ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF FROM ASME CODE HYDROSTATIC PRESSURE TEST

REQUIREMENTS FOR THE REACTOR COOLANT SYSTEM

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT, UNIT 2

DOCKET 50-328

1.0 INTRODUCTION

1.1 Purpose

To determine whether Sequoyah Unit 2 can safely operate if relief is granted from ASME Code Section XI requirements for hydrostatic pressure testing of certain valves in the safety injection line.

1.2 Background

The Technical Specifications (TS) for the Sequoyah Nuclear Plant state that the surveillance requirements for the inservice inspection of ASME Code Class 1, 2, and 3 components and inservice testing of ASME Code Class 1, 2, and 3 pumps and valves shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda. This is required by 10 CFR 50, Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50, Sections 50.55a(a)(3) or 50.55a(g)(6)(i). The ASME Code and Addenda applicable to the Sequoyah Nuclear Plant, Units 1 and 2, are the 1980 Edition and Winter 1981 Addenda.

In its submittals of March 17, March 25, and April 17, 1992, the Tennessee Valley Authority (the licensee) requested relief from the hydrostatic pressure testing requirements of Section XI of the ASME Code. The requirements apply to piping modified by replacing four check valves. These valves are in a safety injection line to the reactor coolant system (RCS) that cannot be isolated from the rest of the RCS. Their function is to provide a pressure isolation boundary for the interface of the RCS and the emergency core cooling system (ECCS). The licensee contends that conformance to the Code requirement is impractical and would be a hardship.

2.0 DISCUSSION

The licensee plans to remove and replace 4 valves as described below.

a. Valve 2-VLV-63-589, a 1¼-inch primary check valve in the safety injection line to the RCS Loop 4 cold leg.

b. Valves 2-VLV-63-587 and 2-VLV-63-588, 1¼-inch primary check valves in the safety injection lines to the RCS loops 2 and 3 cold legs, respectively.

c. Valve 2-VLV-63-559, a 6-inch primary check valve in the safety injection line to the RCS Loop 2 hot leg.

The affected piping, valves, and welds are stainless steel, the piping is Type 304; the valve body, American Society of Testing Materials (ASTM) A182, Grade F-316; and the weld metal, ER-308 or ER-316. The weld process is gas tungsten arc welding (GTAW). Thus, the material is readily weldable and is without complicating factors such as post-weld heat treatment or difficult to manage filler metal.

The replacement procedure has strict controls. Multipass welds require grinding after each pass to assure removal of possible defects before the next pass is applied, and calls for Quality Assurance (QA) participation and participation by the Authorized Nuclear Inservice Inspector (ANII) for fit up and inspection. Hold points requiring QA signoff are incorporated. The procedure provides assurance that a high quality weld will be produced.

2.1 Code Requirement

Subparagraph IWA-4400(a), 1980 Edition, Winter Addenda of the ASME Code states that after repairs by welding on the pressure retaining boundary, a system hydrostatic test shall be performed in accordance with IWA-5000.

The Code-required hydrostatic test pressures are based on the RCS temperature. Pressures range from 2280 psig at a temperature of 500°F or higher to a maximum of 2460 psig at 100°F or less.

2.2 Licensee's Basis for Relief

Because replacing the valves affects a section of piping and welds that cannot be isolated from the rest of the RCS, a hydrostatic test of the entire system would be required to comply with the Code. This would be an undue hardship for the following reasons:

a. Performing a low-temperature/high-pressure test (cold hydrostatic pressure test) would require removing the RCS safety/relief valves and installing blind flanges. Moreover, the secondary side of the steam generators would have to be pressurized to prevent overpressurization of the steam generator tubes. These measures result in an unusual plant configuration. The additional plant shut down time required for these activities results in a substantial cost in replacement power to TVA's system.

b. Performing a high temperature/low-pressure hydrostatic pressure test during startup presents a problem with the lifting of the pressurizer safety valves. The lowest pressure allowed by the code is 1.02 times the RCS operating pressure of 2235 psig, or 2280 psig. The setpoint for the RCS pressurizer safety valves is 2485 psig, +/- one percent. The leak-tight pressure for these valves has been certified by the vendor at about 10 percent below the setpoint pressure, or 2236 psig. Above this pressure, the valves begin to discharge small amounts of steam before full lift. According to the valve manufacturer, this discharge could become excessive, and the proper reseating of the relief valves would not be possible. In such a case it would be necessary to cool the unit back down and depressurize the RCS to repair the valves. Gagging or removing the valves to install a blind flange cannot be performed within the Limiting Conditions for Operation specified in the TS.

c. For the safety of personnel, it is impractical to perform the visual examination of the RCS piping after a 4-hour hold period at the high-temperature/low pressure condition (500°F). Paragraph IWA-5245 of the ASME Section XI Code recognizes the high temperature levels that would be experienced by examination personnel and allows the RCS temperature to be lowered (after the 4-hour hold time) to 200°F for the performance of the visual examination (VT-2). The provision for lowering the RCS temperature would require performing several start-up tests again during the second power ascension. This places the plant in transition from heatup to cooldown and requires about two to three more days of outage time.

2.3 <u>Proposed Alternative Testing</u>

Instead of performing the Code hydrostatic pressure test, TVA proposes the following alternative testing:

a. Test the downstream welds in conjunction with the RCS leak test that is performed during restart in Mode 3 at normal operating pressure.

b. Test the upstream welds with a hydrostatic pump at a test pressure of about 2000 psig.

Each replacement weld will be visually inspected for leakage during these reduced pressure tests and the required nondestructive examination (NDE) would be performed to meet construction code requirements.

3.0 Staff Evaluation

Granting relief is supported by the following considerations:

a. The high temperature/low pressure Code hydrostatic test would only be performed at a 12 percent pressure increase over the system leakage test to be conducted at about 2000 psig upstream of the check valves. This Code hydrostatic test would not provide any significant increase in the ability to determine the structural integrity and the leak tightness of the repairs over the system leakage test and, therefore, the hardship in performing the Code hydrostatic test would outweigh its benefits.

b. The structural integrity of the replacement welds would be ensured by the controls instituted in the replacement procedure and by performance of the required NDE.

c. The metals of construction (stainless steels), are tough, ductile materials that are not expected to fail catastrophically.

d. The Code requires a hydrostatic pressure test at 10-year inspection intervals. This pressure test is scheduled for the next outage only 18 months from now. The replacement welds will be subjected to the Code hydrostatic test at that time.

3.1 CONCLUSION

The staff concludes that the requirement to perform the ASME Section XI Code pressure test results in a hardship or unusual difficulty without a compensating increase in the level of quality and safety, since testing at pressures greater than the alternative pressure would not result in added assurance of the structural integrity of the RCS and ECCS pressure boundary. In addition, the staff has concluded that this assurance is provided by the tightly controlled procedure, the performance of NDE testing, and performance of the alternative pressure test. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative is authorized.

Additionally, the staff emphasizes that future Code Class hydrostatic pressure tests should be conducted as close to normal RCS operating pressures as possible, consistent with plant and equipment considerations.

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Dated: May 1992

Therefore, based on the enclosed safety evaluation and pursuant to 10 CFR 50.55a(a)(3)(ii), TVA is authorized to use the proposed alternative tests for check valves 2-VLV-63-587, 588, 589, and 559.

Sincerely,

Frederick J. Hebdon, Director
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosure:
Safety Evaluation

cc w/enclosure:
See next page

*SEE PREVIOUS CONCURRENCE

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