

December 26, 2001

Mr. Harold W. Keiser
Chief Nuclear Officer & President
PSEG Nuclear LLC - X04
Post Office Box 236
Hancocks Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NO. 2 - RELIEF FROM
ASME CODE REQUIREMENTS RELATED TO THE INSERVICE INSPECTION
PROGRAM, SECOND 10-YEAR INTERVAL, RELIEF REQUEST S2-RR-B05
(TAC NO. MB3049)

Dear Mr. Keiser:

By letter dated September 21, 2001, PSEG Nuclear LLC (PSEG) submitted a request for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code), Section XI, requirements for certain inservice inspections (ISI) of Class 1, Category B-J, pressure-retaining piping welds attaching the reactor pressure vessel (RPV) nozzle safe ends to pipe welds at Salem Nuclear Generating Station (Salem), Unit No. 2. In the letter, PSEG requested use of alternative requirements by performing ultrasonic (UT) examination of the safe-end to pipe welds from the inside surface in accordance with the 1983 Edition, including summer 1983 Addenda, of the ASME Code, Section XI, Paragraph IWA-2232(b), and Appendix III. PSEG requested relief for Salem, Unit No. 2, for the second 10-year ISI interval vessel examination scheduled for the spring 2002 refueling outage.

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the subject relief request. The NRC staff's Safety Evaluation (SE) is enclosed. The NRC staff concludes that the proposed alternative will provide reasonable assurance of structural integrity. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the NRC staff authorizes the proposed alternative for Salem, Unit No. 2, for the second 10-year ISI interval, until November 22, 2002, on the basis that compliance with Code requirements would result in a hardship without a compensating increase in the level of safety.

Sincerely,

/RA/

James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-311

Enclosure: Safety Evaluation

cc w/encl: See next page

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ACCESSION NUMBER: ML013100202

*See previous concurrence

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DATE	12/19/01	12/19/01	11/19/2001	11/29/01	12/26/01

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO THE ULTRASONIC EXAMINATION OF
SAFE-END TO PIPE WELDS FROM THE INSIDE SURFACE
IN ACCORDANCE WITH RELIEF REQUEST S2-RR-B05
PSEG NUCLEAR LLC
SALEM NUCLEAR GENERATING STATION, UNIT NO. 2
DOCKET NO. 50-311

1.0 INTRODUCTION

The inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 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(a)(3), alternatives to the requirements of paragraph (g) may be used, when authorized by the U.S. Nuclear Regulatory Commission (NRC), if the licensee demonstrates that: (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 pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection (ISI) 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 code of record for the second 10-year ISI interval is the ASME Code, 1983 Edition with the summer 1983 Addenda. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval.

ENCLOSURE

By letter dated September 21, 2001, PSEG Nuclear LLC (PSEG) submitted a request for relief from the ASME Code, Section XI, requirements for certain ISIs of Class 1, Category B-J, pressure-retaining piping welds attaching the reactor pressure vessel (RPV) nozzle safe-ends to pipe welds at Salem Nuclear Generating Station (Salem), Unit No. 1. In its September 21, 2001, letter PSEG requested approval to use alternative requirements by performing ultrasonic (UT) examination of the safe-end to pipe welds from the inside surface in accordance with the 1983 Edition, including summer 1983 Addenda of the ASME Code, Section XI, Paragraph IWA-2232(b) and Appendix III.

Relief was requested for Salem, Unit No. 2, for the second 10-year ISI interval vessel examinations scheduled for the spring 2002 refueling outage.

2.0 BACKGROUND

2.1 Component Description

Salem, Unit No. 2, ASME Section XI, Class 1, Category B-J pressure retaining piping welds attaching Reactor Pressure Vessel (RPV) nozzle safe-ends to pipe.

2.2 ASME Code Examination Requirement for which Relief is Requested

The 1999 Edition of 10 CFR 50.55a, "Codes and Standards," was revised by a *Federal Register* Notice dated September 22, 1999 (64 FR 51400). The revision requires that ASME Code, Section XI, 1995 Edition, including 1996 Addenda, Appendix VIII, Supplements 2 and 3 for wrought austenitic piping welds be implemented by May 22, 2000.

Relief was requested for Salem, Unit No. 2, for the second 10-year ISI vessel examinations scheduled for the spring 2002 refueling outage.

2.3 Licensee's Proposed Alternative to ASME Code

PSEG proposes to perform RPV UT examination of the safe-end to pipe welds from the inside surface in accordance with the 1983 Edition, 1983 Addenda of the ASME Code, Section XI, Paragraph IWA-2232(b) and Appendix III.

2.4 Licensee's Basis for the Proposed Alternative (as stated)

In its letter dated September 21, 2001, PSEG provided the following basis for requesting relief:

The subject welds can be made accessible for the ultrasonic (UT) examination from the outside surface, however, the examination would be severely limited. Limitations from the pipe outside diameter (OD) would be due to the close proximity of two welds, RPV nozzle to safe end weld and the safe end to pipe or elbow weld. The inlet safe-end-to-cast-elbow weld would be a single sided examination due to surface contour. There are currently no Appendix VIII qualified personnel or procedures for performing piping welds from the inside surface. In lieu of doing the Appendix VIII, Supplements 2, and 3 UT examinations from the pipe OD, PSEG Nuclear requests relief to continue the past practice of performing the UT examination from the inside diameter (ID).

This will be done in conjunction with our 10-year vessel examination, utilizing current industry technology. This will reduce[] the examination limitations by employing the UT from the ID. Additionally, it would decrease the amount of weld or cast metal that the sound beam will travel through by bringing the examination area closer to the transducer surface. The ID examination would reduce the radiation dose and be a cost savings by eliminating the need for the removal of the sand plugs.

The concept of personnel performance demonstrations for ultrasonic examination qualifications was introduced to the nuclear industry in the 1989 Edition, 1989 Addenda, of Section XI. The Performance Demonstration Initiative (PDI) was formed in 1991 to implement the requirements of Appendix VIII. When the PDI proposed an alternative implementation schedule, during the public comment period, it did not consider the ID surface examinations of Category B-J welds performed from the ID surface.

Qualifications for piping examinations from the OD surface were initiated in 1994. Examinations from the ID surface were considered in the design and fabrication of piping samples. However, it was the intention of PDI to complete the piping qualifications that are performed from the ID surface, in conjunction with the nozzle-to-shell and dissimilar metal welds. These examinations are normally performed using the RPV examination device. A stand-alone qualification for the one or two Category B-J welds past the RPV nozzle will require additional qualification specimens, which are not currently available. Performing separate qualifications at this time, and later returning to perform the nozzle and dissimilar metal weld qualifications places an undo [sic] burden on the vendors and owners.

Our vendor would be required to perform an additional qualification exercise if they have to implement Appendix VIII examinations on the subject welds during this outage. It is estimated that the total cost to our inspection vendor could exceed \$100,000. If these qualifications were performed at the same time as the dissimilar metal weld qualifications the additional costs would be minimal.

These combined demonstrations would be performed according to the requirements of Supplement 12 to Appendix VIII. Modifications of Supplement 12 are currently in progress within the ASME Code to address piping examination from the ID surface. The required implementation date for Supplement 12 is November 22, 2002.

PDI has been administering Supplement 2 and 3 exams since 1994. These demonstrations have not included examinations from the pipe ID surface. Supplement 12 examinations are expected to begin by the required implementation date of November 22, 2002. As of the writing of this Relief

Request there are no PDI qualified procedures or personnel. Attempting to meet the Appendix VIII qualifications from the inside surface would pose undo hardship at this time. Relief is therefore requested in accordance with 10 CFR 50.55a(a)(3)(ii). Compliance with the specified requirements of doing the Appendix VIII, Supplements 2, and 3 UT examinations from the pipe OD would result in hardship or unusual difficulty without a compensating increase in the level of safety.

3.0 EVALUATION

In 1991, licensees created the PDI to implement the performance demonstration requirements of Appendix VIII to Section XI of the ASME Code for UT examination systems. PDI began qualifying personnel and procedures to Appendix VIII, Supplements 2 and 3 in 1994. These qualifications were applicable for UT examinations conducted from the outside surface of the pipe-to-pipe weld. By the time the proposed rule was published for comment in the *Federal Register* (62 FR 63892) on December 3, 1997, the staff and PDI believed that a sufficient number of UT personnel were qualified to Supplement 2 requirements to satisfy the licensees' needs. The staff established the accelerated implementation schedule for Supplement 2 based on this availability of qualified personnel. The final rule was published in the *Federal Register* (64 FR 51370) on September 22, 1999, which has since been reflected in the regulations.

Shortly after publishing the final rule, PDI realized that their program could not support Supplement 2 performance demonstrations conducted from the inside surface. For example, the existing test specimens were designed for performance demonstrations performed on the outside surface; the specimens contained flaws which were visible from the inside surface; and, the specimens did not model geometric limitations or scanning conditions that would be encountered during inside surface examinations. To support performance demonstrations conducted from the inside pipe surface, PDI has to: design, fabricate, and acquire new test specimens; develop the appropriate protocol and test implementation procedures; "fingerprint" the specimens; develop inspection procedures; and train personnel. PDI has submitted a proposed Code change to Supplement 2 that provides criteria for examinations that are to be performed from the inside diameter of piping. PDI projected that they will be able to support performance demonstrations from the pipe inside surface by November 22, 2002.

The licensee has determined that Supplement 2 examinations performed on the outside surface of the safe-end-to-pipe welds would not satisfy Code coverage requirements. Examinations from the outside surface would also require that the sand plugs be removed from the floor of the refueling cavity, and would result in additional costs and occupational radiation dose to plant workers as opposed to performing the examinations from the inside surface. In addition, in order to satisfy the required accelerated implementation of Supplement 2, the licensee would be required to fabricate additional qualification specimens that are not currently available, which would result in a significant burden in order to perform the necessary qualifications to implement Appendix VIII examinations on subject welds during this outage.

PSEG proposes to perform RPV UT examination of the safe-end to pipe welds from the inside surface in accordance with the 1983 Edition, including the summer 1983 Addenda, of the ASME Code, Section XI, Paragraph IWA-2232(b), and Appendix III. Appendix III requires a minimum UT examination volume of the inner 1/3 of the weld area (1/3t). This ensures that sufficient volume of the weld is examined for potential flaws, and will provide reasonable assurance of the structural integrity of these welds. Thus, the NRC staff finds that requiring PSEG to conduct UT examination from the outside surface of the pipe in accordance with the qualification requirements of Supplement 2 would result in a hardship without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

Based on its review, the NRC staff finds that the proposed alternative described in PSEG's September 21, 2001, letter will continue to provide reasonable assurance of structural integrity. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the staff authorizes the proposed alternative for Salem, Unit No. 2, ASME Section XI, Class 1, Category B-J pressure retaining piping welds attaching RPV nozzle safe-ends to pipe until November 22, 2002, on the basis that compliance with Code requirements would result in a hardship without a compensating increase in the level of quality and safety.

Principal Contributor: R. Fretz

Date: December 26, 2001