

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

March 15, 2002

SUBJECT: BROWNS FERRY PLANT, UNITS 2 AND 3 - SAFETY EVALUATION
REGARDING PROPOSED ALTERNATIVE TO ADOPT THE BWRVIP-75
WELD EXAMINATION SCHEDULE (TAC NOS. MB3771 AND MB3772)

Dear Mr. Scalice:

By letter dated January 8, 2002, Tennessee Valley Authority submitted a proposed alternative for weld inspection at Browns Ferry Plant, Units 2 and 3 (BFN 2 and 3), in lieu of its present commitments to Generic Letter 88-01 and NUREG-0313, Revision 2. The welds selected for examination in accordance with the BFN 2 and 3 risk-informed inservice inspection program are not affected by this proposed alternative. The proposed alternative would be to adopt the guidance contained in the Electric Power Research Institute (EPRI) proprietary report TR-113932, "BWR [Boiling Water Reactor] Vessel and Internals Project, Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules (BWRVIP-75)," dated October 1999, as revised by the U.S. Nuclear Regulatory Commission (NRC) staff's initial safety evaluation (SE) dated September 15, 2000, and as modified in the enclosure to the NRC letter dated January 8, 2002.

The NRC staff has completed its review of your proposed alternative to adopt and utilize the guidance of the EPRI BWRVIP-75 report and your response to the open items in the staff's September 15, 2000, SE for the EPRI BWRVIP-75 report. Based on this review, the staff finds, as discussed in the enclosed SE, that your utilization of the EPRI BWRVIP-75 report, as revised, is acceptable.

Sincerely,
/RA/

Kahtan N. Jabbour, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-260, and 50-296

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

BROWNS FERRY NUCLEAR PLANT UNITS 2 AND 3

PROPOSED ALTERNATIVE TO ADOPT THE BWRVIP-75

WELD EXAMINATION SCHEDULE

DOCKET NOS. 50-260 AND 50-296

1.0 INTRODUCTION

1.1 Background

By letter dated January 8, 2002, Tennessee Valley Authority submitted a proposed alternative for weld inspection at Browns Ferry Plant, Units 2 and 3 (BFN 2 and 3), in lieu of its present commitments to Generic Letter 88-01 and NUREG-0313, Revision 2. The welds selected for examination in accordance with the BFN 2 and 3 risk-informed inservice inspection programs are not affected by this proposed alternative. The proposed alternative would be to adopt the guidance contained in the Electric Power Research Institute (EPRI) proprietary report TR-113932, "BWR [Boiling Water Reactor] Vessel and Internals Project, Technical Basis for Revisions to Generic Letter (GL) 88-01 Inspection Schedules (BWRVIP-75)," dated October 1999, as revised by the U.S. Nuclear Regulatory Commission (NRC) staff's initial safety evaluation (SE) dated September 15, 2000, and as modified in the enclosure to the NRC letter dated January 8, 2002.

1.2 BWRVIP-75 Report

The BWRVIP-75 report was submitted to the NRC for staff review by letter dated October 27, 1999. The BWRVIP-75 report proposed revisions to the scope and frequencies of inspections of Category A through E welds as defined in GL 88-01, "NRC Position on IGSCC [Intergranular Stress Corrosion Cracking] in BWR Austenitic Stainless Steel Piping," dated January 25, 1988, and NUREG-0313, Revision 2, "Technical Report on Material Selection and Process Guidelines for BWR Coolant Pressure Boundary Piping," dated January 1988, for both normal water chemistry (NWC) and hydrogen water chemistry (HWC) conditions. The proposed revisions were based on the consideration of inspection results and service experience gained by the industry since the issuance of GL 88-01, and included additional knowledge regarding the benefits of improved BWR water chemistry.

The NRC staff has reviewed the BWRVIP-75 report and found, in its letter dated September 15, 2000, that, with the exception of the open items discussed in the staff's SE, the BWRVIP-75 report's guidance is acceptable for licensee referencing as the technical basis for relief from, or as an alternative to, the requirements of Section XI to the American Society of Mechanical Engineers (ASME) Code and Title 10, *Code of Federal Regulation* (10 CFR), Section 50.55a.

Enclosure

This alternative permits licensees to use the sample scope and frequencies specified in the BWRVIP-75 report that are less than those required by the ASME Code when the open items in the staff's SE are addressed. The staff's approval of the BWRVIP-75 report also allows licensees to utilize the BWRVIP-75 report's guidance, as revised to reflect the resolution of the open items in the staff's SE, in lieu of licensees' commitments to GL 88-01 and NUREG-0313, Rev. 2, or as the technical basis for a plant-specific request for a license amendment to change technical specifications (TSs) requiring GL 88-01 or NUREG-0313, Rev. 2 inspections.

The stated inspection scope and frequency in the BWRVIP-75 report, as revised by the staff's initial SE, shall be satisfied for each category. These inspections may be credited toward ASME Section XI requirements; however, inspections of those welds outside the GL 88-01 scope are not affected and will not to be included in any relief or alternative based on the staff's BWRVIP-75 SE. The findings and conclusions in the staff's BWRVIP-75 SE are not applicable to any welds or piping (e.g., socket welds, carbon steel piping, etc.) other than those within the original scope of GL 88-01 and NUREG-0313, Rev. 2 (e.g., those in BWR piping made of austenitic stainless steel four inches or larger in nominal diameter and exposed to reactor coolant at a temperature above 200 °F during power operation, and to RPV attachments and appurtenances).

The BWRVIP-75 report's proposal regarding NWC conditions, which significantly reduces the inspection schedule from that originally specified in GL 88-01, follows the intent of the staff's position delineated in the GL in that improved water chemistry could justify reductions in inspection schedules. When HWC is implemented, the BWRVIP-75 report's proposed inspections are further reduced from those recommended for NWC. There is no change in the inspection schedule for Categories F and G welds, which will continue to be inspected every refueling outage. In addition, the report also provides new sample expansion criterion E and a definition for effective HWC. The proposed reduction in inspections, with the exceptions for the below open items, is adequately justified by the described industry-wide inspection results, plant operating experience, and improved water chemistry.

2.0 STAFF EVALUATION

TVA provided an enclosure to its January 8, 2002, letter, which stated its proposed technical justification for BFN Units 2 and 3 adopting the BWRVIP-75 report's inspection scope and frequency as revised by the staff's September 15, 2000, SE. The staff has reviewed this proposal and it is evaluated below.

Open Item 3.1 Proposed Inspection Frequency and Scope for Category A Welds

The licensee stated:

The Category A welds are included in the Risk-Informed Inservice Inspection (RI-ISI) program for BFN Units 2 and 3. The risk informed evaluation process was approved by NRC letters dated January 19, 2001 (TAC No. MA8873) for Unit 2, and February 11, 2000, (TAC No. MA5355) for Unit 3. The Category A welds in Unit 2 were specifically addressed in that unit's safety evaluation since the risk-informed analysis reduced the number of welds

subject to examination when compared to the requirements of GL 88-01. The risk informed process at BFN determines the consequence and failure probability for each Category A weld in high safety significant segments, which is then incorporated into the risk ranking process. The applicable degradation mechanisms are considered along with mitigation efforts, resistant materials, stress improvement, and/or hydrogen water chemistry. TVA will perform the selection, frequency, and sample expansion for the Category A welds in accordance with the applicable unit's RI-ISI program.

Staff's Evaluation:

Based on the prior finding that the applicable unit's RI-ISI program is acceptable for the selection, frequency, and sample expansion for the Category A welds, the staff continues to find this acceptable.

Open Item 3.2 Proposed Inspection Frequency for Category B Welds

The licensee stated:

There are no Category B welds in BFN Units 2 and 3.

Staff's Evaluation:

The staff finds this acceptable.

Open Item 3.3 Proposed Inspection Frequency for Category C Welds

The licensee stated:

The Category C welds for BFN Units 2 and 3 have received either induction heat stress improvement (IHSI) or mechanical stress improvement process (MSIP) as an IGSCC mitigating measure. The welds which received IHSI only will be considered for inclusion in the BWRVIP-75 sampling and frequency based on compliance with the recommendations of BWRVIP-61, "Induction Heating Stress Improvement Effectiveness on Crack Growth in Operating Plants." TVA proposes to utilize the normal water chemistry (NWC) sample size of 25 percent over a ten year interval for the Category C welds.

Staff's Evaluation:

Based on the above, the staff finds the licensee's response to this open item to be acceptable.

Open Item 3.4 Proposed Inspection Frequency for Category E Welds (weld overlay repair)

The licensee stated:

TVA proposes to utilize the NWC sample size of 25 percent over a ten year interval for the examination of Category E weldments with weld overlay repair. The Category E weldments identified for the 25 percent inspection frequency will have been examined during two successive satisfactory inspections with qualified procedures where no indication of crack growth or new cracking has occurred in the weld overlay or in the upper portion (defined as approximately 25 percent) of the piping and weld under the weld overlay.

Staff's Evaluation:

It is the staff's understanding that the licensee has no Category E weldments made of nonresistant materials, as defined in GL 88-01; therefore, the licensee's proposal is acceptable.

Open Item 3.5 Inspection of Category E Welds (Stress Improved) with Existing Cracks

The licensee stated:

TVA proposes to schedule the Category E weld examination with existing cracks and no overlay in accordance with the Category D NWC schedule of once per six years. This would be done following three successive satisfactory inspections with qualified procedures.

Staff's Evaluation:

The staff finds the licensee's response to this open item is acceptable.

Open Item 3.6 Sample Expansion

The licensee stated:

Sample expansion will be performed in accordance with the requirements of GL 88-01 with the exception of Category A welds, which follow the RI-ISI program criteria for each unit.

Staff's Evaluation:

The staff finds the licensee's response to this open item is acceptable.

Open Item 3.7 Reactor Water Coolant Conductivity

The licensee stated:

The reactor water coolant conductivity goal for BFN Units 2 and 3 is less than 0.11 $\mu\text{S}/\text{cm}$. Typical daily values are in the 0.10 $\mu\text{S}/\text{cm}$ range. The administrative limit for conductivity is 0.30 $\mu\text{S}/\text{cm}$. These values are consistent with the recommendations of BWRVIP-29.

Staff's Evaluation:

The staff finds the licensee's response to this open item is acceptable.

Open Item 3.8 Effective HWC and NMCA Programs

The licensee stated:

BFN Units 2 and 3 have implemented hydrogen water chemistry (HWC) and noble metal chemistry addition (NMCA) programs. However, BFN is currently requesting IGSCC inspection schedules in accordance with a normal water chemistry program.

Staff's Evaluation:

In as the proposed schedule and scope for NWC is more conservative than that for HWC, the staff finds the licensee's response to this open item is acceptable.

Open Item 3.9 Identification of Safety Significant Locations

The licensee stated:

TVA will utilize risk insights and specific weld criteria, including potential degradation mechanisms, to identify safety significant locations for examination. Personnel selecting the inspection locations will be knowledgeable of the IGSCC mechanism and its impact on the subject piping systems.

Staff's Evaluation:

The staff finds the licensee's response to this open item to be acceptable. The staff requests that the licensee, in its report of inspection results following the outage, discuss the ranking process utilized and the ranking of the weldments.

3.0 CONCLUSION

The staff has reviewed the licensee's proposal to adopt and utilize the guidance contained in the BWRVIP-75 report as an alternative, in accordance with 10 CFR 50.55a(3)(i), in lieu of its present commitments to inspect in accordance with GL 88-01. Based on the staff's review of the licensee's justification, on the licensee's completion of the proposed inspections as discussed above and the licensee's response to the BWRVIP-75 SE's open items, the staff finds that the licensee's usage of the BWRVIP-75 report, as revised to reflect the response to the open items in the staff's September 15, 2000, BWRVIP-75 SE, is acceptable.

Principal contributor: C. E. (Gene) Carpenter, NRR

Date: March 15, 2002

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BROWNS FERRY NUCLEAR PLANT

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