May 22, 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 - APPROVAL OF INSERVICE TESTING PROGRAM RELIEF REQUEST (TAC NOS. MB1502 AND MB1503)

Dear Mr. Scalice:

By letter dated March 9, 2001, the Tennessee Valley Authority (TVA) requested U.S. Nuclear Regulatory Commission (NRC) approval to adopt a provision of the 1995 Edition, with 1996 Addenda of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code for the Operation and Maintenance of Nuclear Power Plants, pursuant to Title10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(f)(4)(iv). The proposed alternative would extend the interval for the verification of opening and closing operability, pressure set verification, and the performance of pressure and position sensing accessories testing of the primary containment vacuum relief valves, at the Sequoyah Nuclear Plant (SQN), Units 1 and 2.

TVA also requested NRC authorization, pursuant to 10 CFR 50.55a(a)(3)(i), of Relief Request RV-7, which would implement an alternative to the leak-rate testing required by Section XI of the 1989 Edition of the ASME B&PV Code. The proposed alternative would implement SQN's Containment Leakage Rate Program (CLRP) for the primary containment vacuum relief valves. The CLRP follows Regulatory Guide 1.163 for implementation of the testing requirements in 10 CFR 50.54(o) and 10 CFR Part 50, Appendix J, Option B, and would allow extension of the surveillance test interval up to 60 months for these valves, on the basis of valve performance.

The NRC staff has completed its review of the licensee's proposed use of later Code provisions and Relief Request RV-7. Our Safety Evaluation is enclosed. TVA's proposed use of later Code provisions is hereby approved pursuant to 10 CFR 50.55a(f)(4)(iv) and the alternative proposed in TVA's Relief Request RV-7 is hereby authorized pursuant to 10 CFR 50.55a(a)(3)(i), on the basis that they both meet the requirements of the 1995 Edition, with 1996 Addenda of the ASME Code for the Operation and Maintenance of Nuclear Power Plants incorporated by reference into 10 CFR 50.55a(b). These approvals/authorizations are effective for the remainder of the terms of the current operating licenses for both Sequoyah Units.

Sincerely,

/RA/
Patrick M. Madden, 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/enclosures: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM

SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2

TENNESSEE VALLEY AUTHORITY

DOCKET NUMBERS: 50-327 AND 50-328

1.0 INTRODUCTION

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a, requires that inservice testing (IST) of certain American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves are performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code applicable Edition and Addenda, except where relief has been requested and granted or proposed alternatives have been authorized by the U.S. Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(f)(6)(i), or (a)(3)(i), or (a)(3)(ii). In order to obtain authorization or relief, the licensee must demonstrate that (1) conformance is impractical for its facility; (2) the proposed alternative provides an acceptable level of quality and safety; or (3) compliance would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety. Pursuant to 10 CFR 50.55a, the Commission may grant relief from or authorize proposed alternatives to the ASME Code requirements upon making the necessary findings.

The regulations in 10 CFR 50.55a(f)(4)(iv), provide that IST of pumps and valves may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in 10 CFR 50.55a(b), subject to Commission approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met.

The Sequoyah Nuclear Plant (SQN) Units 1 and 2 IST Program is based on the 1989 Edition of the ASME B&PV Code, Section XI. The NRC staff's findings with respect to Tennessee Valley Authority's (TVA's) request to implement portions of the ASME OMa-1996 Code for SQN Units 1 and 2, are contained in this safety evaluation.

2.0 RELIEF REQUEST RV-7 SUBMITTAL

By letter dated March 9, 2001, TVA requested NRC approval to adopt a provision of the 1995 Edition, with the 1996 Addenda of the ASME Code for the Operation and Maintenance (OM) of Nuclear Power Plants, pursuant to 10 CFR 50.55a(f)(4)(iv). The provision would extend the valve functional testing interval for SQN's primary containment vacuum relief valves.

ENCLOSURE

In addition, in Relief Request RV-7, TVA requested NRC authorization to implement an alternative to the Code-required leak-rate testing for SQN's primary containment vacuum relief valves, pursuant to 10 CFR 50.55a(a)(3)(i). The alternative would adopt the leak rate test requirements of 10 CFR 50.54(o) and Appendix J to 10 CFR Part 50.

There are three identical primary containment vacuum relief valves located, 120 degrees apart, at the top of the containment vessel in SQN Unit 1 and 2. These valves open for vacuum relief in the event of inadvertent operation of the plant systems that result in excessive external forces on the containment vessel. These valves close to perform a containment isolation function. Each containment vessel vacuum relief valve, as described in the SQN Final Safety Analysis Report (FAR), is a 24-inch, self-actuated, horizontally-mounted, swing-disc, check valve, with an elastomer seat. The seat material will withstand temperature, pressure, and radiation conditions following a loss-of-coolant accident (LOCA). Each unit has a design flow rate of 28 pounds per second at a pressure differential of 0.5 psid across the entire unit. Each normally closed vacuum relief valve is equipped with limit switches so that the open and shut positions of the valve are indicated in the Main Control Room. The valves begin opening at a containment pressure differential of 0.1 psid and will be fully open in 2.2 seconds for a vacuum design basis event.

The valves are classified as Code Class 2, IST active, Category A-C valves that have containment vacuum relief and isolation functions.

SQN's Unit 1 and 2 current second 10-year IST program is based on the 1989 Edition of the ASME B&PV Code, Section XI, which references the ANSI/ASME OM- 1988 Standard, Part 10. The 1988 OM Standard, Part 10, references the 1987 OM Standard, Part 1 for testing valves that function as relief devices.

2.1 Containment Vacuum Relief Valve Relief Request RV-7

The SQN primary containment vacuum relief valves function as relief devices and are currently tested in accordance with the 1987 OM Standard, Part 1. These primary containment relief valves are categorized as relief devices and are tested for the verification of the valve opening and closing functions, pressure set verification, and the performance of pressure and position sensing accessories, and also tested for leakage rate in accordance with 1987 OM Standard, Part 1, sub-section (§)1.3.4.3(a) and §1.3.4.3(b) requirements, respectively, as follows;

> 1.3.4.3(a)
> Within every 6-month period operability tests shall be performed unless historical data indicates a requirement for more frequent testing.
>
> 1.3.4.3(b)
> Leak-rate testing shall be performed every 2 years unless historical data indicates a requirement for more frequent testing.

2.2 Basis for Relief

TVA requests relief from current code testing requirements to reduce the frequency for the required testing.

The primary containment vacuum relief valves are located at the top of the containment vessel and are accessed by entry into the annulus area. Access to the valves requires test personnel to climb a series of ladders approximately 150 feet inside the annulus area. Temporary test

equipment must be transported to the valves by the test personnel. This practice presents potential personnel safety issues, and radiological dose exposure, because of the required test interval and testing performance during plant operation.

A review of the maintenance history indicates these valves are reliable, with no history of failing the Code-required operability tests. In addition the relief valves have exhibited good performance history for leak rate tests. There have been no repetitive maintenance issues or problems with these valves.

Relaxation of the test interval for the valves provides increased industrial safety and reduced irradiation exposure for test personnel during performance of these test activities.

3.0 PROPOSED ALTERNATIVES

As an alternative to testing requirements of the 1987 OM Standard, Part 1, §1.3.4.3(a) for the verification of the primary containment vacuum relief valve opening and closing functions, verification of set pressure, and the performance of any pressure and position sensing accessories, TVA proposes to adopt for its IST program, §1.3.7(a) of Appendix I of the OMa-1996. OMa-1996, Appendix I, §1.3.7(a) provides for performing tests on all Class 2 and 3 containment relief valves at each refueling outage or every 2 years, whichever is sooner, unless historical data requires more frequent testing.

As an alternative to performing the primary containment vacuum relief valve leakage rate testing, per the requirements of the 1987 OM Standard, Part 1, §1.3.4.3(b), TVA proposes to implement SQN's Containment Leakage Rate Program that follows the testing requirements of 10 CFR 50.54(o) and 10 CFR Part 50, Appendix J, Option B, as modified by approved exemptions.

4.0 EVALUATION

In Relief Request RV-7, TVA proposes to extend the testing interval for the primary containment vacuum relief valves to, (1) verify open and close capability, set pressure verification, and test performance of any pressure and position sensing accessories, and (2) perform leak-rate testing, pursuant to 10 CFR 50.55a(f)(4)(iv) and 10 CFR 50.55a(a)(3)(i) respectively. However, the relief request is also related to the leak-rate testing being evaluated pursuant to §50.55a(f)(4)(iv), because the proposed alternatives are contained in portions of the OMa-1996, which is incorporated by reference in §50.55a(b).

Each of the SQN primary containment vessels has an installed vacuum relief (VR) system that is described in the FSAR as follows:

- The purpose of the VR system is to protect the vessel from an excessive external force. The VR system does not serve accident mitigating functions, such as a LOCA or serve to limit the spread radioactivity. The system is designed to protect the containment vessel in the event of excessive cooling and the subsequent buildup of external pressure on the containment vessel. When the external pressure exceeds the VR valve set pressure, air flows from the annulus space through VR valves into the containment vessel. The operation of the VR system results in a pressure reduction in the annulus between the containment vessel and the shielding building. The system is designed to mitigate the following basis event occurrences:

1. Inadvertent containment spray actuation.
2. Inadvertent containment air return system operation.
3. Simultaneous occurrence of both of the above.

- The containment vessel vacuum relief VR system has three identical units, all located on the dome, at the same elevation, and 120 degrees apart. One of the three units is redundant. Each unit contains a normally closed vacuum relief valve in series with a normally open containment isolation valve, with the vacuum relief valve being outside of the isolation valve. The units are located in the annulus between the containment vessel and the shield building. The units are installed with sufficient space between the VR system and the shield building to prevent contact during seismic or pressure transient motion and to allow for an adequate air flow path.

TVA's current code IST frequency requirements expose test personnel to potential safety hazards and unnecessary irradiation exposure, because of the high elevation, remote location and limited access to the valves for performance of the required testing. TVA's review of the maintenance history of these valves indicates they are reliable, with no history of failing tests to open and close, and have exhibited good performance history for leak rate tests. Further, there have been no repetitive maintenance issues or problems with these valves. TVA proposes alternatives to increase safety and reduce unnecessary irradiation exposure of test personnel by extending the testing interval.

The SQN Unit 1 and 2 primary containment vacuum relief valves have containment vacuum relief and isolation functions and are classified as Code Class 2, IST active, Category A-C valves.

OMa-1996, §ISTC 4.4, "Inservice Tests for Category C Safety Valves and Relief Valves," indicates that relief valves shall meet the IST requirements of Appendix I. OMa-1996, Appendix I, §7.3.8, which pertains to Pressurized Water Reactor Class 2 vacuum relief valves, requires that the valves be actuated to verify open and close capability, set-pressure, and performance of any pressure and position sensing accessories. Further, Appendix I, §1.3.7(a), which pertains to Class 2 primary containment vacuum relief valves, require that the tests be performed at each refueling outage or every 2 years, whichever is sooner, unless historical data requires more frequent testing.

OMa-1996, ISTC 4.3, "Inservice Seat Leakage Rate Test for Category A Valves," §ISTC 4.3.2, requires that containment isolation valves with leak-rate requirements based on an Appendix J program commitment shall be tested in accordance with the Owner's 10 CFR Part 50, Appendix J program.

In its evaluation of TVA's proposed alternatives, the staff finds that, (1) verifying open and close capability, set pressure and operability testing pressure, and position sensing accessories every refueling outage or every 2 years whichever is sooner, and (2) implementing SQN's Containment Leakage Rate Program that follows the testing requirements of 10 CFR 50.54(o) and 10 CFR Part 50, Appendix J, Option B, as modified by approved exemptions, meet OMa-1996, Appendix I, §7.3.8 and ISTC §4.3.2 requirements, respectively, for IST Category A-C primary containment vacuum relief valves. All related requirements have been met. Therefore, the use of these portions of the 1996 Addenda of the ASME Code for the Operation and Maintenance of Nuclear Power Plants is approved pursuant to 10 CFR 50.55a(f)(4)(iv) for the SQN Unit 1 and 2 IST program with respect to testing primary containment vacuum relief valves.

5.0 CONCLUSION

The NRC staff concludes that TVA's use of ASME/OM Code, OMa-1996, Appendix I, §7.3.8 and ISTC §4.3.2 as alternatives to the 1987 OM Standard, Part 1, §1.3.4.3 (a) and §1.3.4.3 (b) requirements, respectively, is approved, pursuant to 10 CFR 50.55a(f)(4)(iv) for testing Class 2, ISTC Category A-C, primary containment vacuum relief valves at SQN Units 1 and 2. All related requirements have been met. In addition, the staff finds that the alternative proposed in Relief Request RV-7 provides an acceptable level of quality and safety and is hereby authorized pursuant to 10 CFR 50.55a(a)(3)(i). These approvals/authorizations are effective for the remainder of the terms of the current operating licenses for both Sequoyah Units.

Principal Contributor: Francis T. Grubelich, NRR

Date: May 22, 2001

Mr. J. A. Scalice
Tennessee Valley Authority

SEQUOYAH NUCLEAR PLANT

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