

March 28, 2001

Mr. J. A. Scalice  
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 - REQUEST FOR RELIEF  
FROM RADIOGRAPHIC EXAMINATION OF WELD REPAIR OF ASME CODE  
CLASS 3 SPARE VALVES FOR ESSENTIAL RAW COOLING WATER  
SYSTEM (TAC NO. MB0490)

Dear Mr. Scalice:

By letter dated September 15, 2000, Tennessee Valley Authority (TVA) submitted a request for relief from the radiographic examination requirements of weld repairs to Code Class 3 essential raw cooling water (ERCW) system spare valves for the Sequoyah Nuclear Plant Units 1 and 2. Pursuant to Title 10, *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i), TVA requested the use of alternative nondestructive examinations to the American Society of Mechanical Engineers (ASME) Code for repair of six ERCW system valves that TVA plans to utilize as spares. TVA proposed the use of magnetic particle examination on each pass of the carbon steel weld metal and liquid penetrant examination on each pass of the stainless steel weld metal and following the final machining of the seating surface as an alternative to ASME Code-required radiographic examination for acceptance of the weld repairs.

The U.S. Nuclear Regulatory Commission staff has evaluated TVA's request and supporting information on the proposal and concluded that it provides an acceptable alternative method of weld examination. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the relief request is authorized because TVA has demonstrated that the proposed alternative would provide an acceptable level of quality and safety.

The staff's Safety Evaluation of the relief request is enclosed.

Sincerely,  
**/RA/**

Richard P. Correia, 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  
REQUEST FOR RELIEF FROM RADIOGRAPHIC EXAMINATION OF WELD REPAIR  
OF ASME CODE CLASS 3 ERCW SYSTEM SPARE VALVES FOR  
SEQUOYAH NUCLEAR PLANT UNITS 1 AND 2  
TENNESSEE VALLEY AUTHORITY  
DOCKET NUMBERS 50-327 & 50-328

1.0 INTRODUCTION

By letter dated September 15, 2000, Tennessee Valley Authority (TVA), the licensee, submitted a request for relief from the radiographic examination requirements of weld repairs to American Society of Mechanical Engineers (ASME) Code Class 3 essential raw cooling water (ERCW) system spare valves for the Sequoyah Nuclear Plant Units 1 and 2 (SQN). Pursuant to Title 10, *Code of Federal Regulations*, Section 50.55a(a)(3)(i) (10 CFR 50.55a(a)(3)(i)), TVA is requesting the use of alternatives to the ASME Code for repair of six valves that TVA plans to utilize as spares for SQN ERCW system.

ASME Section XI, 1989 Edition paragraph IWA-4120(a) states: "Repairs shall be performed in accordance with the Owner's Design Specification and the original Construction Code of the component or system. Later Editions and Addenda of the Construction Code or of Section III, either in their entirety or portions thereof, and Code Cases may be used. If repair welding cannot be performed in accordance with these requirements, the applicable alternative requirements of IWA-4500 and the following may be used: ". . . (3) IWD-4000 for Class 3 components." The original Code of Construction for these valves is ASME Section III, 1974 Edition, Summer 1975 Addenda, Class 3. This edition of the Code requires radiographic examination of these repair welds.

In accordance with 10 CFR 50.55a(a)(3)(i), proposed alternatives to the regulations in 10 CFR 50.55a paragraphs (c), (d), (e), (f), (g), and (h) may be used when authorized by the Director of the Office of Nuclear Reactor Regulation of the U.S. Nuclear Regulatory Commission (NRC), as long as the applicant shall demonstrate that the proposed alternatives would provide an acceptable level of quality and safety.

The licensee proposes the use of magnetic particle examination on each pass of the carbon steel weld metal and liquid penetrant examination on each pass of the stainless steel weld metal and following the final machining of the seating surface as an alternative to Code-required radiographic examination for acceptance of the weld repairs to ASME Code Class 3 ERCW system spare valves.

ENCLOSURE

The NRC staff has reviewed and evaluated the licensee's request and supporting information on the proposed alternative to the Code requirements for Sequoyah Nuclear Plant Units 1 and 2, pursuant to the provisions of 10 CFR 50.55a(a)(3)(1).

## 2.0 DISCUSSION

### 2.1 Licensee's Basis for Relief Request

SQN has six butterfly valves that were removed from the plant's ERCW system and replaced with new valves. The valves that were removed have degradation of the seating surfaces. SQN has issued a design change to repair the seating surfaces of the valves by removing base metal in the seating area and replacing the base metal with weld metal. Once sufficient weld metal has been deposited, it will be machined to the original design configuration of the seating surfaces. The Code of Record for these valves is ASME Section III, 1974 Edition, Summer 1975 Addenda, Class 3. The bodies of the subject valves are made from a machined piece of ASME SA 515 Grade 70 pressure vessel plate. The original component construction code (ASME Section III) requires the repair to be performed in accordance with the rules of ND-2500. Paragraph ND-2530 of the Code requires a radiographic examination to be performed if the depth of repair exceeds the lesser of 3/8 inch or 10% of the section thickness. The repair thickness, in this case, exceeds both of these values.

The valve body is 4-3/4 inches deep, front to back. The body has a inside diameter of 23-3/8 inches and an outside diameter of 27-1/4 inches which gives a nominal section valve body wall thickness of 1-15/16 inches, at the thinnest part. There are several protrusions on the outside of the machined valve body. The two major protrusions house the area for the stem for the valve. These protrusions are 5-5/16 inches and 7-7/16 inches thick as measured from the valve ID surface. A TVA Level III Radiography Examiner has determined that due to the thickness of the valve body in the aforementioned areas, a radiographic examination cannot be performed with code acceptable radiographic results. SQN has performed preliminary radiography of these areas and could not obtain the code required radiographic sensitivity for these protruded areas. Additionally, because of the location of the area to be examined (adjacent to the valve edge), radiographic undercutting occurs and cannot be eliminated.

TVA has evaluated the use of ultrasonic examination and determined that this examination technique is not practicable. Due to the configuration of the final valve seating surface, the TVA Level III Ultrasonic Examiner determined that 100 percent code coverage of the repaired areas could not be achieved.

SQN's Code of Record for Repairs and Replacements is ASME Section XI, 1989 Edition. The new design calls for the existing seating surfaces to be removed and to build up the removed metal by depositing carbon steel weld metal and then by depositing stainless steel weld metal for the final seating surface. TVA proposes to perform a surface examination following each layer of weld deposited and following the final machining of the seating surface. Each pass of the carbon steel weld metal will be examined by the magnetic particle process. The stainless steel weld metal will be examined using the liquid penetrant method. The combination of these two surface examination methods will provide acceptable assurance of the integrity of the weld metal deposited.

## 2.2 Licensee's Request for Relief

Based on the above discussion, TVA stated that the proposed alternative surface examinations for the weld overlay repair provide an acceptable level of quality and safety. Authorization to implement the proposed alternatives is requested in accordance with 10 CFR 50.55a(a)(3)(i).

## 3.0 EVALUATION

The staff has evaluated the licensee's request and supporting information on the proposal to use magnetic particle examination on each pass of the carbon steel weld metal and liquid penetrant examination on each pass of the stainless steel weld metal and following the final machining of the seating surface as an alternative to Code-required radiographic examination for acceptance of the weld repairs to ASME Code Class 3 ERCW system spare valves. The required ASME examination will not provide for adequate non-destructive examination of the weld metal deposit and final machined surface but the combination of these two surface examination methods replacing the required examination will provide an acceptable assurance of the integrity of the weld metal deposited. The staff considers that a series of surface examinations (i.e., after each weld pass) is equivalent to a one-time volumetric examination using radiography and is, therefore, acceptable.

## 4.0 CONCLUSION

The NRC staff concludes that the licensee's request to use magnetic particle examination on each pass of the carbon steel weld metal and liquid penetrant examination on each pass of the stainless steel weld metal and following the final machining of the seating surface as an alternative to the radiographic examination requirements for weld repairs to ASME Code Class 3 ERCW system spare valves for SQN provides an acceptable alternative method of weld examination. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the relief request is authorized since the applicant has demonstrated that the proposed alternative would provide an acceptable level of quality and safety.

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Date: March 28, 2001

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**SEQUOYAH NUCLEAR PLANT**

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