December 16, 2004

Mr. Karl W. Singer
Chief Nuclear Officer and Executive Vice President
Tennessee Valley Authority
6A Lookout Place 1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE BROWNS FERRY NUCLEAR, UNITS 1, 2, AND 3, LICENSE RENEWAL APPLICATION

Dear Mr. Singer:

By letter dated December 31, 2003, Tennessee Valley Authority, (TVA or the applicant) submitted an application pursuant to 10 CFR Part 54, to renew the operating licenses for Browns Ferry Nuclear (BFN), Units 1, 2, and 3, for review by the U.S. Nuclear Regulatory Commission (NRC). The NRC staff is reviewing the information contained in the license renewal application (LRA) and has identified, in the enclosure, areas where additional information is needed to complete the review.

These RAIs were discussed with your staff, Ken Brune, and a mutually agreeable date for this response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-1594 or e-mail YKS@nrc.gov.

Sincerely,
/RA/
Yoira K. Diaz Sanabria, Project Manager
License Renewal Section A
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

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

Enclosure: As stated

cc w/encls: See next page

December 16, 2004

Mr. Karl W. Singer
Chief Nuclear Officer and Executive Vice President
Tennessee Valley Authority
6A Lookout Place 1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE BROWNS FERRY NUCLEAR, UNITS 1, 2, AND 3, LICENSE RENEWAL APPLICATION

Dear Mr. Singer:

By letter dated December 31, 2003, Tennessee Valley Authority, (TVA or the applicant) submitted an application pursuant to 10 CFR Part 54, to renew the operating licenses for Browns Ferry Nuclear (BFN), Units 1, 2, and 3, for review by the U.S. Nuclear Regulatory Commission (NRC). The NRC staff is reviewing the information contained in the license renewal application (LRA) and has identified, in the enclosure, areas where additional information is needed to complete the review.

These RAIs were discussed with your staff, Ken Brune, and a mutually agreeable date for this response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-1594 or e-mail YKS@nrc.gov.

Sincerely,
/RA/
Yoira K. Diaz Sanabria, Project Manager
License Renewal Section A
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

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

Enclosure: As stated

cc w/encls: See next page

DISTRIBUTION: See next page

Adams Accession no.: **ML043560502**

Document Name: E:\Filenet\ML043560502.wpd

OFFICE	PM:RLEP	PM:RLEP	SC:EMEB	SC:RLEP
NAME	YDiaz-Sanabria	RSubbaratnam	KManoly	SLee
DATE	12/15/04	12/15/04	12/15/04	12/16/04

OFFICIAL RECORD COPY

cc:
Mr. Karl W. Singer
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Ashok S. Bhatnagar, Senior Vice
President
Nuclear Operations
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Michael J. Lorek, General Manager
Nuclear Engineering
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Michael D. Skaggs, Site Vice President
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

General Counsel
Tennessee Valley Authority
ET 11A
400 West Summit Hill Drive
Knoxville, TN 37902

Mr. John C. Fornicola, Manager
Nuclear Assurance and Licensing
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Kurt L. Krueger, Plant Manager
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Jon R. Rupert, Vice President
Browns Ferry Unit 1 Restart
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Robert G. Jones
Browns Ferry Unit 1 Plant Restart Manager
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Fredrick C. Mashburn, Senior
Program Manager
Nuclear Licensing
Tennessee Valley Authority
4X Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Timothy E. Abney, Manager
Licensing and Industry Affairs
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Bobby L. Holbrook
Senior Resident Inspector
U.S. Nuclear Regulatory Commission
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, AL 35611-6970

State Health Officer
Alabama Dept. of Public Health
RSA Tower - Administration
Suite 1552
P.O. Box 303017
Montgomery, AL 36130-3017

Chairman
Limestone County Commission
310 West Washington Street
Athens, AL 35611

cc:
Mr. Fred Emerson
Nuclear Energy Institute
1776 I St., NW, Suite 400
Washington, DC 20006-2708

Ken Brune, Manager
Browns Ferry License Renewal Project
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

DISTRIBUTION: Ltr. To K. Singer, TVA, Re: Browns Ferry, Units 1, 2 and 3 , LRA, Dated: December 16, 2004

Adams accession nos.: **ML043560502**

HARD COPY
RLEP RF
Yoira Diaz, Project Manager
Ram Subbaratnam, Project Manager
E-MAIL:
RidsNrrDrip
RidsNrrDe
G. Bagchi
K. Manoly
W. Bateman
J. Calvo
R. Jenkins
P. Shemanski
J. Fair
RidsNrrDssa
RidsNrrDipm
D. Thatcher
R. Pettis
G. Galletti
C. Li
M. Itzkowitz (RidsOgcMailCenter)
R. Weisman
M. Mayfield
A. Murphy
S. Smith (srs3)
S. Duraiswamy
Y. L. (Renee) Li
RLEP Staff

K. Jabbour
C. Julian (RII)
S. Cahill (RII)
A. Hodgdon
C. Carpenter
D. Coe
E. Kleeh
M. Marshall
R. McNally

BROWNS FERRY NUCLEAR, UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA)
REQUEST FOR ADDITIONAL INFORMATION (RAI)

Follow-up RAI to RAI-3.0-1 LP (b)

The applicant stated in its response to RAI 3.0-1LP, that the impurities (i.e.; chlorides and sulfates in the reactor coolant system (RCS) water) are monitored once in two weeks during wet layup. Since the frequency of the verification of the RCS water chemistry is once every two weeks, pitting and crevice corrosion of the reactor pressure vessel (RPV), RPV internals and RCS components, could occur.

(1) Identify the potential sources in the primary systems which can cause impurities to leak into the primary systems.

(2) Provide information regarding its past experience, if any, related to any sudden increase in concentration of chlorides and sulfates in the RCS water during the wet layup, and the corrective actions taken to prevent impurities migrating into crevices in the RCS.

(3) Identify the crevice locations in the RPV, RPV internals and RCS components, which will not be replaced and where accumulation of aggressive ions such as chlorides and sulfates inside the crevice can enhance the likelihood of crevice and pitting corrosion during the wet layup.

(4) Provide information regarding the type of the intended inspection prior to restart and during the period of extended operation, to be use to identify this aging effect due to pitting and crevice corrosion in the RPV, RPV internals and RCS components which will not be replaced.

RAI 3.0-9 LP

The LRA Appendix F indicates that significant sections of piping and components have been or will be replaced prior to restart. It is not clear if Appendix F includes all piping and components that has been or will be replaced prior to restart. Based on the responses to RAI for Section B.2.1.4 developed during the license renewal audit inspection during the weeks of June 21, 2004 and July 26, 2004, it was stated that repaired or replaced components will receive a preservice examination in accordance with the requirements of ASME Section XI Subsection IWB, IWC, or IWD programs related to the components being repaired or replaced and prior to returning the system to service. In this response, it was stated that a re-baseline inspection will be performed on the remaining Class 1, 2 and 3 components that have not been repaired or replaced.

(1) Please provide information to identify the basis, such as inspections or suspected degradation, to determine which components need to be replaced and those that do not.

(2) Clarify if the LRA Appendix F includes all piping and components that will be replaced prior to startup and identify in a simplified boundary diagram, those specific sections of piping and components that have recently been or will be replaced and those that have not been replaced.

(3) Please refer to RAI 3.0-11 LP; clarify appropriate layup or cleanliness programs and inspections that are in use and planned for these components. Please refer to RAI 3.0-10 LP; provide information for those systems or portions of systems and components that have not been recently replaced and were subject to the extended layup.

RAI 3.0-10 LP

For those systems or portions of systems that have been subject to an extended layup, one-time inspections prior to start-up may not be appropriate as a verification program for extended layup or chemistry control for certain materials where degradation is expected and additional inspections may be required. Industry documents, such as EPRI NP-5106 "Sourcebook for Plant Layup and Equipment Preservation," and EPRI CS-5115 "Guidelines: Long-Term Layup of Fossil Plants," recommend periodic inspections during layup to determine the effectiveness of the layup program. EPRI NP-5106 specifically recommends that a surveillance and assessment program is needed to monitor the effects of outage or storage conditions on nuclear power plant components, otherwise, evidence of bad layup often will not even manifest itself until after a plant has returned to power. This document also states that, in order to monitor the effectiveness of the layup practice and to differentiate between the effects of power operation and layup, it would be necessary to inspect components immediately after plant shutdown and again just prior to start-up. EPRI CS-5115 recommends that a routine monitoring program must be established to check the effectiveness of the layup program, specifically states that a routine annual inspection of all equipment plus general condition of the plant should be conducted. Aging management program (AMP) XI.M32 describes the one-time inspection as a program to verify the effectiveness of an aging management program and confirm the absence of an aging effect. This AMP also describes the use of the one-time inspection program to be acceptable where either an aging effect is not expected to occur but there is insufficient data to completely rule it out or an aging effect is expected to progress very slowly.

EPRI NP-5106 and EPRI NP-5580, "Sourcebook for Microbiologically Influenced Corrosion in Nuclear Power Plants," identify that aging effects that are expected for nearly all materials during the extended layup and plant operation, unless effective layup, chemistry programs and inspections have been implemented to confirm the absence of aging. Although consistency with the BWRVIP-79 is credited, no inspection data has been referenced in the LRA, to confirm that the aging effects are not occurring or are expected to occur at a very slow rate. Responses to RAIs 3.3-1 LP and 3.3-2 LP, just included a discussion that one-time inspection will be performed prior to Unit 1 restart to verify the material condition, but did not included any information in regard to the rate of degradation or a justification that using one-time inspection is sufficient to identify material degradation. The response to RAI 3.01 LP (b)2 indicated that one-time inspection does not differentiate between the rates of aging in different environments. The response to RAI 3.0-5 LP also stated that it was not the intent of this AMR to determine the rate of loss of material. In addition, there is no information in the LRA or in the responses to

these RAIs to justify that the rate of degradation during the extended outage was bounded by the degradation rate during plant operation. Therefore, please address the following staff concerns:

Application of one-time inspection versus periodic inspections

One-time inspections may not be appropriate where degradation is expected to occur or not occur very slowly. For systems not associated with the BWR VIP program, please justify why a one-time inspection is appropriate for aging management in lieu of periodic inspections. Please clarify if previous inspections performed during the extended outage are being credited, and clarify the extent and results of those inspections. If the one-time inspection is intended to represent a baseline and additional inspections will be applied to evaluate future degradation, please clarify and explain how follow-up inspections will be performed, including information to support the effectiveness of the corrective action process to resolve aging degradation.

Review of one-time inspections

NUREG-1801 XI.M32 indicates that one-time inspections or any other action or program is to be reviewed on a plant specific basis. If one-time inspection program is credited as being consistent with NUREG-1801, the information provided in the LRA is not sufficient to determine that the program can be used on a plant specific basis. Please provide additional information on each element of the one-time inspection program to support a plant specific review. Alternatively, please provide a plan to implement the program with sufficient time to validate its effectiveness. Since this program is to be implemented prior to start-up, it should be readily available now or in the near future. The following specific information should be included:

(1) Scope of the program
Identify specific components and locations subject to one-time inspection or clarify the basis for selecting a particular sample size. This concern is addressed in greater detail below.

(3) Parameters Monitored/Inspected
Identify specific parameters monitored/inspected such as wall thining, evidence of general corrosion, cracking, pitting, erosion, MIC and fouling.

(4) Detection of Aging Effects
Identify NDE techniques applied to detect degradation and clarify which components will be inspected internally. Identify qualifications of inspection personnel and any specific training to improve techniques where results are subjective or qualitative.

(5) Monitoring and Trending
Clarify how plant specific and industry wide experience will be applied to the techniques used to perform follow-up inspections.

(6) Acceptance Criteria
Define general acceptance criteria with justification such as no evidence of any degradation or minimum wall thickness plus an allowance for future degradation. Also identify where specific established acceptance criteria is or will be defined.

(7) Operating Experience
Although the program is new and no operating experience with the program exists, there should be operating experience with the effectiveness of various inspections and the corrective action process to detect and correct aging degradation. Clarify if sufficient data is now available or when it will be available. Provide examples of such operating experience and identify the results of any independent assessments to evaluate the effectiveness of plant inspections and the corrective action process to detect and correct aging degradation. Also, as identified above, the one-time inspection program should be implemented early enough to validate its effectiveness.

Sample size for one-time inspections

Section B.2.1.29 of the LRA, indicates that elements of the one-time inspection program will include determination of the sample size based on an assessment of materials of fabrication, environment, plausible aging effects, and operating experience. NUREG 1801, XI.M32, recommends a review of one-time inspections on a plant specific basis including determination of the sample size. Identify when the sample size is to be developed and provide the basis for selecting an adequate sample size including the basis for expanding the sample size and locations.

Rate of degradation

The rate of degradation is important to determine the need and timing for follow-up inspections. The information submitted in the LRA and RAI responses, letter dated October 8, 2004, did not clarify whether the conditions that existed during the extended outage were more severe or less severe than during plant operation. As a result, the rate of degradation cannot be readily determined from a one-time inspection. Clarify how the rate of degradation will be determined from a one-time inspection to facilitate planing follow-up inspections and to predict the remaining service life. Also, clarify how an appropriate schedule of one-time inspection is to be determined, please refer to the following section.

Schedule for one-time inspection

Section B.2.1.29 of the LRA, states that one-time inspection will be completed before the end of the current operating license term, but the inspection will not be scheduled too early in the current operating license term so that there will be no questions raised regarding the continued absence of aging effects prior to and near the extended period of operation. The response to RAI 3.01 LP (b)2 stated that a one-time inspection will be performed prior to restart. Identify with justification, such as using information on the rate of degradation or otherwise, the appropriate timing of the one-time inspection to demonstrate that the inspection is early enough to validate the effectiveness of the program, and yet late enough to account for latent aging effects. Please clarify if periodic inspections rather than one-time inspections are necessary.

Microbiologically Influence Corrossion (MIC)

Industry documents, such as NP-5580, "Sourcebook for Microbiologically Influenced Corrosion in Nuclear Power Plants," indicate that MIC is potentially a significant corrosion mechanism during an extended outage and during plant operation. Various corrosion mechanisms that would not be active during operation often appear during layup as water chemistry controls may

not be as stringent as during high temperature operation when greater attention is focused on impurity control. The response to RAI 3.0-3 LP states that a review of operating experience did not identify MIC as a concern in treated water. It is not clear if inspections or monitoring for microbes were actually performed in susceptible areas. Clarify why one-time inspections are appropriate for locations with stagnant, low flow or intermittent flow, where MIC is expected on the basis of industry operating experience due to possible ineffective chemistry control in these regions. Identify the results of any inspections performed in low flow or stagnant areas to demonstrate that aging effects are not expected to occur or are expected to occur slowly. Also provide information on any corrosion monitoring programs for MIC, including augmented inservice inspection of susceptible areas and corrosion coupons or spool pieces, unless periodic inspection are taken into consideration to evaluate aging effects in these areas.

RAI 3.0-11 LP

The System Cleanliness Verification Program is not addressed in the LRA. NRC quarterly integrated inspection report 05000259/2004006 states that on March 22, 2004 the licensee decided to remove all Unit 1 systems from layup. This decision was based on the need to transition to a System Cleanliness Verification Program. On the basis of NRC quarterly integrated inspection report 05000259/2004007, this program is intended to replace the previous Equipment Layup Program that has been in place since the unit was shutdown. This report also stated that, under the new program, the assigned system and component engineers, along with chemistry personnel, would perform a series of inspections of Unit 1 systems to identify any system degradation or special requirements to support Unit 1 recovery. Clarify if these series of inspections are part of the one-time inspection program that is going to be implemented prior to restart or in addition to the cleanliness verification program inspections. Also it is not clear that this system cleanliness verification program includes inspections on components that were replaced or repaired. Please provide information as to what type of inspections have been or are going to be performed by the System Cleanliness Verification Program.

Follow-up RAI to RAI 3.3-2 LP (Refer to new RAI 3.0-10 LP)

The response to RAI 3.3-2 LP stated that carbon steel piping and fittings, copper valves, copper heat exchanger (cooler) tubing, cast iron heat exchanger (cooler) head see the raw water environment during lay-up. It also mentioned that a sample of components with a raw water environment within the Control Rod Drive System (85) will be inspected for aging degradation by the One-Time Inspection Program. Raw water environment may be a likely detrimental environment for aging degradation for carbon steel, cast iron and copper-based components. NUREG 1801 XI.M32, one-time inspection, states that the AMP is an acceptable verification when either (a) an aging effect is not expected to occur but there is insufficient data to completely rule it out, or (b) an aging effect is expected to progress very slowly. Clarify whether one-time inspection is appropriate to manage aging of carbon steel, cast iron and copper-based components in raw water environment during lay-up. Also provide the technical justification as to why one-time inspection is appropriate. If one-time inspection is not appropriate, then provide alternative appropriate aging management activities such as periodic inspection, with specific programmatic elements.