

August 17, 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: SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2 — AMERICAN SOCIETY
OF MECHANICAL ENGINEERS, SECTION XI, INSERVICE INSPECTION
PROGRAM, WELD EXAMINATION LIMITATION RELIEF REQUEST
(TAC NOS. MC3352 AND MC3353)

Dear Mr. Singer:

By a letter to the U.S. Nuclear Regulatory Commission dated May 27, 2004 (ADAMS Accession No. ML041620422), the Tennessee Valley Authority (TVA) submitted a Relief Request (RR) pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g)(5)(iii), for Sequoyah Nuclear Plant (SQN), Units 1 and 2. TVA requested relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code to address limited examination of two welds on SQN Unit 1 and 2 seal water injection filter head-to-shell welds. The RR is based on limitations that preclude full-code examinations of the two ASME class 2 welds. Due to the design configurations that preclude a 100 percent ultrasonic examination, TVA had proposed that an ultrasonic examination be performed on the accessible areas of the welds to the maximum extent practical.

Based on our review of your submittal, we have concluded that the Code examination coverage requirements are impractical for the subject components listed in RR ½-ISI-26. Further, reasonable assurance of the structural integrity of the subject components has been provided by the examinations that were, or will be, performed. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for the second 10-year inservice inspection interval at SQN, Units 1 and 2. The staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security and is otherwise in the public interest giving due consideration to the significant burden upon the licensee that could result if the requirements were imposed on the facility.

Karl W. Singer

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August 17, 2004

All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Sincerely,

/RA/

Michael L. Marshall, Jr., Acting Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

Enclosure: Safety Evaluation

cc w/enclosure: See next page

All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Sincerely,

/RA/

Michael L. Marshall, Jr., Acting Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

Enclosure: Safety Evaluation

cc w/enclosure: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SECOND 10-YEAR INTERVAL INSERVICE INSPECTION

REQUEST FOR RELIEF NO. 1/2-ISI-26

SEQUOYAH NUCLEAR PLANT. UNITS 1 AND 2

TENNESSEE VALLEY AUTHORITY

DOCKET NUMBERS 50-327 AND 50-328

1.0 INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed and evaluated the information provided by Tennessee Valley Authority (TVA, the licensee) in its letter dated May 27, 2004, which proposed its second 10-Year Interval Inservice Inspection (ISI) Program Plan Request for Relief No. 1/2-ISI-26 for Sequoyah Nuclear Plant (SQN), Units 1 and 2.

2.0 REGULATORY REQUIREMENTS

Inservice inspection of American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code and applicable addenda as required by Title 10, Code of Federal Regulations (10 CFR) Section 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). As stated in 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable Code of record for the second

Enclosure

10-year inservice inspection for SQN, Units 1 and 2, is the 1989 Edition, no addenda, of the ASME Boiler and Pressure Vessel Code, Section XI. For nondestructive examination (NDE) pursuant to 10 CFR 50.55a(g)(ii)(C)(2), licensees implementing the 1989 Edition and earlier editions and addenda of IWA-2232 of Section XI, Division 1, of the ASME Code must implement the 1995 Edition with the 1996 Addenda of Appendix VIII and the supplements to Appendix VIII of Section XI, Division 1 of the ASME Boiler and Presser Vessel Code. For SQN, Units 1 and 2, the licensee has implemented the 1995 Edition with the 1996 Addenda for NDE. The second 10-year ISI interval for SQN, Units 1 and 2, began on December 16, 1995, and ends on May 31, 2006. The licensee extended the second 10-year interval as permitted by IWA-2430(d)(1).

3.0 TECHNICAL EVALUATION

Component Identification

Chemical Volume and Control System - System 62
Seal Water Injection Filter, Head-to-Shell Weld,
Full-Penetration Weld SWIFW-2-A for SQN, Units 1 and 2

Code Requirements

The 1995 Edition through 1996 Addenda, ASME Section XI, Table IWC-2500-1, Examination Category C-A, Item Number C1.20 requires volumetric examination coverage of essentially 100 percent of the Head-to-Shell Weld.

Licensee's Basis for Relief Request (As Stated):

A full code examination of the weld is considered impractical due to design configuration. The design configuration used in the fabrication of the seal water injection filter head-to-shell weld and support steel attachments precludes volumetric examination of essentially 100 percent of the required examination volume. In order to examine the weld in accordance with the code requirement, the seal water injection filter would require extensive design modifications. The physical arrangement of head-to-shell weld (SWIFW-2-A) and the welded support steel attachments, which carry the weight of the component to the floor, limit the access for a complete volumetric examination. A total of three support steel attachments are welded along the axial direction of the component at equally spaced locations. Each support steel attachment is approximately 4.0 inches in width and covers the adjoining circumferential head-to-shell weld. The complete circumference of the component is 34.25 inches (actual measurement). The unexamined area is 12 inches. The design configuration limits the best effort ultrasonic examination to approximately 65 percent of the required volume and applies to both welds. The Unit 1 weld was examined using application of the best available ultrasonic technology. The Unit 2 weld will also be examined using application of the best available ultrasonic technology, which will achieve approximately the same coverage.

The support steel attachments, which cover the subject weld induce negligible stresses in the head-to-shell weld. The function of the support attachment is to carry the weight of the component.

Radiographic examination as an alternate volumetric examination method was determined to be impractical due to the support steel attachment adversely affecting radiographic quality.

The performance of an ultrasonic volumetric or a surface examination from the inside was also determined to be impractical because of the following radiological factors. Based on similar Unit 1 and 2 components, the estimated radiological conditions for the inside surface of the Seal Water Injection Filter are:

- 3-4 rad/hour beta
- 1-2 rem/hour gamma
- 1 rad/hour per 100 square-cm [dose rate measurement of surface contamination]

Maximum stay time to maintain exposure to less than 1 rem is approximately 30 minutes. One rem is TVA's administrative annual dose limit for an individual. Protection from the extremely high contamination levels and from the high beta dose rate would be required. Respiratory protection would be required. The above estimates are based on actual experience inside primary components.

Performance of an ultrasonic volumetric examination of essentially 100 percent of the required volume of the head-to-shell weld SWIFW-2-A on seal water injection filters is impractical. As previously discussed, TVA determined that it would be impractical to attempt other volumetric or surface examinations in order to increase examination. The high percentage (65 percent) for volumetric (ultrasonic) examination of the subject weld areas and adjacent metal and the Code-required VT-2 examinations for leakage provide reasonable assurance of weld integrity and is considered to provide an acceptable level of quality and safety. In addition, any significant degradation, if present, would be detected during the ultrasonic and VT-2 examinations that are performed on the subject welds. As a result, reasonable assurance of structural integrity of these welds is provided by the performance of these examinations.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted for the second 10-year inspection interval. If the examination of Unit 2 head-to-shell weld SWIFW-2-A does not result in 65 percent or greater volumetric coverage, TVA plans to submit a new relief request for this weld.

This request for relief is applicable to the second 10-year inspection interval for SQN, Unit 1 and Unit 2. The examination of weld SWIFW-2-A for Units 1 and 2 occurs in the third period.

Licensee's Proposed Alternative Examination (As Stated):

In lieu of the code required 100% volumetric examination, an ultrasonic examination will be performed on accessible areas to the maximum extent practical given the physical limitations of the head-to-shell welds. Refer to Enclosure 2 for the Unit 1 examination data report.

Staff's Evaluation:

The 1995 Edition through 1996 Addenda, ASME Code, Section XI, requires volumetric examination coverage of essentially 100 percent of the Seal Water Injection Filter, Head-to-Shell Weld, Full Penetration Weld SWIFW-2-A for SQN, Units 1 and 2. Based on the drawings provided in the incoming, the NRC staff determined that the design of the head-to-shell weld (SWIFW-2-A) prevented the licensee from performing the ASME Code required volumetric examinations. Welded steel attachments that support the weight of the component to the floor limit the access to the weld. There is a total of three equally spaced

welded support steel attachments along the axial direction of the subject vessel. The licensee noted that the support steel attachments, which cover the subject weld, induce negligible stresses in the head-to-shell weld.

The licensee considered radiographic examination as an alternative to the Code required volumetric examination; however, it determined that the radiograph method was impractical because the support steel attachments adversely affect the quality of the radiographic. The licensee also considered performing an ultrasonic volumetric or a surface examination from the inside of the subject vessel. Based on the high-radiation exposure to examiners the licensee determined that these methods were impractical. Therefore, based on the configuration of the subject vessels, the staff determined that the ASME Code-required volumetric examinations are impractical. The subject components would have to be redesigned in order for the licensee to perform the ASME Code-required volumetric examination, which would result in a significant hardship on the licensee.

The circumference of the subject Unit 1 and Unit 2 vessel weld is 34.25 inches and the unexamined area is 12 inches of the circumference. The licensee was able to obtain a best effort ultrasonic examination of approximately 65 percent of the required volume of the subject Unit 1 weld. The licensee examined the Unit 1 weld using application of the best available ultrasonic technology and will use the same available ultrasonic technology when examining the subject Unit 2 weld, which will achieve approximately the same coverage of approximately 65 percent of the required volume for the subject Unit 2 weld. There were no indications detected during the volumetric examinations of the subject Unit 1 weld. In addition, the licensee performed or will perform, ASME Code required VT-2 visual examinations during system leakage tests on the subject components.

Therefore, based on the volumetric coverage obtained for Unit 1 and expected volumetric coverage for Unit 2, plus the VT-2 visual examinations, any significant patterns of degradation can be detected by the subject examinations providing reasonable assurance of continued structural integrity for both Units 1 and 2 Seal Water Injection Filter Head-to-Shell Welds SWIFW-2-A. The licensee noted that if the examination of Unit 2 head-to-shell weld, SWIFW-2-A, does not result in 65 percent or greater volumetric coverage, it will submit a new relief request for this weld.

4.0 CONCLUSIONS

The staff has reviewed the licensee's submittal and concludes that the Code examination coverage requirements are impractical for the subject components listed in Request for Relief 1/2-ISI-26. Further, reasonable assurance of the structural integrity of the subject components has been provided by the examinations that were or will be, performed. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for the second 10-year ISI interval at SQN, Units 1 and 2. The staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security and is otherwise in the public interest giving due consideration to the significant burden upon the licensee that could result if the requirements were imposed on the facility. All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

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Date: August 17, 2004

Mr. Karl W. Singer
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SEQUOYAH NUCLEAR PLANT

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