UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE

SUPPLEMENTAL SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF FROM REGULATORY REQUIREMENTS

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-328

1.0 INTRODUCTION

The technical specification 4.0.5 for the Sequoyah Nuclear Plant, Unit 2, states the following:

> "surveillance requirements for inservice inspection and testing of the American Society of Mechanical Engineers (ASME) Code Class, 1, 2, and 3 components . . . shall be performed in compliance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i)."

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 requirements, set forth in the Code, Section XI, of editions and addenda that become effective in the future, to the extent practical within the limits of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components shall comply with the latest edition and addenda of Section XI of the Code incorporated by reference in 10 CFR 50.55a(b) on the date 12 months before the date of issuance of the operating license.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, the licensee shall submit information to the U. S. Nuclear Regulatory Commission (NRC) in support of that determination and a request made for relief from the ASME Code requirement. After evaluating the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that (1) are determined to be authorized by law, (2) will not endanger life or property or the common defense and security, and (3) are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

By letter dated November 9,1988, the Tennessee Valley Authority (the licensee) forwarded Revision 13 of the first 10-year interval inservice inspection (ISI) program for the Sequoyah Nuclear Plant, Unit 2. In a letter dated June 12, 1989, the licensee submitted Revision 14 of the ISI program for Unit 2. The forwarding letter advised that this revision included minor programmatic

changes, editorial changes, corrections of typographical errors, and no new relief requests or commitments. Because Revision 14 appeared to contain no significant changes, the staff postponed a review of this revision. In the letter dated July 12, 1990, the licensee informed the staff of some changes (more welds listed) to relief request ISI-3 by Revision 14, and presented additional information for relief requests ISI-1, ISI-2, ISI-6, and ISI-8. Revision 14 included no changes to Revision 13 for relief requests ISI-1, ISI-2, ISI-6 and ISI-8. During the review of this information, the staff determined that a supplemental safety evaluation was necessary for the ISI program for Unit 2.

2.0 EVALUATION

By letter dated April 19, 1990 (Reference 1), the staff forwarded its Safety Evaluation to the licensee on Revision 13 of the first 10-year interim ISI Program and the 14 requests for relief for Unit 2. In that Safety Evaluation, the NRC staff concurred with the findings and recommendations contained in the SAIC's Technical Evaluation Report (TER) SAIC-89/1473, "First Interval Inservice Inspection Program, Sequoyah Nuclear Station Unit 2." The TER is attached to the Safety Evaluation. Since the Safety Evaluation was issued, the licensee submitted additional information in the letter dated July 12, 1990 on its requests for relief ISI-1, ISI-2, ISI-3, ISI-6, and ISI-8. Of the 14 requests for relief, the other nine requests are only discussed in the Safety Evaluation dated April 19, 1990. The staff's review of this additional information has resulted in changes that need to be made to the Safety Evaluation. The changes to the Safety Evaluation generated by TVA's letter of July 12, 1990, are as follows:

2.1 RELIEF REQUEST ISI-1, "Pump Internal Pressure Boundary Surface", Category B-L-2, Item B12.70

Code Requirement - Visual examinations (VT-1) of the internal surfaces of at least one pump in each group of pumps performing similar functions in the system (e.g., recirculating coolant pumps) shall be performed during each inspection interval. The examinations may be performed on the same pump selected for volumetric examination of welds. The examinations may be performed at or near the end of the inspection interval.

Safety Evaluation Conclusions - The staff concluded that visual examination of the internal pressure retaining surfaces of the pump casings was impractical. The staff further concluded that the licensee's proposed examinations will provide necessary assurance of pump reliability. Therefore, the staff accepted the relief request and required the following:

(a) The required visual examinations are conducted under Category B-L-2 if a reactor coolant pump from one of two units is disassembled for maintenance;

(b) If during the 10-year interval, a pump from either unit is not disassembled for maintenance, a pump from one unit shall be examined from the exterior by ultrasonic thickness measurements;

(c) Visual examination of the pump casing for leakage is conducted in conjunction with system leakage and hydrostatic tests under Category B-P;

(d) Periodic inservice testing of the pumps is conducted in accordance with IWP.

Additional Information Provided by Licensee - The 1977 Edition with Addenda through Summer 1978, ASME Code, Section XI, IWV-1100 defines the scope of the IWP Program as applying to pumps installed in light water cooled nuclear power plants which are provided with an emergency power source. The reactor coolant pumps at Units 1 and 2 are not in its IWP program because they do not have an emergency power source.

Staff Reevaluation - There is no justification for requiring the inclusion of the reactor coolant pumps in the IWP Program for the purposes of another pressure test and measuring pump performance characteristics. Accordingly, for Relief Request ISI-1 which is addressed on pages 26 to 28 of the TER attached to the Safety Evaluation dated April 19, 1990, the staff concludes that Item (d) above does not have to be met for Relief Request ISI-1 to be acceptable. Therefore, the licensee only has to meet Items(a), (b), and (c) above for Relief Request ISI-1.

2.2 Relief Request ISI-2, Valve Internal Pressure Boundary Surface, Category B-M-2, Item B12.40

Code Requirement - Visual examinations (VT-1) of valve internal surfaces of at least one valve within each group of valves that are of the same constructional design and manufacturing method, and that are performing similar functions in the system shall be performed during the first inspection interval. The examinations may be performed on the same valve selected for volumetric examinations of welds. The examinations may be performed at or near the end of the inspection interval.

Safety Evaluation Conclusions - The staff determined that the requested relief was not needed at this time and postponed granting of relief. Relief will be considered on a case-by-case basis for specific valves towards the end of the inspection interval.

Additional Information Provided by the Licensee - The licensee acknowledged that the valves under consideration for the blanket relief requested were in the Unit 2 IWV program. The point was made by the licensee that if a valve was not under the IWV program, the IWV program should not be imposed on that valve because relief from the given Code requirement was requested.

Staff Reevaluation - The relief requests for specific valves will be addressed on a case-by-case basis using the additional information when the requests are presented by the licensee.

2.3 Relief Request ISI-3, "Pressure Retaining Dissimilar Metal Welds in Piping", Category B-F, Item B5.50, and Category B-J, Items 4.4, 4.6, and 4.7

Code Requirement - The 1977 Edition with addenda through Summer 1978 ASME Code requires a volumetric and surface examination in accordance with Figure IWB-2500-8 of longitudinal and circumferential welds in pipes of four inches in diameter and larger. For pipes smaller than four inches in diameter, only a surface examination is required. For branch connection welds in pipes that are four inches or larger in diameter, a surface and volumetric examination is required in accordance with Figures IWB-2500-9, -10, and -11. For pipes smaller than four inches in diameter, only a surface examination is required.

Safety Evaluation Conclusions - The staff concluded that for six of the seven welds for which relief was requested, the proposed alternative examinations of an ultrasonic examination to the maximum extent practical and a surface examination, along with the system pressure and hydrostatic tests required by the Code would provide adequate assurance of structural reliability. For one weld, SIF-128, the staff recommended that examination be delayed to allow developing ultrasonic technology be used in the examination and that a different weld be chosen for inspection in this interval that allows a good ultrasonic scan using currently available equipment.

Additional Information Provided by the Licensee - Revision 14 of the ISI Program added nine additional Category B-F welds and nine additional Category B-J piping welds to Relief Request ISI-3. These 18 additional welds all have their Code-required scans reduced 50 percent because of nozzle geometry on one side.

Staff Reevaluation - Of the 18 welds, the staff selected and reviewed the records of completed nondestructive examinations for the following 4 welds for method(s), technique, extent, and other factors: RC-10-SE, RC-11-SE, RC-18-SE, and RC-30. The staff documented this review in Inspection Reports 50-327/89-08 and 50-328/89-08 and identified no violations or deviations for these welds.

From the review of the information obtained, the staff concludes that the requirements in Section XI ASME Code are impractical for the 18 additional piping welds identified in Revision 14, Appendix E, ISI-3, Attachment A, Pages 7 and 8 and in the July 12, 1990 letter. Compliance with the Code requirements would require the redesign and refabrication of the piping systems to eliminate physical obstructions caused by pipe fittings' and components' geometries. The proposed alternative limited volumetric examinations, the surface examinations required by Section XI ASME Code, and the hydrostatic tests, ensure an acceptable level of inservice structural integrity. Therefore, the staff concludes that relief should be granted as requested for these 18 additional welds with the augmented requirements listed in the TER attached to the Safety Evaluation dated April 19, 1990.

2.4 Relief Request ISI-6, "Steam Generator Nozzle Inside Radius Section", Category B-D, Item B3.140

Code Requirement - Volumetric examination is required of the inside radius sections of all primary steam generator nozzles covering the volume described in Figure IWB-2500-7 during each inspection interval. At least 25 percent but no more than 50 percent (credited) of the nozzles shall be examined by the end of the first inspection period and the remainder by the end of the inspection interval.

Safety Evaluation Conclusions - The licensee based its relief request on the Electric Power Research Institute (EPRI) Report NP-4242, "Long Term Inspection Requirements for Nuclear Power Plants." The staff recommended relief should be granted in Reference 1 provided the licensee visually inspects the nozzle inner radii if it is necessary to enter the steam generator inlet and outlet plenums for maintenance or other activities.

Additional Information Provided by the Licensee - The licensee again requested that the request for relief be granted as originally requested without the augmented requirements in the TER attached to the Safety Evaluation dated April 19, 1990. The licensee had proposed not performing the volumetric inspections until the second inspection interval. The EPRI Report NP-4242 proposed that the nozzle inner radius be examined no sooner than at half the plant life and, subsequently, at the regular code inspection intervals.

Staff Reevaluation - The licensee had proposed not performing the volumetric examinations until the second inspection interval. The justification was based upon the EPRI Report NP-4242. This report recommended that the inner radius of these nozzles be examined no sooner than at half the plant life and, subsequently, at the established code inspection intervals. The EPRI Report NP-4242 has not been received or reviewed by the NRC staff. Upon reviewing the relief requested under ISI-6, the staff concluded that delaying the inspection required by the Code from the first 10-year inspection interval to the second and later 10-year intervals is inadequately justified. The reasons for this position are as follows:

(a) There is not assurance that the original flaw size assumed in the EPRI report was not exceeded in the nozzle. This plant predates the requirements for preservice examinations and the preservice inspection results were not submitted in the request.

(b) The techniques used for this preservice ultrasonic inspection need to have demonstrated adequate sensitivity to detect the allowable reference flaw size.

The provision for relief in 10 CFR 50.55a(g) is designed for situations where the limits of design, geometry, or materials of construction of the components makes it impractical to physically perform the inspections. Another avenue for changes of inspection requirements under the regulations is provided in 10 CFR 50.55a(a)(3). Here, the licensee must demonstrate that (1) the proposed

alternatives provide an acceptable level of quality and safety, or (2) compliance with the specified requirements would result in hardship or unusual difficulties without a compensating increase in the level of quality and safety. If there is a compelling reason for changing the Code requirements, there are mechanisms within the Code to effect the necessary changes. The staff has concluded that performing the code-required volumetric examinations of Item B3.140 in the first 10 year interval is required.

Sequoyah Nuclear Plant Unit 2's commercial operating date is June 1, 1982. The code requirement in B3.140 for inspection of at least 25 percent of this item in the first inspection period was not performed. It is impossible (i.e, impractical) to perform the inspections required in the first 40-month inspection period as it ended October 1985. Accordingly, relief is needed from the requirement in B3.140 of performing at least 25 percent of the items by the end of the first inspection period because none of the items were inspected in the first inspection period of the first inspection interval. The request for Relief ISI-6 was submitted to the staff in TVA letter dated August 23, 1983 prior to the end of the first inspection period. Therefore, the staff considered if relief from this requirement would be acceptable.

The development of cracks at the inner nozzle radius of these nozzles at the beginning of their life is remote, as indicated by the EPRI Report NP-4242, and delay of 25 percent of these inspections from the end of the first 40-month period to the end of the first 10-year inspection interval poses no threat to safety. In subsequent 10-year intervals, the requirements of the code shall be met. Therefore, delaying the volumetric examination of the nozzles sections until the third inspection period of the first inspection interval and then following the code requirements is acceptable.

This is a change in the augmented requirements for Relief Request ISI-6 which were listed in the TER attached to the Safety Evaluation dated April 19, 1990 which approved this relief request. The staff concludes that these new augmented requirements are acceptable for the approved Relief Request ISI-6.

2.5 Relief Request ISI-8, "Pressure Retaining Welds on Pump Casings", Category B-L-1, Item B12.10

Code Requirement - During each inspection interval, the pressure retaining welds in at least one pump in each group of pumps performing similar functions in the system (e.g., recirculating coolant pumps) shall be surface and volumetrically examined in accordance with Figure IWB-2500-16 during each inspection interval. The examinations may be performed at or near the end of the inspection interval.

Safety Evaluation Conclusions - The present non-destructuve examination (NDE) volumetric techniques available can not accurately evaluate welds in pump casings. The staff concluded that adherence to the Code requirement for these welds is impractical and that the proposed examination will provide the necessary assurance of structural reliability during this interval. Therefore, the staff further concluded that relief was recommended as requested by the licensee, provided the following:

(a) One reactor coolant pump casing weld is surface examined during each inspection interval.

(b) The pump casing is visually inspected for leakage in conjunction with system leakage and hydrostatic tests under Category B-P.

(c) The pumps are periodically tested in accordance with the IWP program.

Additional Information Provided by the Licensee - The licensee stated that the reactor coolant pumps are not contained in Sequoyah's IWP test program as explained in the discussion on Relief Request ISI-1 above and therefore should not be subject to the tests of the IWP program as required by Item (c) above.

Staff Reevaluation - There is no justification for requiring the inclusion of the reactor coolant pumps in the IWP program for the purposes of performing another pressure test and measuring pump performance characteristics. Accordingly, for Relief Request ISI-8, which is addressed on Pages 24 of the TER in Reference (1), the staff concludes that Item (c) does not have to be met for Relief Request ISI-8 to be acceptable. Therefore, the licensee only has to meet Items (a) and (b) above for this relief request.

3.0 CONCLUSION

By letters dated November 9, 1989, June 12, 1989, and July 12, 1990, the licensee has determined that certain requirements for inservice inspection in the ASME Code, Section XI, are impractical. The licensee has requested relief from the Code or has proposed alternative requirements to the Code requirements for Unit 2. We conclude that for the components for which relief was requested, the proposed alternative examinations identified in the Safety Evaluation forwarded to the licensee by letter dated April 19, 1990 and this supplemental safety evaluation provide reasonable assurance of the structural integrity of the piping and component pressure boundary and component supports.

The staff concludes that Revision 14 of the first 10-year interval ISI program with the additional information provided in the letter dated July 12, 1990 and the specific written requests constitute the basis for compliance of Unit 2 with 10 CFR 50.55a(g) and Technical Specification 4.0.5, and is acceptable.

For the Unit 2 ISI Program, the licensee submitted 14 requests for relief from the requirements of the Code: ISI-1 to ISI-14. As discussed in the Safety Evaluation issued April 19, 1990, the staff has determined that these requests are acceptable except for the following four requests: ISI-2, ISI-7, ISI-11, and ISI-12. Granting relief from Code requirements is authorized by law where (1) the proposed alternative would provide an acceptable level of quality and safety (pursuant to 10 CFR 50.55a(a)(3)(i)) and (2) the Code requirement is impractical and the alternative requirement will not endanger life or property, or the common defense and security, and is in the public interest (pursuant to 10 CFR 50.55a(g)(6)(i)). For two requests, ISI-9 and ISI-14, the staff concluded in the Safety Evaluation that the proposed alternatives to the Code requirements will provide an acceptable level of quality and safety at Unit 2. For the remaining eight requests, ISI-1, ISI-3 to ISI-6, ISI-8, ISI-10, and

ISI-13, the staff concluded in the Safety Evaluation that the Code requirements are impractical to perform at Unit 2 and the alternative requirements will not endanger life or property, or the common defense and security, and are in the public interest considering the burden that could result on TVA if the Code were imposed on Unit 2. Where the relief request status in the Safety Evaluation was "Granted with augmented requirements", the augmented requirements are as recommended in the TER attached to the Safety Evaluation. The granting of these relief requests was contingent upon all other requirements of Section XI being met for inservice tests and system pressure tests of the components affected by these relief requests.

In the letters dated June 12, 1989 and July 12, 1990, the licensee provided additional information on the following five requests for relief for the Unit 2 ISI Program: ISI-1, ISI-2, ISI-3, ISI-6, and ISI-8. Based on its review of this additional information, as discussed in Sections 2.1 to 2.5 above, the staff concluded the following on these five requests for relief: (1) the augmented requirement of inservice testing of the reactor coolant pumps in accordance with the IWP program is not required for Relief Requests ISI-1 and ISI-8, (2) the staff review of Relief Request ISI-2 for specific valves will address the need for the valves to be included in the IWV Program if the valves are not in this program, (3) Relief Request ISI-3 should be granted for the 18 additional welds listed in the July 12, 1989 letter with the augmented requirements listed in the TER attached to the Safety Evaluation dated April 19, 1990, (4) the augmented requirements for approved Relief Request ISI-6 may be revised from those stated in the TER attached to the Safety Evaluation to performing 100 percent of the volumetric examination of the nozzles by the third inspection period of the first inspection interval and, thereafter, following the code requirements. The Relief Requests ISI-1, ISI-2, ISI-3, ISI-6, and ISI-8 are discussed in Sections 2.1 to 2.5 above, respectively.

4.0 REFERENCE

1. Letter from Suzanne C. Black (NRC) to Oliver D. Kingsley, Jr. (TVA), Subject: First 10-Year Interval Inservice Inspection Program (TAC 59498) Sequoyah Nuclear Plant, Unit 2, dated April 19, 1990.

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