceptance standards. For the containment steel shell or liner, material loss exceeding 10% of the nominal containment wall thickness, or material loss that is projected to exceed 10% of the nominal containment wall thickness before the next examination, are documented. Such areas are to be accepted by engineering evaluation or corrected by repair or replacement in accordance with IWE-3122.

BFN Evaluation

Element 6 states 'For the containment steel shell or liner, material loss exceeding 10% of the nominal containment wall thickness, or material loss that is projected to exceed 10% of the nominal containment wall thickness before the next examination, are documented. Such areas are to be accepted by engineering evaluation or corrected by repair or replacement in accordance with IWE-3122.' The acceptance criteria for the inspections associated with this enhancement will provide additional assurance that the design minimum wall thickness is being maintained. If during the License Renewal examinations local areas of degradation are found, IWE-3122 provides the acceptance criteria. If either the thickness of the base metal in local areas is reduced by no more than 10% of the nominal plate thickness of the reduced thickness can be shown by engineering analysis to satisfy the requirements of the BFN Design Criteria, the component is acceptable by engineering evaluation. Additionally, the noted degradation condition would be subject to the site Corrective Action Program.

Staff Evaluation. As discussed in their letter dated March 23, 2006, the ACRS recommended that either the drywell refueling seals should be included within the scope of license renewal and be subjected to periodic inspections or the drywell shells should be subjected to periodic volumetric inspections to detect external corrosion. The applicant addressed the drywell refueling seals in followup to RAI 2.4-3 by letter dated May 31, 2005. The applicant's response to RAI 2.4-3 stated that the Browns Ferry refueling seals are not within the scope of license renewal. In addressing the ACRS's concern, the applicant chose to perform periodic ultrasonic inspections of the drywell shell in the area of the sand bed region. The sand bed region was chosen for inspection because it is the terminus for the drainage pathway for water that may enter the inaccessible area. By being a drainage pathway, it could be subjected to wetting and drying in the lower areas near the sand bed region which could result in corrosion of the shell.

As discussed at the ACRS meeting, BFN will perform periodic UT of the Units 1, 2, and 3 drywell in the area of the sand bed region. These UT thickness measurements will be performed as an enhancement to the ASME Section XI Subsection IWE License Renewal Aging Management Program. BFN will perform the first inspection on each unit prior to the

period of extended operation. Subsequent inspections will be performed on each unit at an interval not to exceed 10 years. The results of these inspections will be reviewed to ensure that the acceptance criteria of ASME Section Subsection IWE-3000 are met during each inspection. The staff evaluated the applicant's acceptance criteria for the inspections associated with this enhancement which will provide additional assurance that the design minimum wall thickness will be maintained and found it acceptable. The staff also found that these enhancements will address the aging concerns that staff documented previously in the RAI 3.5-4 and the periodic inspection provides assurance that any degradation identified will be suitably addressed and managed. Staff considers this open issue adequately resolved.

The applicant has also previously committed (Commitment # 46, BFN letter dated November 16, 2005) to perform supplementary inspections of the vertical portions of the drywell shell which were intended to provide the staff the necessary assurance that the potential degradation of the uninspectable side of the drywell will be monitored and managed. The inspections of the drywell shell near the sand bed region are in addition to the inspections discussed in Enclosure 1 of the TVA letter to the NRC dated November 16, 2005. As discussed in this letter:

For Unit 1, TVA will perform one time confirmatory ultrasonic thickness measurements on the vertical cylindrical area immediately below the drywell flange.

For Units 2 and 3, TVA will perform one time confirmatory ultrasonic thickness measurements on a portion of the cylindrical section of the drywell in a region where liner plate is 0.75 inches thick (i.e. below the drywell head).

UFSAR Supplement. In LRA Section A.1.29 and supplement, the applicant provided the UFSAR supplement for the ASME Code Section XI Subsection IWE Program. The staff reviewed this section and determined that the information in the UFSAR supplement with the above revisions to the UFSAR supplement provides an adequate summary description of the program. The staff found that this section of the UFSAR supplement, with revision, met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review, RAI responses, and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exceptions and the associated justifications and determined that the AMP, with exceptions, is adequate to manage the aging effects for which it is credited. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concluded that, with revisions, it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3 AMPs That Are Not Consistent with or Not Addressed in the GALL Report

In its letter dated April 4, 2006, the applicant supplemented LRA Appendix B. The applicant identified and added the following plant-specific AMP: Unit 1 Periodic Inspection Program (B.2.1.42)

For AMPs that are not consistent with or not addressed by the GALL Report, the staff performed a complete review of the AMPs to determine whether they were adequate to monitor or manage aging. The staff's review of these plant-specific AMPs is documented in the following section of this SSER.

3.0.3.3.5 Unit 1 Periodic Inspection Program (B.2.1.42)

Summary of Technical Information in the Application. In the LRA, the applicant did not include a description of the new, plant-specific AMP B.2.1.42, "Unit 1 Periodic Inspection Program." During the course of the staff's AMR of Unit 1 systems in layup for the extended outage, it was realized that neither the GALL-recommended one-time inspection nor the Unit 1 restart inspection would be sufficient in itself to monitor the effects of any new degradation that might occur during the period of extended operation. This plant-specific program is designed to monitor the condition of and perform periodic inspections of components that were in layup and have been requalified without replacement.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in AMP B.2.1.42 regarding the applicant's demonstration of the Unit 1 Periodic Inspection Program to ensure that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB throughout the period of extended operation.

The staff reviewed the Unit 1 Periodic Inspection Program against the AMP elements found in the SRP-LR Section A.1.2.3 and Table A.1-1, and focused on how the program manages aging effects through the effective incorporation of the 10 program elements (i.e., program scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience).

The applicant indicated that the corrective actions, confirmation process, and administrative controls are part of the site-controlled quality assurance program. The staff's evaluation of the quality assurance program is discussed in SER Section 3.0.4. The remaining seven elements are discussed below.

The program was initially submitted for review by the applicant's letter dated August 4, 2005. The staff review determined that the required information submitted was not entirely complete or consistent with the information identified in SRP-LR Section A.1.2.3. On September 2, 2005, in an informal communication (eight staff questions addressed below) and in a formal meeting summary dated October 31, 2005, the staff requested additional information to support its review. The program was initially revised and resubmitted by TVA letter dated November 16, 2005. Subsequently, by letters dated March 7 and April 4, 2006, the applicant submitted its revised Unit 1 Periodic Inspection Program to resolve staff comments and close out all remaining open items.

In NRC Question 1 of the informal staff request of September 2, 2005, the staff requested the applicant to review the entire SRP-LR Section A.1.2.3 and to include additional applicable information. In NRC Question 2 of the informal staff request of September 2, 2005, the staff also identified a general concern that, in the description of the program, the use of the term "failures" is not appropriate for license renewal. In response, the applicant revised the term

"failures" to read, "acceptable degradation." The applicant also revised the UFSAR Section A.2.4 and the description of each element to include the information identified in SRP-LR Section A.1.2.3, as discussed below.

(1) Scope of Program - In LRA Section B.2.1.42, the applicant stated that the program provides periodic monitoring of the non-replaced piping/fittings that were not in service supporting operation of Units 2 and 3. This piping is carbon/low-alloy or stainless steel that was exposed to air, treated water, or raw water during the extended Unit 1 shutdown. The susceptible locations identified are those areas determined to have the highest potential for service-induced wear or latent aging effects. The staff found, in general, the scope of the program to be comprehensive and acceptable because it includes components that were subject to lay-up at locations most susceptible to degradation as a result of the extended outage. The applicant's response to Question 3 of the informal staff request of September 2, 2005, by the revised letter dated November 16, 2005, did not include a detailed AMR table (Table 3) in a standard format. The format should list system and components, and it should reference the new inspection program, "B.2.1.42 Unit 1 Periodic Inspection Program," as the AMP. The submitted format did not allow a staff review of specific combinations of components, materials, environments, and aging effects to be managed by the new Unit 1 Periodic Inspection Program. In addition, the applicant did not respond to NRC Question 3(b) concerning the number of sample locations. Instead, the applicant stated that its earlier response, dated May 18, 2005, in a table titled,"NDE Examinations Performed for Original Non-replaced Piping, (3 sheets)," had identified specific components, piping, and welds that will be included in the scope of this new program. The applicant stated that the table included piping and welds in the RHRSW, fire protection, EECW, raw cooling water, control rod drive, core spray, feedwater, high pressure coolant injection, main steam, reactor core isolation cooling, residual heat removal, and reactor building closed cooling water systems. The staff accepts this list to satisfy the requirement of the program element "scope" in lieu of the detailed AMR table for purpose of this evaluation. However, in a teleconference on December 7, 2005, the applicant agreed (by letter dated December 20, 2005) to revise the LRA AMR tables (Table 3) to add the newly identified piping and components that will be included in the scope of the program and to identify these in appropriate systems tables in a future revision. Also, the applicant agreed to review the adequacy of the number of sample locations on the basis of a 95/95 confidence level. By letter dated March 7, 2006, the applicant included a detailed description of the scope of the program and, by letter dated April 4, 2006, the applicant again modified the scope of the program. The revised scope includes five common material and environment combinations and a comprehensive list of systems that were not in service during the extended outage and are now subject to periodic inspections. These systems include all systems that were subject to moisture as a result of layup conditions during the extended outage. The inspection locations will be selected from non-replaced piping that is in-scope for license renewal and will include areas where degradation would be expected as well as areas where degradation would not be expected.

The staff confirmed that the scope of program element satisfies the criterion defined in SRP-LR Section A.1.2.3.1. The staff concluded that the program attribute is acceptable.

(2) Preventive Actions - In the initial preventive action program element, the applicant identified the Unit 1 Periodic Inspection Program as a detection program. Programs are normally identified as condition monitoring, performance monitoring, or prevention and mitigation programs. In NRC Question 5 of the informal staff request of September 2, 2005, the staff requested the applicant to clarify that the program is a condition monitoring program. In the revised LRA Section B.2.1.42, the applicant stated that the program is a condition monitoring program and, thus, there are no preventive actions. The staff concurred with this assessment and does not identify the need for any preventive actions associated with this program.

The staff confirmed that the preventive actions program element satisfies the criterion defined in SRP-LR Section A.1.2.3.2. The staff concluded that the program attribute is acceptable.

(3) Parameters Monitored or Inspected - In LRA Section B.2.1.42, the applicant clarified that the Unit 1 Periodic Inspection Program is a condition monitoring program and only the first two items of the SRP-LR are applicable. The applicant identified that the selected sample will be examined by the same or equivalent methodology (UT thickness for piping and UT shear wave and surface exam for weld), as performed to determine acceptability of not replacing piping sections prior to restart. The applicant stated that the susceptible locations were those areas determined to have the highest potential for service-induced wear or latent aging effects, which includes all types of corrosion. The applicant also identified that the inspection techniques utilized evaluate internal conditions and are sensitive to the presence of unacceptable conditions, including wear, erosion, and corrosion (including crevice corrosion), if present. In addition, the applicant initially identified that the sample selected for periodic inspection will be based on a 90/90 confidence level consistent with the methodology identified in Electric Power Research Institute (EPRI) 107514. The staff was concerned that a 90/90 confidence level may not be appropriate and that EPRI 107514 had not been reviewed by the staff. In NRC Question 4 of the informal staff request of September 2, 2005, the staff requested the applicant to clarify whether application of EPRI 107514 represented an industry consensus for selecting a sample on the basis of 90/90 criteria. The applicant was also requested to identify the sample size on the basis of 90/90 criteria versus 95/95 and to justify selecting a sample size on the basis of the 90/90 criteria versus the more restrictive 95/95 criteria. In its response, dated November 16, 2005, the applicant revised the sample size basis to reflect a confidence level of 95/95 and replaced the EPRI reference with "Elementary Statistical Analysis." TVA's letter dated April 4, 2006, clarified that the sample size for the 95/95 assurance criterion for the common material and environment groupings will be based on NUREG-1575. The staff's review of the acceptability of the revised basis for the sample size is further discussed under Element 4. The staff found that the parameters monitored or inspected will provide symptomatic evidence of potential degradation and, therefore, are acceptable.

The staff confirmed that the parameters monitored or inspected program element satisfies the criterion defined in SRP-LR Section A.1.2.3.3. The staff concluded that this program attribute is acceptable.

(4) Detection of Aging Effects - SRP-LR Section A.1.2.3.4 states that the applicant is to provide justification, including codes and standards referenced, that the inspection

technique and frequency are adequate to detect the aging effects before a loss of structure and component (SC) intended function. In the initial submittal of LRA Section B.2.1.42, the applicant did not identify any codes and standards. In NRC Question 6 of the informal staff request of September 2, 2005, the staff requested the applicant to include additional information to demonstrate that the technique and frequency of future inspections is justified. In revised LRA Section B.2.1.42, in its submittal dated November 16, 2005, the applicant stated that the program is not covered by industry codes or standards and the selected inspection methodologies are based on the inspections performed to determine whether components require replacement prior to restart. The applicant also stated that the examination techniques utilized for the baseline inspection were ultrasonic thickness measurements for the piping and ultrasonic shear wave for welds. The applicant identified that the restart inspections can be used as a baseline and additional periodic inspections of sample locations will be performed after Unit 1 is returned to service and again within the first 10 years of the period of extended operation. The ultrasonic thickness measurements used should be capable of detecting most forms of internal degradation of the piping caused by the extended outage. The staff was concerned that inspections may not be performed to recognized codes and standards and that UT inspection may not be the best technique to detect certain types of corrosion. The staff believes that codes and standards such as ASME Section V and ASTM are appropriate references. Based on industry standards such as ASTM G46-94 and standard practices identified in EPRI documents and the GALL Report, visual inspections may be a more appropriate technique to identify certain types of internal degradation, such as pitting and MIC. Therefore, the applicant was requested to identify specific codes and standards used for periodic inspections and evaluate the acceptability of UT alone to detect all forms of corrosion. In a teleconference with the applicant on December 7, 2005 (as referenced in the applicant submittal dated December 20, 2005) the applicant indicated that internal visual inspections are performed as part of other aging management programs when the system is open, but UT is preferred for periodic inspection trending purposes, since opportunistic internal inspections are limited by accessibility. By letter dated March 7, 2006, the applicant clarified that the selected sample will be examined by UT thickness for piping and welds not covered by ASME Section XI, and the program has been revised to select inspection locations from areas where degradation would be expected as well as areas where degradation would not be expected. The applicant stated that if unacceptable degradation is detected in any sample location, the unacceptable degradation will be evaluated and dispositioned using the Corrective Action Program. The staff found a combination of opportunistic internal visual inspections combined with periodic UT inspections to be an acceptable technique to detect latent aging effects.

In regard to the basis for the sample size addressed in the SRP-LR "detection of aging effects" element, the applicant described the sample size basis under Element 3, "parameters monitored or inspected." The applicant applied a statistical analysis to establish a confidence level of 95/95 for selecting a sample size within a common material and environment. In SER Section A.2.4, submitted by letter dated October 19, 2005, the applicant stated that if unacceptable degradation is identified, the sample size will be appropriately expanded. Although the applicant did not respond to staff's request in NRC Question 3(b) concerning the number of sample locations (scope) to be inspected, the applicant did adequately identify the basis for the sample size. The number of sample locations was subsequently identified in TVA draft letter dated

March 7, 2006. The applicant clarified that the sample size will be based on NUREG-1475, with a minimum sample size of 59 locations for each material and environmental combination. In the event any inspection location fails the acceptance criterion, the entire material and environment combination sampled is considered suspect and the unacceptable degradation must be evaluated and dispositioned using the Corrective Action Program.

The staff concurred that application of periodic internal visuals from other programs, combined with ultrasonic inspections from the periodic inspection program, are acceptable to detect potential aging effects that may have occurred as the result of the extended outage. Frequency of inspections is addressed under Element 5, below.

The staff found that the 95/95 confidence level is an acceptable basis for determining an adequate sample size and that, in the event unacceptable degradation is detected, a provision to expand the sample size by considering all common material and environment combinations as suspect is consistent with NUREG-1475, industry practice, and SRP-LR Section A.1.2.3.4. The staff concluded that this program attribute is acceptable.

(5) Monitoring and Trending - In the initial submittal of LRA Section B.2.1.42, the applicant did not identify whether results will be monitored and trended. In NRC Question 7 of the informal staff request of September 2, 2005, the staff requested the applicant to clarify that results will be monitored and trended. In its response, the applicant confirmed that the program has been revised to clarify the requirement to monitor and trend the results of periodic inspections. In revised LRA Section B.2.1.42, the applicant stated that the inspection frequency is re-evaluated each time the inspection is performed and can be changed based on the trend of the results. SRP-LR Section A.1.2.3.5 states that plant-specific and/or industry-wide operating experience may be considered in evaluating the appropriateness of the technique and frequency. The applicant credits lessons learned from the Units 2 and 3 restart experience, and TVA draft letter dated March 7, 2006, clarified that the baseline inspections will be performed on the selected sample locations prior to restart. The first periodic inspection will be performed after Unit 1 is returned to operation, but prior to the end of the current operating period, and the second periodic inspection of all sample locations will be completed within the first 10 years of the period of extended operation. The applicant further clarified that, to ensure accurate and repeatable baseline values are available, sample locations will be identified on controlled drawings contained in the technical instruction for the Unit 1 Periodic Inspection Program. The staff found that the overall monitoring and trending proposed by the applicant is acceptable because there is reasonable assurance that effective periodic inspections at the frequency identified combined with the Corrective Action Program will effectively manage the applicable aging effects.

The staff confirmed that the monitoring and trending program element satisfies the criterion defined in SRP-LR Section A.1.2.3.5. The staff concluded that this program attribute is acceptable.

(6) Acceptance Criteria - In LRA Section B.2.1.42, revised by letter dated March 7, 2006, the applicant stated that the acceptance criteria is that the pipe wall will remain above minimum acceptable wall thickness until the next periodic inspection. The staff found the

application of minimum wall thickness based on the Code of record to be reasonable and appropriate acceptance criteria to maintain the intended functions of the components inspected.

The staff confirmed that the acceptance criteria program element satisfies the criterion defined in SRP-LR Section A.1.2.3.6. The staff concluded that this program attribute is acceptable.

(10) Operating Experience - In NRC Question 8 of the informal staff request of September 2, 2005, the staff requested the applicant to identify a commitment to provide (or have available for review) operating experience for this new program in the future to confirm its effectiveness. The applicant's response confirmed that the program has been revised to clarify the requirement to evaluate the results of the periodic inspections to verify program effectiveness. In the revised version of LRA Section B.2.1.42, the applicant stated that the Unit 1 Periodic Inspection Program is a new program that will monitor the operating conditions of Unit 1 components that were not replaced during the Unit 1 restart. The applicant credits the trending data developed in Element 5 to demonstrate the effectiveness of the Unit 1 Periodic Inspection Program. The staff found that there is reasonable assurance that the use of trending data will provide objective evidence to determine the effectiveness of the periodic inspection program.

The staff confirmed that the operating experience program element satisfies the criterion defined in SRP-LR Section A.1.2.3.10. The staff concluded that this program attribute is acceptable.

UFSAR Supplement. By letter dated March 7, 2006, the applicant provided the following revised UFSAR supplement for the Unit 1 Periodic Inspection Program:

A.2.4 Unit 1 Periodic Inspection Program

The Unit 1 Periodic Inspection Program is a new program that performs periodic inspections of the non-replaced piping/fittings that were not in service supporting operation of Units 2 and 3 following the extended Unit 1 outage to verify that no latent aging effects are occurring, and to correct degraded conditions prior to loss of function.

The piping in the program is carbon/low-alloy or stainless steel that: 1) was exposed to air, treated water or raw water during the extended Unit 1 shutdown; and 2) will be exposed to treated water or raw water during normal operation. The inspection locations will be selected from non-replaced piping which is within the scope of license renewal and will include areas where degradation would be expected as well as areas where degradation would not be expected. The sample selected for periodic inspection will be based on a 95/95 confidence level on a common material and environment bases. The sample size for the 95/95 assurance criterion for the common material and environment groupings will be based on NUREG-1475 as described in Chapter 21 which is based on a large or infinite lot size.

The initial sample, once selected, will be utilized in subsequent inspections. The initial baseline inspection of the sample locations will be performed prior to restart. The first Unit 1 periodic inspection of all sample locations will be performed after Unit 1 is

returned to operation but prior to the end of the current operating period. The second periodic inspection of all sample locations will be completed within the first 10 years of the period of extended operation. The inspection frequency is re-evaluated each time the inspection is performed and can be changed based on the trend of the results. The inspections will continue until the trend of the results provides a basis to discontinue the inspections. However, as a minimum, periodic inspections of all selected sample locations must be performed: 1) after Unit 1 is returned to operation but prior to the end of the current operating period; and 2) within the first 10 years of the period of extended operation.

The inspection techniques utilized evaluate internal conditions that are sensitive to the presence of unacceptable conditions including wear, erosion, and corrosion (including crevice corrosion) if present. If unacceptable degradation is detected in any sample location, the unacceptable degradation will be evaluated and dispositioned using the Corrective Action Program.

The staff reviewed the above UFSAR supplement and determined that it provides an adequate summary description of the program. The staff found that this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review of the applicant's program, the staff found that the Unit 1 Periodic Inspection Program adequately addresses the 10 program elements identified in Appendix A of the SRP-LR, and that the program can adequately manage the aging effects for which it is credited. The staff also reviewed the UFSAR supplement for this AMP and found that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

The following two AMR review items are presented in this SSER for background information on issues that were raised in the ACRS full committee meeting dated March 9, 2006, because of which the enhancements to the two foregoing AMPs resulted. The following sections revise the previous staff evaluations found in the final SER dated January 12, 2006.

3.3 Aging Management of Auxiliary Systems

3.3.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

3.3.2.3.3 Residual Heat Removal Service Water System – Summary of Aging Management Evaluation – Table 3.3.2.3

Inspection of Residual Heat Removal Service Water (RHRSW) Piping. The staff reviewed LRA Table 3.3.2.3, which summarizes the results of AMR evaluations for the RHRSW system component groups. This item originated from regional AMP inspections conducted during December 2004 and a followup inspection September 2005, related to the RHRSW pump pit suction pipes.

As part of its review of the LRA, the staff, by letter dated October 31, 2005, requested supplemental information needed to address four open items included in the ACRS interim evaluation of BFN's LRA and the staff's draft SER. This supplemental response to the staff's request concerns the open item from AMP inspection of RHRSW piping. The AMP inspection is

documented by staff letter to the applicant dated November 7, 2005, "Browns Ferry Nuclear Plant - Inspection Report 05000259/2005013, 05000260/2005013, and 05000296/2005013."

In its response, by letter dated November 16, 2005 the applicant stated:

> The Residual Heat Removal Service Water (RHRSW) pump pit supplies water for both the RHRSW system and the Emergency Equipment Cooling Water (EECW) system. The RHRSW pump pit takes suction from three 24" cast iron pipes that are encased in concrete. These pipes are coated internally with cement. Each of the three 40 foot long pipes has a tee on the upstream end which receives raw cooling water from two Condenser Circulating Water (CCW) pump pits via sluice gate valves located in the CCW pump pits. There are six sluice gates with two for each of the three encased pipes.
>
> The three RHRSW inlet pipes are included in the BFN Open Cycle Cooling Water (OCCW) program. The inlets of these pipes are the injection point for corrosion inhibitors and biocides that are used to maintain the EECW System. The chemicals being injected at the inlet of these pipes are used to treat the other components in the OCCW system, including those components located in the RHRSW pump pits. These pipes receive the largest concentration of chemicals.
>
> The sluice gate utilizes a local manual closure mechanism. The function of the sluice gate valves is to allow isolation of the encased pipe for RHRSW pump pit or CCW pump pit maintenance. The sluice gate has no active safety function other than remaining open to provide a flow path. The previously discussed raw water chemical treatment system [System No. 23] injects chemicals or biocides immediately upstream of the sluice gates. The treated water immediately enters the throat of the valve and proceeds on to the imbedded piping. Substantial chemical treatment does not come into contact with the external portion of the sluice gate or its operator. Four of the six valves have been replaced in the past. The remaining two valves are scheduled to be replaced in January 2006.
>
> As part of the License Renewal Process, an NRC inspection of Aging Management Programs (AMPs) was performed at Browns Ferry during the week of December 13, 2004. During this inspection, TVA indicated that a one time inspection of the external surfaces of the OCCW piping that is exposed to raw water would be performed. It was later determined that the external surface of the RHRSW pump pit inlet piping is encased in concrete and is not accessible for inspection. TVA did not specify an internal inspection for license renewal because the aging of the pipe internals is managed by compliance with the requirements of Generic Letter 89-13 which is consistent with requirements of NUREG 1801 for Aging Management Programs (AMPs) for Open Cycle Cooling Water Systems. In a follow-up NRC AMP inspection during the week of September 19, 2005, TVA was informed that the staff's expectation was that an inspection be performed on the internal surfaces of the subject pipe.

Based on additional discussions with the NRC, BFN will perform the following three actions:

(1) Perform a confirmatory inspection of the RHRSW pump pit supply piping using underwater cameras or other methods or techniques available at the time of the inspection. The inspection will include internal portions of one RHRSW pump pit supply pipe, and to the extent possible, will identify flow restrictions and material loss due to corrosion. The inspection will be performed from either the CCW pump pit or the RHRSW Pump Pit end of the pipe. This inspection will be performed prior to the period of extended operation.

(2) BFN will include instructions in the CCW pump pit Preventive Maintenance Program to periodically inspect the sluice gate valves. This will be completed prior to the period of extended operation.

(3) BFN will perform a confirmatory inspection of the seismic restraints in the RHRSW pump pit. This inspection will be performed prior to the period of extended operation.

These confirmatory inspection items are incorporated into the Open Cycle Cooling Water System Program, as an enhancement to the previously approved staff evaluation. The enhancement is shown in SSER Section 3.0.3.2.11.

The staff concluded that with the proposed inspection the component will continue to fulfill its intended function (i.e., no pipe blockage) and the proposed enhancement to the OCCWS Program is acceptable.

3.5 Aging Management of Containments, Structures, and Components Supports

3.5.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report

3.5.2.3.1 Primary Containment Structures – Summary of Aging Management Evaluation – Table 3.5.2.1 - Drywell Liner plate inspection in the sand pocket regions

The staff reviewed this AMR item previously in RAI 3.5-4 dated December 10, 2004, was documented previously in the final SER issued on January 12, 2006 (see SER Section 3.5.2.3.1). UT thickness measurements of the sand pocket area that were obtained during the U2C10 and U3C8 refueling outages for Units 2 and 3, respectively; and in 1999 and 2002 for Unit 1 (0-TI-376 Appendix 9.7, page 4), indicated that the condition of the drywell steel liner plate in this area meets code requirements, and that this area should not be categorized for augmented examination. In that previous evaluation the staff, in concluding, stated:

> Based on the detailed response, the staff found that the applicant has in place detailed procedures for examining the concrete and steel components inside the drywell, and systematic acceptance criteria. Since the applicant plans to continue this process during the extended period of operation and therefore, the staff found the applicant's process of detecting degradation of these components adequate and acceptable, and the staff's concern described in RAI 3.5-4 is resolved.

However, when the ACRS questioned the applicant on March 9, 2006, as to the details of the recent inspections, the applicant provided details of the UT inspections that were conducted during these outages for Units 1, 2, and 3 and earlier in 1997 and 1999. The staff found these details of particular interest for Unit 1. Staff pursued the inquiry, especially an indication identified in a UT inspection conducted in 1997 in Unit 1.

In responding to this ACRS concern, the applicant, in its submittal dated April 4, 2006, stated:

> UNIT 1 DRYWELL SHELL INSPECTION RESULTS
>
> Inspections of the Unit 1 drywell liner plate in the area of the sand bed region were performed in 1987, 1997, 1999, 2002, and 2004. Six areas of the drywell liner plate were ultrasonically (UT) inspected for each of the noted years. Each of the areas is 7" long circumferentially and 5" wide vertically. Each area starts immediately above the concrete floor at elevation 549.92'. Each area is divided into a 6" long by 4" rectangle divided into 1" by 1" grid squares and identified physically using low stress stamps by the letters "A" thru "X" (144 total locations). An inclusion was initially detected at Area #2 grid "I", in the 1999 inspection. An inclusion is particles of nonmetallic material usually oxides, sulphides, silicates, and such which are entrapped mechanically or are formed during solidification or by subsequent reaction within the solid metal. The following table provides the minimum and maximum thickness measured ultrasonically at the Area #2 grid "I" for each inspection:

Year	Maximum (inch)	Minimum (inch)
1987	1.146	1.080
1997	1.126	1.106
1999	1.136	1.110
2002	1.142	1.113
2004	1.146	1.114

> [Note: Inspection results are available on site for review.]
>
> The nominal wall thickness is 1.125" for this area of the drywell liner plate. The ASME Code derived tolerance is 10% of nominal wall thickness which yields a minimum of 1.0125". Any readings below 1.0125" require documenting per the site corrective program and an engineering evaluation. As can be seen, all of the measurements are above the minimum criteria and indicate no trend in wall loss.
>
> In performing the ultrasonic inspection of this area, the inclusion was noted at a depth of 0.766". There was minimum loss of back wall signal with an associated signal at 0.766" depth and no appreciable length (one half of a transducer diameter; transducer diameter is 3/8"), confirming the inclusion is small and sub-surface. Subsequent inspections revealed no measurable difference in the depth / size of the inclusion and no change in the thickness in the liner in this area. The inspection results were reviewed by a Level 3

inspector and found to be non-recordable in accordance with ASME/ASTM Specification SA 516. The inclusion was noted in the inspection results as an aid to inspectors performing future inspections of the area. The presence of the inclusion does not affect the strength of the drywell containment shell, and since it does not connect to the surface of the liner plate, it does not represent a site for future corrosion. No additional component, material, environment, or program was brought into scope as a result of this inclusion.

On March 9, 2006, the applicant also met with the ACRS and the NRC staff and confirmed the details of these inspections. Because of the previous operational history of the drywell shell in the sandbed region the applicant agreed and the staff concurs, that proposed revision would adequately supplement the AMP on ASME Section XI Subsection IWE Program in managing the component. Also, after evaluating the data provided and documented in TVA submittal dated April 4, 2006, the staff concluded that the presence of the inclusion does not affect the strength of the drywell containment shell and as it does not connect to other corroded areas, it does not represent a site for future corrosion. The revised commitment to perform periodic UT examinations of the drywell shell in the sand-pocket areas, is shown as an augmentation to the previously approved staff evaluation of the ASME Section XI Subsection IWE Program. The enhancement is described in SSER Section 3.0.3.2.20. Therefore, the staff considers the open issue resolved.

3.5.3 Conclusion

The staff concluded that the applicant provided sufficient information to demonstrate that the effects of aging of the containments, structures, and component supports components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program summaries and concluded that they adequately describe the AMPs credited for managing aging of the containments, structures, and component supports, as required by 10 CFR 54.21(d).

3.8 Conclusion for Aging Management

The staff reviewed the information in LRA Section 3, "Aging Management Review Results," and Appendix B, "Aging Management Programs and Activities." On the basis of its review of the AMR results and AMPs, the staff concluded that the applicant had demonstrated that the aging effects will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the applicable UFSAR supplement program summaries and concluded that the UFSAR supplement adequately describes the AMPs credited for managing aging as required by 10 CFR 54.21(d).

With regard to these matters, the staff concluded that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB, and that any changes made to the BFN CLB in order to comply with 10 CFR 54.21(a)(3) are in accord with the Atomic Energy Act of 1954, as amended, and NRC regulations.

SECTION 5

REVIEW BY THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

The NRC staff issued its safety evaluation report (SER) with open items related to the renewal of operating licenses for Browns Ferry Nuclear Plant, Units 1, 2, and 3 on August 9, 2005. On October 5-6, 2005, the applicant presented its license renewal application, and the staff presented its review findings to the Advisory Committee on Reactor Safeguards (ACRS) Plant License Renewal Subcommittee and Full Committee. The staff reviewed the applicant's comments on the SER and completed its review of the license renewal application. The staff's evaluation is documented in an SER that was issued by letter dated January 12, 2006.

During the 530th meeting of the ACRS, March 9, 2006, the ACRS completed its review of the BFN license renewal application and the NRC staff's SER. The ACRS documented its findings in a letter to the Commission dated March 23, 2006. This supplement addresses the committee's concern as documented in the previous sections. A copy of this letter is provided on the following pages of this SSER section.

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ACRSR-2180

March 23, 2006

The Honorable Nils J. Diaz
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

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

Dear Chairman Diaz:

During the 530th meeting of the Advisory Committee on Reactor Safeguards, March 9-11, 2006, we completed our review of the license renewal application (LRA) for the Browns Ferry Nuclear Plant (BFN) Units 1, 2, and 3 and the associated final Safety Evaluation Report (SER) 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 SER with Open Items on October 5, 2005. We issued an interim letter on the safety aspects of this application on October 19, 2005. During our 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. This report fulfills the requirements of 10 CFR 54.25 that the ACRS review and report on all license renewal applications.

CONCLUSIONS AND RECOMMENDATIONS

1. With the inclusion of the conditions in Recommendations 2 and 3, the application for license renewal for BFN Units 1, 2, and 3 should be approved.

2. The drywell refueling seals should be included within the scope of license renewal and be subjected to periodic inspections. Alternatively, as proposed by the staff, the drywell shells should be subjected to periodic volumetric inspections to detect external corrosion.

3. If the extended power uprate (EPU) is implemented before the period of extended operation, the staff should require that TVA evaluate the operating experience of Units 1, 2, and 3 at the uprated power level and then incorporate lessons learned into their aging management programs prior to entering the period of extended operation.

DISCUSSION

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

The BFN site is located in Limestone County, Alabama on the north shore of the Wheeler Reservoir. All three BFN units are General Electric boiling water reactors (BWR 4) with Mark 1 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 and TVA plans to restart it in May 2007. The approximate duration of power operation of the three units is 10 years for Unit 1, 23 years for Unit 2, and 18 years for Unit 3. As part of an extensive restart program for Unit 1, components that have been in "layup" for the past 20 years will be either replaced or requalified. Layup is intended to provide a controlled environment to limit corrosion of plant components.

BFN Unit 1 is currently not identical to Units 2 and 3. TVA has committed to implement all of the physical and programmatic improvements to Unit 1 that have been made to Units 2 and 3. By the time of restart, the Unit 1 licensing basis will be identical to that of the other two units. The three units will have nearly identical components, materials, environments, operating procedures, and technical specifications. The Corrective Action Program applies to all three units, so that any condition identified in one unit will be reviewed for generic implications to the other units. The applicant states that, because all three units contain the same materials and have experienced the same conditions, the aging mechanisms during the layup and recovery periods are similar among the three units. Since the aging effects of the Unit 1 shutdown are similar to those experienced in Units 2 and 3, the applicant has used operating experience from the restart of Units 2 and 3 in the recovery of Unit 1. Based on these considerations, TVA has submitted a common license renewal application for all three units.

In part because it is not clear to what extent the layup experience of Units 2 and 3 parallels the experience of Unit 1, in our interim report we questioned the extent of applicability of Units 2 and 3 operating experience to the unique operating history of Unit 1. The SER states that a 1987 NRC inspection report identified several instances of deficient layup conditions during the early phase of the extended outage. This raises the possibility of potential latent effects that could result in accelerated aging once the plant restarts and operates at power. The applicant acknowledges this concern by stating on page B-4 of the LRA that "During the performance of the Aging Management Review activities, there was recognition that the operating experience

restarted and again within the first ten years of the period of extended operation. The inspection frequency will depend on the results of each inspection. The acceptance criteria are that the pipe wall remains above the minimum acceptable thickness until the next inspection and no unacceptable weld cracks exist. We concur with the staff's conclusion that this program will adequately manage the aging effects for which it is credited.

In the original BFN LRA, the applicant requested renewed licenses at EPU conditions for all three units. In a letter dated January 7, 2005, TVA requested that the EPU and the LRA be separated. Even though the staff reviewed the LRA based on current licensed power levels for each unit, the final SER has several references to EPU conditions. The steam dryers are included in the scope of license renewal, but their aging management review will be performed as part of the safety evaluation of the EPU application. The time-limited aging analyses (TLAAs) associated with neutron embrittlement, reactor vessel fatigue, radiation degradation of drywell expansion gap foam, and stress relaxation of the core plate hold-down bolts were performed assuming EPU conditions.

In the final SER, the staff documents its review of the license renewal application and other information submitted by TVA and obtained through the audits and inspections conducted at the plant site. The staff reviewed the completeness of the applicant's identification of structures, systems, and components (SSCs) that are within the scope of license renewal; the integrated plant assessment process; the applicant's identification of the plausible aging mechanisms associated with passive, long-lived components; the adequacy of the applicant's aging management programs (AMPs); and the identification and assessment of TLAAs requiring review.

The BFN application either demonstrates consistency of aging management programs with the Generic Aging Lessons Learned (GALL) Report or documents deviations from the approaches specified in the GALL Report. The staff reviewed this application in accordance with NUREG-1800, the Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants.

The staff also performed inspections and an audit of AMPs and aging management reviews (AMRs). A recent inspection found that the applicant had made significant progress in developing the AMP implementation packages but identified errors in them. The applicant initiated a Problem Evaluation Report to identify the causes of the errors and determine corrective actions to prevent recurrence. Inspections performed before BFN enters the period of extended operation should verify that implemented corrective actions have been effective.

The audit of the AMPs and AMRs is documented in a report by the Brookhaven National Laboratory. The audit examined 28 AMPs and the associated AMRs and verified that the AMPs are consistent with the GALL Report or concluded that they would adequately manage aging during the period of extended operation. Several of the existing AMPs will be enhanced to include Unit 1 prior to the period of extended operation. Appendix F of the LRA describes TVA 's plan to resolve the differences between the licensing bases of Unit 1 and Units 2 and 3 before Unit 1 restart. The staff's review of Appendix F did not identify any omissions or discrepancies.

The staff concluded that the scoping and screening processes implemented by the applicant have successfully identified SSCs within the scope of license renewal and subject to an AMR.

With the inclusion in the scope of license renewal of those Unit 1 systems and components that were in layup and have not been replaced, we agree with this conclusion.

Open Item 2.4-3 in the SER concerns aging management of drywell shell corrosion. The staff was concerned that leakage through refueling seals at the top of the drywell could lead to corrosion of the drywell shell in a location that cannot be inspected. This aging effect has been observed in several Mark I containments and is the subject of Generic Letter 87-05 and Information Notice 86-99 on the potential for corrosion of BWR Mark I steel drywells in the sandpocket region. The staff has concluded that the refueling seals should be within the scope of license renewal because they are nonsafety-related components whose failure can affect the integrity of the safety-related containment steel liner. We concur with this conclusion.

The applicant acknowledges that water was observed below the refueling seals at BFN Unit 3 during the 1998 refueling outage, but maintains that the refueling seals should not be within the scope of license renewal. As an alternative to the inclusion of the seals, the staff proposed that TVA periodically perform ultrasonic testing of the drywell shells as part of the containment inservice inspection program. Such an approach has been used by previous license renewal applicants, and we agree that it is an acceptable alternative. As an alternative to the staff's proposal, the applicant committed to perform a one-time confirmatory inspection of the Unit 1 drywell shell prior to restart and of the Units 2 and 3 shells prior to entering the period of extended operation. Based on this commitment, the staff closed out this open item. We do not agree with this resolution. One-time inspections are intended to confirm that an unexpected aging effect is not occurring or is occurring at such a slow rate that no further inspections are required. This aging effect has been observed in several Mark I containments, and we are aware of at least one instance of through-wall corrosion. One-time inspection of the shell does not provide assurance that leakage of the refueling seals after the one-time inspection is performed will not create an environment that could result in future drywell degradation. Unless the applicant can demonstrate that the resulting corrosion rate would not be sufficient to degrade the pressure retaining function during the period of extended operation, the refueling seals should be within the scope of license renewal and subject to periodic inspections, or the drywell shells should be subjected to periodic volumetric inspections.

During our March 9, 2006 meeting, we were told that the staff has reopened this item based on discussions with the applicant regarding drywell inspection results. Ultrasonic inspections performed in 1999, 2002, and 2004 identified a small inclusion in the drywell liner of Unit 1. The applicant will submit this information to the staff in writing. The staff plans to document its evaluation of this information in a supplemental SER. Based on our discussions with the applicant and staff, the resolution of this issue does not affect our recommendations regarding this LRA.

In our interim letter we noted that in the draft SER some restart inspections were referred to as "one-time" inspections. We suggested that, to avoid confusion, the term "one-time" inspection should be used only for license-renewal-related inspections. For clarification purposes, the final SER now provides definitions of one-time inspections, restart inspections, and Unit 1 periodic inspections. Section 3.7 of the final SER still refers to some restart inspections as one-time inspections. The final SER should be revised to be consistent with these definitions.

The applicant has identified systems and components requiring a TLAA and reevaluated them for 20 more years of operation. The SER concludes that the TLAAs are valid for the period of

extended operation, the TLAAs are projected to the end of the period of extended operation, or that aging effects will be adequately managed for the period of extended operation. We concur with this assessment.

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 LRA and the associated SER reflect operating experience only at the current power level. If the EPU is implemented before the period of extended operation, the staff should require that TVA evaluate the operating experience of Units 1, 2, and 3 at the uprated power level and then incorporate lessons learned into their aging management programs prior to entering the period of extended operation. The EDO response to our interim letter stated that the staff's SER for the EPU would include a commitment to perform such an evaluation.

With the inclusion of commitments to perform periodic inspections of BFN Units 1, 2, and 3 drywell refueling seals or drywell shells and to perform an evaluation of operating experience at the EPU level and incorporate lessons learned into their aging management programs prior to entering the period of extended operation, the application for license renewal of Browns Ferry Units 1, 2, and 3 should be approved.

Sincerely,

/RA/

Graham B. Wallis
Chairman

References:

1. U.S. Nuclear Regulatory Commission, "Safety Evaluation Report Related to the License Renewal of the Browns Ferry Nuclear Plant, Units 1, 2, and 3," January 2006.
2. 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.
3. Tennessee Valley Authority, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - Application for Renewed Operating Licenses," December 31, 2003.
4. Tennessee Valley Authority, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - January 28, 2004 Meeting Follow-Up - Additional Information," February 19, 2004.
5. 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, Docket Nos.: 05000259, 05000260, 05000296," April 26, 2005.
6. U.S. Nuclear Regulatory Commission, "Browns Ferry Nuclear Plant - Inspection Report 05000259/2004012, 05000260/2004012, and 05000296/2004012," January 27, 2005.
7. U.S. Nuclear Regulatory Commission, "Browns Ferry Nuclear Plant - Inspection Report 05000259/2005013, 05000260/2005013, and 05000296/2005013," November 7, 2005.
8. Tennessee Valley Authority, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application (LRA) - Annual Update (TAC Nos. MC1704, MC1705, and MC1706)," January 31, 2006.
9. Letter from William J. Shack, Acting Chairman, ACRS, to Luis A. Reyes, Executive Director for Operations, NRC, "Interim Report on the Safety Aspects of the License Renewal Application for the Browns Ferry Nuclear Plant, Units 1, 2, and 3," October 19, 2005.
10. Letter from Luis A. Reyes, Executive Director for Operations, NRC, to William J. Shack, Acting Chairman, ACRS, "Response to Advisory Committee on Reactor Safeguards - Interim Report on

the Safety Aspects of the License Renewal Application for Browns Ferry Nuclear Plant, Units 1, 2, and 3," November 28, 2005.

11. Tennessee Valley Authority, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - Summary of NRC Site Visit and Meeting Regarding Extended Power Uprate (EPU) and License Renewal Application (LRA)," January 7, 2005.
12. 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.
13. 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.

SECTION 6

CONCLUSIONS

The staff of the U.S. Nuclear Regulatory Commission (NRC or the Commission) reviewed the license renewal applications for the Browns Ferry Nuclear, Units 1, 2, and 3, in accordance with Commission regulations and NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," dated July 2001. Title 10, Section 54.29, of the *Code of Federal Regulations* (10 CFR 54.29) provides the standards for issuance of a renewed license.

On the basis of its evaluation of the license renewal applications, the NRC staff concluded that the requirements of 10 CFR 54.29(a) have been met and that all open items and confirmatory items have been resolved.

The staff notes that any requirements of Subpart A of 10 CFR Part 51 are documented in Supplement 21 to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Browns Ferry Nuclear, Units 1, 2, and 3, Final Report," dated June 23, 2005.

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APPENDIX A
COMMITMENTS FOR LICENSE RENEWALS
OF BFN UNITS 1, 2, AND 3

During the review of the Browns Ferry Nuclear Plant (BFN) license renewal application (LRA) by the U.S. Nuclear Regulatory Commission (NRC) staff, the applicant made commitments related to aging management programs (AMPs) to manage aging effects of structures and components (SCs) before the period of extended operation. The following tables list these commitments, along with the implementation schedules and the sources of the commitments.

- Table 1 lists those commitments that are not for a specific unit.
- Table 2 lists commitments that are specific to Unit 1.

Note that these tables also contain non-AMP commitments.

Changes to the attached Commitment Tables reflect changes made as a result of the changes delineated in Enclosure 1 of the letter dated April 4, 2006. The following items are revised:

- Item 15 of Table 1
- Item 28 of Table 1
- Item 45 of Table 1
- Item 48 of Table 1
- Item 49 of Table 2

Also, Items 50 through 62 of Table 3 were revised to add the TVA response dated March 2, 2006, as a source document.

Also, Items 52 of Table 3 was revised to add the TVA response dated April 21, 2006, as a source document.

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TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
1. Accessible Non-Environmental Qualification Cables and Connections Inspection Program	Develop and implement new program.	A.1.1	Prior to the period of extended operation	• LRA Section B.2.1.1
2. Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program	Revise implementing documents for LPRM cable system aging to reference existing Technical Specification requirements and license renewal reference(s).	A.1.2	Prior to the period of extended operation	• LRA Section B.2.1.2 • Response to follow-up to RAI 2.5-2 dated March 2, 2005
	Develop and implement new program to manage IRM cable system aging.		Prior to the period of extended operation	• LRA Section B.2.1.2 • Response to follow-up to RAI 2.5-2 dated March 2, 2005
3. Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program	Develop and implement new program to manage the medium-voltage cables to the Residual Heat Removal Service Water pumps.	A.1.3	Prior to the period of extended operation	• LRA Section B.2.1.3 • Response to RAI 3.6-3(a) dated December 9, 2004 • Response to follow-up RAI 3.6-3 dated January 18, 2005
4. ASME Section XI Inservice Inspection Subsections IWB, IWC, and IWD Program	Revise implementing documents to include license renewal reference(s).	A.1.4	Prior to the period of extended operation	• LRA Section B.2.1.4
5. Chemistry Control Program	Revise implementing documents to include license renewal reference(s).	A.1.5	Prior to the period of extended operation	• LRA Section B.2.1.5

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
6. Reactor Head Closure Studs Program	Revise implementing documents to include license renewal reference(s).	A.1.6	Prior to the period of extended operation	• LRA Section B.2.1.6
7. Boiling Water Reactor Vessel Inside Diameter Attachment Welds Program	Revise implementing documents to include license renewal reference(s).	A.1.7	Prior to the period of extended operation	• LRA Section B.2.1.7
8. Boiling Water Reactor Feedwater Nozzle Program	Revise implementing documents to include license renewal reference(s).	A.1.8	Prior to the period of extended operation	• LRA Section B.2.1.8
9. Boiling Water Reactor Control Rod Drive Return Line Nozzle Program	Revise implementing documents to include license renewal reference(s).	A.1.9	Prior to the period of extended operation	• LRA Section B.2.1.9
10 Boiling Water Reactor Stress Corrosion Cracking Program	Revise implementing documents to include license renewal reference(s).	A.1.10	Prior to the period of extended operation	• LRA Section B.2.1.10
11. Boiling Water Reactor Penetrations Program	Revise implementing documents to include license renewal reference(s).	A.1.11	Prior to the period of extended operation	• LRA Section B.2.1.11 • Enclosure 1 of TVA letter dated September 14, 2005

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
12. Boiling Water Reactor Vessel Internals Program	Revise implementing documents to include license renewal reference(s).	A.1.12	Prior to the period of extended operation	• LRA Section B.2.1.12
	Inspect the top guide beams		Prior to the period of extended operation	• Response to NRC Question (3) dated May 25, 2005
	Establish an aging management program for the steam dryers.		Two years before the first BFN unit enters the period of extended operation	• Response to RAI 3.1-1 dated January 31, 2005
	Enhance the Reactor Pressure Vessel Internals Inspection (RPVII) Units 1, 2, and 3 procedure to require visual inspection of the Access Hole Covers (AHCs) and inspection of the AHC welds.		Two years before the first BFN unit enters the period of extended operation	• Response to RAI B.2.1.12-1(C) dated January 31, 2005 • Response to NRC Question (7) dated May 25, 2005
	Implement the inspection of weld TS-2 (BWRVIP-41).		When inspection technique for weld TS-2 being developed by the BWRVIP Inspection Committee is available.	• Response to Question (12) dated May 25, 2005
13. Flow-Accelerated Corrosion Program	Revise implementing documents to include license renewal reference(s).	A.1.14	Prior to the period of extended operation	• LRA Section B.2.1.15
14. Bolting Integrity Program	Revise implementing documents to include license renewal reference(s).	A.1.15	Prior to the period of extended operation	• LRA Section B.2.1.16

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
15. Open-Cycle Cooling Water System Program	Revise implementing documents to include license renewal reference(s).	A.1.16	Prior to the period of extended operation	• LRA Section B.2.1.17
	Enhance the Open-Cycle Cooling Water System Program to perform confirmatory inspections of the RHRSW pump pit supply piping, sluice gate valves and seismic restraints in the RHRSW pump pit.		Once prior to the period of extended operation Within 10 years after entering the period of extended operation	• Enclosure 1 of TVA letter dated April 4, 2006
16. Closed-Cycle Cooling Water System Program	Revise implementing documents to include license renewal reference(s).	A.1.17	Prior to the period of extended operation	• LRA Section B.2.1.18
17. Inspection of Overhead Heavy Load and Light Load Handling Systems Program	Revise implementing documents to include license renewal reference(s).	A.1.18	Prior to the period of extended operation	• LRA Section B.2.1.20
18. Compressed Air Monitoring Program	Revise implementing documents to: • Include license renewal reference(s). • Incorporate guidelines in ASME OM-S/G-2000, Part 17; ANSI/ISA-S7.0.01-1996; and EPRI TR 108147	A.1.19	Prior to the period of extended operation	• LRA Section B.2.1.21
19. BWR Reactor Water Cleanup System Program	Revise implementing documents to include license renewal reference(s).	A.1.20	Prior to the period of extended operation	• LRA Section B.2.1.22
20. Fire Protection Program	Revise implementing documents to include license renewal reference(s).	A.1.21	Prior to the period of extended operation	• LRA Section B.2.1.23

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
21. Fire Water System Program	Revise implementing documents to: • Include license renewal reference(s). • Perform flow tests or non-intrusive examinations to identify evidence of loss of material due to corrosion.	A.1.22	Prior to the period of extended operation	• LRA Section B.2.1.24
	Perform sprinkler head inspections to ensure signs of degradation, such as corrosion, are detected in a timely manner.		Prior to exceeding the 50-year service life for any sprinkler	• LRA Section B.2.1.24
22. Aboveground Carbon Steel Tanks Program	Revise implementing documents to include license renewal reference(s).	A.1.23	Prior to the period of extended operation	• LRA Section B.2.1.26
23. Fuel Oil Chemistry Program	Revise implementing documents to include license renewal reference(s).	A.1.24	Prior to the period of extended operation	• LRA Section B.2.1.27 • Enclosure 1 of TVA letter dated September 14, 2005

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
24. Reactor Vessel Surveillance Program	Revise implementing documents to include license renewal reference(s).	A.1.25	Prior to the period of extended operation	• LRA Section B.2.1.28
	Enhance the Integrated Surveillance Program (ISP) per proposed BWRVIP-116.		Prior to the period of extended operation	• LRA Section B.2.1.28
	If the ISP is not approved two years prior to the commencement of the license renewal period, a plant-specific surveillance program for each BFN unit will be submitted to the NRC.		Two years prior to the commencement of the license renewal period	• Response to RAI B.2.1.28-1(A) dated January 31, 2005 • Response to Question (9) dated May 25, 2005
	Maintain Unit 1 and Unit 3 surveillance capsules (standby capsules) available to the ISP.		Unit 3 is ongoing Unit 1 will commence at restart	• Response to Question (10) dated May 25, 2005

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
25. One-Time Inspection Program	Develop and implement new program.	A.1.26	Prior to the period of extended operation	• LRA Section B.2.1.29
	Develop and submit procedure for NRC review.		At least two years prior to the expiration of the current operating license	• Response to Proposed Unresolved Item 3.0-4 LP dated May 27, 2005
	Perform a one-time inspection of the ASME equivalent Class MC supports in a submerged environment of the Units 2 and 3 Torus.		Prior to the period of extended operation	• Response to RAI B.2.1.33-2 dated January 18, 2005
	Perform a one-time inspection of the in-scope submerged concrete in one individual CCW pump bay of the Intake Pumping Station.		Prior to the period of extended operation	• Response to Question 359 dated October 8, 2004 • Response to RAI 3.5-16 dated April 5, 2005
	Perform ultrasonic thickness measurements of tank bottoms for those tanks specified in the Fuel Oil Chemistry Program (B.2.1.27) and the Aboveground Carbon Steel Tanks Program (B.2.1.26).		Prior to the period of extended operation	• Response to RAI 7.1.19-1 dated May 25, 2005

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
26. Selective Leaching of Materials Program	Develop and implement program.	A.1.27	Prior to the period of extended operation	• LRA Section B.2.1.30
27. Buried Piping and Tanks Inspection Program	Revise implementing documents to include license renewal reference(s).	A.1.28	Prior to the period of extended operation	• LRA Section B.2.1.31
	Add a trigger to the excavation permit document to require notification of engineering to perform a piping inspection when piping is excavated.		Complete	• NRC Inspection Report dated January 27, 2005
	Determine (via engineering evaluation) if sufficient inspections have been performed to draw conclusion regarding ability of underground coating to protect piping. If required, conduct a focused inspection to draw conclusion concerning the coating.		Within 10 years after entering the period of extended operation	• Response to RAI 7.1.22-1 dated May 25, 2005
	Revise implementing documents to inspect buried piping when it is excavated.		Complete	• Response to RAI 7.1.22-1 dated May 25, 2005

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
28. ASME Section XI Subsection IWE Program	Revise implementing documents to include license renewal reference(s).	A.1.29	Prior to the period of extended operation	• LRA Section B.2.1.32
	Enhance ASME Section XI, Subsection IWE Program to perform a UT inspection of the sand bed area of the drywell liner of Units 1, 2, and 3.		First inspection on each unit prior to the period of extended operation. Subsequent periodic inspections will be performed on each unit at a period not to exceed 10 years.	• Enclosure 1 of TVA letter dated April 4, 2006
29. ASME Section XI Subsection IWF Program	Revise implementing documents to include license renewal reference(s).	A.1.30	Prior to the period of extended operation	• LRA Section B.2.1.33
	Enhance program to manage the aging effects of ASME equivalent Class MC supports.		Prior to the period of extended operation	• Response to Follow-up RAI B.2.1.33-1 dated May 31, 2005
30. 10 CFR 50 Appendix J Program	Revise implementing documents to include license renewal reference(s).	A.1.31	Prior to the period of extended operation	• LRA Section B.2.1.34
31. Masonry Wall Program	Revise implementing documents to include license renewal reference(s).	A.1.32	Prior to the period of extended operation	• LRA Section B.2.1.35
	Revise implementing procedures to clearly identify structures with masonry walls within scope and to clarify qualification requirements for personnel who perform masonry wall walkdowns.		Prior to the period of extended operation	• LRA Section B.2.1.35

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
32. Structures Monitoring Program	Revise implementing documents to include license renewal reference(s).	A.1.33	Prior to the period of extended operation	• LRA Section B.2.1.36
	Enhance procedures implementing the10 CFR 50.65 Maintenance Rule Program to identify all structures and structural components within scope.		Prior to the period of extended operation	• LRA Section B.2.1.36 • Response to GALL audit Question 173 dated October 8, 2004 • Response to GALL audit Question 357 dated October 8, 2004
	Enhance procedures implementing the 10 CFR 50.65 Maintenance Rule program sampling approach to include examinations of below-grade concrete when excavated.		Prior to the period of extended operation	• LRA Section B.2.1.36 • Response to GALL audit Question 285 dated October 8, 2004
	Enhance procedures implementing the 10 CFR 50.65 Maintenance Rule program to include the guidance provided in ACI 349.3R-96 Chapter 7.		Prior to the period of extended operation	• LRA Section B.2.1.36
	Enhance LCEI-CI-C9, Attachment 1, "Buried Piping Inspection Checklist," to include "Mechanical Penetration" as an inspection attribute.		Prior to entering the period of extended operation	• Response to GALL audit Question 285 dated October 8, 2004

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
33. Inspection of Water-Control Structures Program	Revise implementing documents to include license renewal reference(s).	A.1.34	Prior to the period of extended operation	• LRA Section B.2.1.37
	Revise implementing documents to identify required structures and structural components within the scope of license renewal.		Prior to the period of extended operation	• LRA Section B.2.1.37
	Revise implementing documents to include special inspections following the occurrence of large floods, earthquakes, tornadoes, and intense rainfall.		Prior to the period of extended operation	• LRA Section B.2.1.37
	Implement periodic monitoring of the raw service water in close proximity to the Intake Pumping Station for the requirements of an aggressive environment.		Prior to the period of extended operation	• Response to RAI 3.5-16 dated April 5, 2005
34. Environmental Qualification Program	Revise implementing documents to include license renewal reference(s).	A.1.35	Prior to the period of extended operation	• LRA Section B.3.1
35. Fatigue Monitoring Program	Implement enhanced Fatigue Monitoring Program using the EPRI-licensed FatiguePro® cycle counting and fatigue usage tracking computer program.	A.1.36	Prior to the period of extended operation	• LRA Section B.3.2
36. Systems Monitoring Program	Revise implementing documents to include license renewal reference(s).	A.2.1	Prior to the period of extended operation	• LRA Section B.2.1.39 • Enclosure 1 of TVA letter dated September 14, 2005

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
37. Bus Inspection Program	Develop and implement new program.	A.2.2	Prior to the period of extended operation	• LRA Section B.2.1.40 • Response to RAI 3.6-4 dated December 9, 2004
38. Diesel Starting Air Program	Revise implementing documents to include license renewal reference(s).	A.2.3	Prior to the period of extended operation	• LRA Section B.2.1.41
39. Time-Limited Aging Analysis: Reactor Vessel Thermal Limit Analyses: Operating Pressure-Temperature Limits (P-T)	Develop and submit revised P-T limits to the NRC for approval.	A.3.1.5	Prior to the period of extended operation	• LRA Section A.3.1.5 • LRA Section 4.2.5
40. Time-Limited Aging Analysis: Environmental Qualification of Electrical Equipment	Revise existing EQ program to cover the extended period of operation.	A.3.3	Prior to the period of extended operation	• LRA Section A.3.3 • LRA Section 4.4
41. Time-Limited Aging Analysis: Other Plant Specific Time-Limited Aging Analysis: Emergency Equipment Cooling Water Weld Flaw Evaluation	Implement an administrative tracking system to ensure limiting number of fatigue cycles will not be exceeded at the select EECW locations.	A.3.5.7	Prior to the period of extended operation	• LRA Section A.3.5.7 • Response to RAI 4.7.8 dated March 2, 2005

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
42. RAI 2.1-2,A-3	Identify additional piping segments and supports/equivalent anchors to be placed in scope.	N/A	Complete	• Response to RAI 2.1-2,A-3 dated September 3, 2004 • TVA response dated February 28, 2005
43. RAI 2.1-2,B	Implement Unit 1, 2, and 3 DCNs to qualify twelve temperature switches in the Turbine Building.	N/A	Prior to the period of extended operation	• Response to RAI 2.1-2,B dated September 3, 2004
44. RAI 2.1-2,C RHRSW tunnel	Include 24-inch Raw Cooling Water discharge piping located in the RHRSW tunnel in scope of license renewal.	N/A	Complete	• Response to RAI 2.1-2,C RHRSW Tunnel dated September 3, 2004 • TVA response dated January 31, 2005
45. RAI 2.1-2,C Intake Pumping Station	Revise 10 CFR 54.4(a)(2) Scoping Methodology document to address components located in the lower compartments of the Intake Pumping Station.	N/A	Complete	• Response to RAI 2.1-2,C Intake Pumping Station dated September 3, 2004
46. Open Item OI 2.4-3	Perform one time confirmatory ultrasonic thickness (UT) measurements on a portion of the cylindrical section of the drywell on Units 2 and 3.	N/A	Prior to the period of extended operation	• Enclosures 1 and 9 of TVA letter dated November 16, 2005

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
47. Open Item OI 4.7.7	Perform a BFN plant-specific analysis consistent with BWRVIP-25 to demonstrate that the core plate hold-down bolts can withstand required loads, considering the effects of stress relaxation until the end of the period of extended operation. Take appropriate corrective action if the analysis does not satisfy the specified criteria. Submit the analysis or the corrective action taken to resolve the core plate hold-down bolt issue to the NRC for review.	N/A	Two years prior to the period of extended operation	• Enclosures 3 and 9 of TVA letter dated November 16, 2005
48. Not Used				

TABLE 2: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (UNIT 1 SPECIFIC)

NOTE: This Table does not contain all of the same Item Numbers as contained in Table 1. While there is a one-to-one correlation of items with the same number, the same Item Numbers are not in both tables as explained below:

- For Item Numbers 1 through 47, only those Item Numbers that have a Unit 1 specific commitment are included in this table.
- Item Numbers 49 and 63 applies only to Unit 1.

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
2. Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program	Include Unit 1 High-Range Radiation Monitoring cables in the Environmental Qualification (EQ) Program.	A.1.2	Prior to Unit 1 restart	• Response to GALL audit Question 169 dated October 8, 2004
5. Chemistry Control Program	Include Unit 1 in the program.	A.1.5	Prior to Unit 1 restart	• LRA Section B.2.1.5
7. Boiling Water Reactor Vessel Inside Diameter Attachment Welds Program	Include Unit 1 in the program.	A.1.7	Prior to Unit 1 restart	• LRA Section B.2.1.7
8. Boiling Water Reactor Feedwater Nozzle Program	Upgrade Unit 1 operating procedures to decrease the magnitude and frequency of feedwater temperature fluctuations.	A.1.8	Prior to Unit 1 restart	• LRA Section B.2.1.8
10. Boiling Water Reactor Stress Corrosion Cracking Program	Include Unit 1 in the program.	A.1.10	Prior to Unit 1 restart	• LRA Section B.2.1.10 • Response to GALL audit Question 181 dated October 8, 2004

TABLE 2: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (UNIT 1 SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
11. Boiling Water Reactor Penetrations Program	Include Unit 1 in the program.	A.1.11	Prior to Unit 1 restart	• LRA Section B.2.1.11 • Response to GALL audit Question 194 dated October 8, 2004
12. Boiling Water Reactor Vessel Internals Program	Include Unit 1 in the program.	A.1.12	Prior to Unit 1 restart	• LRA Section B.2.1.12 • Response to Question (4b) dated May 25, 2005
13. Flow-Accelerated Corrosion Program	Include Unit 1 in the program.	A.1.14	Prior to Unit 1 restart	• LRA Section B.2.1.15 • Response to GALL audit Question 144 dated October 8, 2004
15. Open-Cycle Cooling Water System Program	Include Unit 1 in the program.	A.1.16	Prior to Unit 1 restart	• LRA Section B.2.1.17 • Response to GALL audit Question 144 dated October 8, 2004
16. Closed-Cycle Cooling Water System Program	Include Unit 1 in the program.	A.1.17	Prior to Unit 1 restart	• LRA Section B.2.1.18 • Response to GALL audit Question 144 dated October 8, 2004
18. Compressed Air Monitoring Program	Include Unit 1 in the program.	A.1.19	Prior to Unit 1 restart	• LRA Section B.2.1.21

TABLE 2: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (UNIT 1 SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
19. BWR Reactor Water Cleanup System Program	Include Unit 1 in the program.	A.1.20	Prior to Unit 1 restart	• LRA Section B.2.1.22 • LRA Section F.13
20. Fire Protection Program	Update the Fire Protection Report and to incorporate Unit 1 as an operating unit. Fully implement the program on Unit 1.	A.1.21	Prior to Unit 1 restart	• LRA Section B.2.1.23
21. Fire Water System Program	Update the Fire Protection Report and procedures to incorporate Unit 1 as an operating unit. Fully implement the program on Unit 1.	A.1.22	Prior to Unit 1 restart	• LRA Section B.2.1.24
24. Reactor Vessel Surveillance Program	Either include Unit 1 within the BWRVIP ISP, or submit for NRC approval a plant specific surveillance program that meets the requirements of 10 CFR 50 Appendix H for the period of extended operation.	A.1.25	Prior to the period of extended operation	• LRA Section B.2.1.28
	Ensure BWRVIP-86-A and BWRVIP-116 are revised to incorporate Unit 1, and submit to the NRC a license amendment request to implement the ISP for site-specific use for Unit 1.		Prior to the period of extended operation	• Response to RAI B.2.1.28-1 dated January 31, 2005
25. One-Time Inspection Program	Perform a one-time inspection of the ASME equivalent Class MC supports in a submerged environment of the Unit 1 Torus.	A.1.26	Prior to Unit 1 restart	• Response to RAI B.2.1.33-2(b) dated January 18, 2005
34. Environmental Qualification Program	Include Unit 1 in the program.	A.1.35	Prior to Unit 1 restart	• LRA Section B.3.1

TABLE 2: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (UNIT 1 SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
47. Open Item OI 2.4-3	Perform one time confirmatory UT measurements on the drywell vertical cylindrical area immediately below the drywell flange	N/A	Prior to Unit 1 restart	• Enclosures 1 and 9 or TVA letter dated November 16, 2005
49. Unit 1 Periodic Inspection Program	Develop and implement new program.	A.2.4	Prior to Unit 1 restart	• Response to Proposed Unresolved Items 3.0-2 LP (1 & 2) and 3.0-3 LP dated May 27, 2005 • Enclosure 1 of TVA letter dated September 14, 2005 • Enclosure 1 of TVA letter dated April 4, 2006
	Develop and submit implementing procedure(s) for NRC review.		Prior to Unit 1 restart	• Response to Proposed Unresolved Items 3.0-4 LP dated May 27, 2005 • Enclosure 1 of TVA letter dated April 4, 2006

TABLE 2: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (UNIT 1 SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
63. Response to NRC Questions Concerning RPV Internals	Replace all BFN Unit 1 dry tubes.	N/A	Prior to Unit 1 restart	• Response to Question (8) dated May 25, 2005
	Perform MSIP for Unit 1 Control Rod Drive Return Line Cap.		Prior to Unit 1 restart	• Response to Question (6) dated May 25, 2005
	Change the Unit 1 AHCs to bolted design.		Prior to Unit 1 restart	• Response to NRC Question (7) dated May 25, 2005

TABLE 3: UNIT 1 RESTART COMMITMENTS THAT ARE DISCUSSED IN LRA APPENDIX F

NOTE: See Note at the beginning of Table 2

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
50. Appendix F.1	Evaluate and modify, as required, main steam leakage path piping to ensure structural integrity.	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006
51. Appendix F.2	Implement Containment Atmosphere Dilution System modification.	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006
52. Appendix F.3	Revise Fire Protection Report per Unit 1 License Condition 2.C.13.	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006 • TVA response dated April 21, 2006
53. Appendix F.4	Implement Environmental Qualification Program.	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006
54. Appendix F.5	Address GL 88-01, and make necessary plant modifications.	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006

TABLE 3: UNIT 1 RESTART COMMITMENTS THAT ARE DISCUSSED IN LRA APPENDIX F

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
55. Appendix F.6	BWRVIP Programs used for Units 2 and 3 will be used for Unit 1.	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006
56. Appendix F.7	Install ATWS features.	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006
57. Appendix F.8	Remove Reactor Vessel Head Spray piping in drywell, and seal the primary containment penetrations	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006
58. Appendix F.9	Implement the Hardened Wetwell Vent modification.	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006
59. Appendix F.10	Cap Service Air and Demineralized Water Primary Containment Penetrations.	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006

TABLE 3: UNIT 1 RESTART COMMITMENTS THAT ARE DISCUSSED IN LRA APPENDIX F

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
60. Appendix F.11	Modify Auxiliary Decay Heat Removal System to serve Unit 1.	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006
61. Appendix F.12	Fully implement the Maintenance Rule Unit 1's temporary exemption ceases to be effective.	N/A	Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006
62. Appendix F.13	Replace RWCU piping outside of primary containment with IGSCC resistant piping. Implement actions requested in GL 89-10 for RWCU	N/A	Complete	• LRA Appendix F • TVA response dated January 31, 2005 • TVA response dated March 2, 2006

APPENDIX B

CHRONOLOGY

This appendix contains a chronological listing of the routine licensing correspondence between the U.S. Nuclear Regulatory Commission (NRC) staff and the Tennessee Valley Authority (TVA), and other correspondence regarding the NRC staff's reviews of the Browns Ferry Nuclear (BFN), Units 1, 2, and 3 (under Docket Numbers 50-259, 50-260 and 50-296) license renewal application (LRA).

November 7, 2005	Letter from Harold O. Christensen, NRC, to K. W. Singer, Tennessee Valley Authority (TVA) regarding Browns Ferry Nuclear Plant - Inspection Report 05000259/2005013, 05000260/2005013, and 05000296/2005013 (Accession No. ML053120402)
November 28, 2005	Response to Advisory Committee on Reactor Safeguards (ACRS) - Interim Report on the Safety Aspects of the License Renewal Application (LRA) for Browns Ferry Nuclear Plant, Units 1, 2, and 3. (Accession No. ML053180460)
December 20, 2005	TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) - Supplemental Information for the Time Limited Aging Analysis of the Relaxation of the Core Hold-Down Bolts and the Unit 1 Periodic Inspection Program (TAC NOS. MC1704, MC1705, AND MC1706) (Accession No. ML053560328)
January 31, 2006	Browns Ferry Nuclear Plant, Units 1, 2, and 3 License Renewal Application - Annual Update Letter (Accession No. ML060410288)
January 31, 2006	Safety Evaluation Report related to the License Renewal Application of Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Request for Additional Information Related to Appendix F items in the Application. (Accession No. ML060330295)
February 14, 2006	TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) Units 1, 2, and 3 License Renewal Application - Revised Commitment Tables" (Accession No. ML060450582)
March 1, 2006	Memorandum to James E. Dyer, Director of Nuclear Reactor Regulation from William D. Travers, Regional Administrator, regarding Browns Ferry License Renewal Application. (Accession No. ML060610326)
March 2, 2006	TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) Units 1, 2, and 3 License Renewal Application - Request for Additional Information related to Appendix F of the License Renewal Application: Integration of BFN Unit 1 Restart and License Renewal Activities" (Accession No. ML0606106100)

March 3, 2006	Safety Evaluation Report related to the License Renewal Application of Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Request for Additional Information Related to Appendix F items in the Application and Topics Discussed in Public Meeting on March 1, 2006, at the Nuclear Regulatory Commission. (Accession No. ML0606203530)
March 7, 2006	TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) Units 1, 2, and 3 License Renewal Application - Periodic Inspection Program" (Accession No. ML060660374)
March 7, 2006	TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) Units 1, 2, and 3 License Renewal Application - Supplemental Information for Open Item 2.4-3. (Accession No. ML060790376)
March 23, 2006	Letter from Dr. Graham B. Wallis, ACRS Chairman, to Honorable Nils J. Diaz, NRC Chairman. Report on the Safety Aspects of the License Renewal Application for the Browns Ferry Nuclear Plant Units 1, 2, and 3. (Accession No. ML060870208)
April 4, 2006	TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) Units 1, 2, and 3 License Renewal Application - Unit 1 Lower Drywell Liner Inspections, Unit 1 Periodic Inspection Program, and Residual Heat Removal Service Water Piping Inspections (TAC NOS. MC1704, MC1705, AND MC1706 (Accession No.ML060950060)
April 21, 2006	TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) Units 1, 2, and 3 License Renewal Application - Revised Commitment List (TAC NOS. MC1704, MC1705, AND MC1706)

APPENDIX C
PRINCIPAL CONTRIBUTORS

NAME	RESPONSIBILITY
R. Subbaratnam	Project Manager
Y. Diaz Sanabria	Project Manager
R. Karas	Management Supervision
D. Jeng	Civil Engineering
H. Ashar	Civil Engineering
K. Manoly	Management Supervision
Y. Li	Technical Support: Mechanical Engineering
R. McNally	Mechanical Engineering
M. Hartzman	Mechanical Engineering
C. Julian	Regional Support
L. Lund	Management Supervision
A. Hodgdon	Office of General Counsel

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8. PERFORMING ORGANIZATION - NAME AND ADDRESS *(If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)*

Division of License Renewal
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

9. SPONSORING ORGANIZATION - NAME AND ADDRESS *(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)*

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10. SUPPLEMENTARY NOTES

11. ABSTRACT *(200 words or less)*

This document is a supplemental safety evaluation report (SSER) on the application for license renewal for the Browns Ferry Nuclear Plant (BFN), as filed by Tennessee Valley Authority (TVA or the applicant). By letter dated December31, 2003, TVA submitted its application to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for renewal of the BFN operating licenses for an additional 20 years. The NRC staff (the staff) issued a safety evaluation report (SER), dated January 12, 2006, which summarizes the results of its safety review of the renewal application for compliance with the requirements of Title10, Part54, of the Code of Federal Regulations, (10CFRPart54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

During the 530th full committee meeting of the Advisory Committee on Reactor Safeguards, March9, 2006, the Committee reviewed the license renewal application (LRA) for BFN Units1, 2, and 3. The staff had closed the open items with a commitment to issue a supplemental safety evaluation report (SSER) that addresses the Committee's review comments on the SER. This SSER addresses the Committee's concerns and includes revisions and enhancements to the following aging management programs (AMPs): (1) Unit1 Periodic Inspection Program (B.2.1.42), (2) ASME SectionXI Subsection IWE Program (B.2.1.32), and (3) Open-Cycle Cooling Water System Program (B.2.1.17). This supplement also addresses the Committee's other concerns as documented in its final letter report dated March23, 2006.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

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