October 12, 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 PLANT, UNITS 1, 2 AND 3, LICENSE RENEWAL APPLICATION (TAC NOS. MC1704, MC1705 AND MC1706)

Dear Mr. Singer:

By letter dated December 31, 2003, Tennessee Valley Authority (TVA) submitted an application pursuant to 10 CFR Part 54, to renew the operating licenses for the Browns Ferry Nuclear Plant, 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 areas where additional information is needed to complete the review. Specifically, the enclosed requests for additional information (RAIs) are related to the aging management of auxiliary systems in Section 3.3 of the LRA. Drafted forms of these RAIs were discussed with TVA staff on a telephone conference call on August 18, 2004.

Based on discussions with Ken Brune of your staff, a mutually agreeable date for your response to the RAIs is within 30 days of the date of this letter. If you have any questions regarding this letter or if circumstances result in your need to revise the response date, please contact me at (301) 415-1594 or by e-mail at 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/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION (RAI) RELATED TO AGING MANAGEMENT OF AUXILIARY SYSTEMS OF BROWNS FERRY UNITS 1, 2, AND 3 BROWNS FERRY NUCLEAR PLANT LICENSE RENEWAL APPLICATION

GENERAL QUESTIONS

RAI 3.3.2.1-1

Aging management review (AMR) table line items for copper alloy in an inside air (external) environment, for this material/environment combination, the LRA identifies no aging effects requiring management (AERMs) and, consequently, proposes no aging management programs (AMPs). However, the existence of AERMs depends on the particular alloy and whether there is condensation or pooling on the component. For example, high zinc (>15%) alloys in condensation or pooling water may exhibit stress corrosion cracking, selective leaching, or pitting and crevice corrosion. The LRA definition of inside air (external) would support condensation and pooling. Clarify how condensation and pooling were considered in the evaluation of potential aging of susceptible alloys.

SYSTEM SPECIFIC QUESTIONS

Fuel Oil System

RAI 3.3.2.2-1

LRA Section 3.3.2.2.7 indicates that the one-time inspections will be performed at locations where contaminants would accumulate in the fuel oil system. It appears that this is applicable to the entire system, even though not all components specifically cite this LRA section (via Table 3.3.1 Item 3.3.1.7). Clarify whether this is the case. Also, clarify whether it applies to the copper alloy components in a fuel oil environment, if contaminants can accumulate in these components. If not, provide justification for not performing inspections at all system low points where contaminants could accumulate, or provide aging management for these areas.

RAI 3.3.2.2-2

In Table 3.3.2.2 of the LRA, numerous line items state that carbon and low alloy steel components in fuel oil experience no AERMs and require no AMPs. This is not consistent with the GALL or with industry experience. Adjacent line items in LRA Table 3.3.2.2 for the same material, environment, and GALL reference, state that the components are subject to loss of material due to microbiologically influenced corrosion (MIC), cite industry experience as the basis for this conclusion, and credit the Fuel Oil Chemistry Program and the One-Time Inspection Program for aging management. Clarify whether these adjacent line items apply to the same components. If so, clarify whether the adjacent line items are intended to state that you consider MIC to be the only aging mechanism instead of the aging mechanisms in GALL. Clarify whether you intend to credit the Fuel Oil Chemistry Program and the One-Time Inspection Program for all carbon steel and low alloy steel components in the system. If not, provide aging management for the carbon steel and low alloy steel components that are not covered by these programs.

Ventilation System

RAI 3.3.2.1.8-1

Table 3.3.2.1.8 that the carbon and low alloy steel ductwork experiences no aging effects. The staff notes that adjacent entries in Table 3.3.2.8 for the same material, environment, and GALL reference, identify a loss of material due to general corrosion. It appears that the applicant takes exception to the GALL's identification that crevice corrosion, pitting corrosion, and MIC are applicable, and instead has determined that general corrosion is applicable. The basis is that the LR scope of the system does not include drip pans and the moisture content of the air does not result in an aggressive environment or pooling water which would promote the other mechanisms. Clarify whether the adjacent line items refer to the same components, such that the components will receive a one-time inspection for general corrosion. Otherwise, provide additional justification for the determination that carbon and low alloy steel ductwork does not require aging management, or provide aging management.

RAI 3.3.2.1.8-2

Table 3.3.2.1.8 line item related to elastomer - rubber and silicone rubber ductwork in inside air. For this material/environment combination, the applicant claims that there are no AERMs based on industry guidance. The degradation of elastomers depends on the environmental factors such as the temperature, radiation levels, and presence of aggressive chemicals. Degradation can also be caused by wear (for items such as seals and vibration dampers). The applicant is asked to provide additional information on the above factors to justify that there are no AERMs for the elastomers, or to provide aging management for the elastomer components in the ductwork.

Heating, Ventilation, and Air Conditioning System

RAI 3.3.2.1.9-1

Table 3.3.2.1.9 line items related to elastomer ductwork, fittings, and flexible connectors in inside air. For this material/environment combination, the applicant claims that there are no AERMs based on industry guidance. The degradation of elastomers depends on the environmental factors such as the temperature, radiation levels, and presence of aggressive chemicals. Degradation can also be caused by wear. The applicant is asked to provide additional information on the above factors to justify that there are no AERMs for the elastomers, or to provide aging management for the elastomer components in the ductwork, fittings, and flexible hoses.

RAI 3.3.2.1.9-2

Table 3.3.2.1.9 line item related to copper alloy heat exchangers in inside air (external). The applicant claims that there are no AERMs for this material environment combination. The staff notes that the component intended functions are pressure boundary and heat transfer. The staff also notes that the LRA states there is condensation in the heat exchangers (Note 3 of Table 3.3.2.1.9). Therefore, there is the potential for corrosion and loss of heat transfer in the copper alloy heat exchanger components. There is also the potential for particulate fouling. The applicant is asked to provide additional justification for determining that there are not

AERMs for these heat exchanger components, including loss of heat transfer, or to provide aging management.

Emergency Equipment Cooling Water System

RAI 3.3.2.1.20-1

Table 3.3.2.1.20 of the LRA identifies heat exchanger components made from copper alloy exposed to inside air (external) with an intended functions of pressure boundary and heat transfer. The LRA identifies that there are no AERMs for this component. This is contrary to industry experience, since condensation and pooling can result in loss of material for certain copper alloys and since particulate fouling can contribute to loss of heat transfer. Provide justification that the heat exchanger components will not experience aging effects, including loss of heat transfer, or provide an AMP to address this AERM.

Reactor Core Isolation Cooling System

RAI 3.3.2.1.23-1

Table 3.3.2.1.23 of the LRA identifies heat exchanger components made from copper alloy exposed to inside air (external) with an intended functions of pressure boundary and heat transfer. The LRA identifies that there are no AERMs for this component. This is contrary to industry experience, since condensation and pooling can result in loss of material for certain copper alloys and since particulate fouling can contribute to loss of heat transfer. Provide justification that the heat exchanger components will not experience aging effects, including loss of heat transfer, or provide an AMP to address this AERM.

Bolting Commodity Group

RAI 3.3.2.1.35-1

The LRA does not consider cracking as an applicable AERM for the nickel alloy bolting (i.e., in the sampling and water quality system). Nickel alloys are susceptible to stress corrosion cracking under certain environmental conditions. Provide additional information on the nickel alloy bolting to justify that cracking will not occur.

B.2.1.39 Systems Monitoring Program

RAI B.2.1.39-1

LRA Section B.2.1.39 describes the existing plant specific systems monitoring program that includes periodic visual inspections of systems' and components' material condition, operation, and configuration. The LRA AMR tables identify the material and aging effect requiring management for each component crediting the systems monitoring program. The AMR identifies the main aging effect managed by the systems monitoring program as loss of material due to general corrosion on the external surfaces of carbon steel, low alloy steel, cast iron and cast iron alloy materials exposed to inside air or outside air environments. The AMR identifies that external surfaces of elastomers used in ductwork and flexible connectors are also managed by the systems monitoring program for elastomer degradation due to ultraviolet

radiation or thermal exposure. The staff requires additional information concerning specific elements of AMP B.2.1.39.

a) Element 4, Detection of Aging Effects, identifies that the systems monitoring program includes visual inspections to identify material condition on a periodic basis. Clarify if visual inspections are required for all surfaces of all components and systems crediting this program or if only selected portions of systems and components are to be inspected. The SRP-LR recommends that, when sampling is used to inspect a group of SCs, the basis for the inspection population and sample size should be provided. If a sampling approach is used, provide justification that the sample size is adequate. Also, clarify how external surfaces of systems that are either covered by insulation or are located in normally inaccessible areas are to be visually inspected. The SRP-LR recommends that the method or technique used to detect the aging effect be appropriate to ensure that the component intended function(s) will be adequately maintained. Clarify how elastomer degradation, such as hardening and loss of strength, would be detected by visual inspections, prior to loss of its intended function. Also, clarify how external surface inspections using the systems monitoring program would detect internal aging effects caused by exposure to treated water for the flexible connectors in the diesel generator system.

b) Element 6, Acceptance Criteria, identifies that during a system or component visual inspection, system engineers use their knowledge to evaluate system physical attributes and operational characteristics. The SRP-LR recommends that the acceptance criteria, such as ASME codes, and its basis be described. Clarify the acceptance criteria applied in the inspection or evaluation of degradation reported as a result of the system monitoring inspection.

c) Element 10, Operating Experience, identifies that the systems monitoring program and system heath reports have identified age related degradation and material conditions of systems and components. The SRP-LR recommends that operating experience with existing programs should be discussed. Identify specific operating experience that provides objective evidence to support the conclusion that the systems monitoring program is effective in managing aging effects on the external surfaces of systems and components within scope of the program. If independent assessments have been performed to evaluate the effectiveness of the systems monitoring program, describe the scope and results of these assessments.

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