January 16, 2003

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. 1 - RELIEF FROM ASME CODE REQUIREMENTS RELATED TO THE SALEM INSERVICE INSPECTION PROGRAM, RELIEF REQUEST S1-RR-B01 AND S1-RR-C01, (TAC NO. MB3811)

Dear Mr. Keiser:

By letter dated January 8, 2002, as supplemented by letters dated July 12 and November 12, 2002, PSEG Nuclear LLC (PSEG) submitted requests for relief from the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (the Code), Section XI, requirements for the examinations affecting the piping and reactor pressure vessel at the Salem Nuclear Generating Station (Salem), Unit No. 1. In the January 8, 2002, letter, PSEG requested relief from performing the inservice examinations for the inaccessible or physically obstructed portions of the examination areas identified within the respective Salem, Unit No. 1, second inservice inspection (ISI) 10-year Relief Requests' non-destructive examination limitations.

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the subject relief requests. As documented in the enclosed Safety Evaluation, the staff concludes that applicable Code requirements are impractical, and that there is reasonable assurance of the structural integrity of the components listed in the request based on the examinations that have been performed. Therefore, the NRC staff is granting PSEG's requests for relief pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.55a(g)(6)(i) for the second 10-year ISI interval at Salem, Unit No. 1.

Sincerely,

/RA/

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

Docket No. 50-272

Enclosure: Safety Evaluation

cc w/encl: See next page

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Chief Nuclear Officer & President
PSEG Nuclear LLC - X04
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Hancocks Bridge, NJ 08038

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ACCESSION NUMBER: ML030160750 * SE Input provided. No major changes made.

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE EXAMINATION OF PIPING AND REACTOR PRESSURE VESSEL

IN ACCORDANCE WITH RELIEF REQUEST SC-RR-B01 AND SC-RR-C01

PSEG NUCLEAR LLC

SALEM NUCLEAR GENERATING STATION, UNIT NO. 1

DOCKET NO. 50-272

1.0 INTRODUCTION

By letter dated January 8, 2002, as supplemented by letters dated July 12 and November 12, 2002, PSEG Nuclear LLC (PSEG or the licensee) submitted a request for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code (the Code), Section XI, requirements for the examinations affecting the piping and reactor pressure vessel at the Salem Nuclear Generating Station (Salem), Unit No. 1.

The U.S. Nuclear Regulatory Commission (NRC) staff, with technical assistance from Pacific Northwest National Laboratory (PNNL), has reviewed the information concerning inservice inspection (ISI) program Request for Relief S1-RR-B01 (Parts A through G) and S1-RR-C01 (Parts A through D) submitted for the second 10-year interval for Salem, Unit No. 1, in PSEG's letter dated January 8, 2002. In response to a Request for Additional Information, the licensee revised the requests for relief in a letter dated July 12, 2002. The licensee provided additional information in its letter dated November 12, 2002.

2.0 REGULATORY REQUIREMENTS

The ISI of the ASME Code Class 1, 2 and 3 components is performed in accordance with Section XI of the ASME B&PV Code and applicable addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Paragraph (a)(3) of 10 CFR 50.55a states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if: (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)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information will be submitted to the Commission in support of that determination and a request must be made for relief from the ASME Code requirement. After evaluation of the

ENCLOSURE

determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and/or may impose alternative requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

The applicable Code of record for the second 10-year ISI for Salem, Unit No. 1, is the 1983 Edition through summer 1983 Addenda of the ASME B&PV Code, Section XI. The Salem, Unit No. 1, second 10-year ISI program ended on May 19, 2001.

3.0 TECHNICAL EVALUATION

Requests for Relief S1-RR-B01 (Parts A through G) and S1-RR-C01 (Parts A through D):

NRC Staff's Evaluation

The staff adopts the evaluations and recommendations for granting reliefs contained in the Technical Letter Report (TLR), included as Attachment 1, prepared by PNNL. Attachment 2 summarizes each relief request and lists PNNL's recommended status of approval.

For Salem, Unit No. 1 Requests for Relief S1-RR-B01 (Parts A through G) and S1-RR-C01 (Parts A through D) the Code requirements are impractical. For the licensee to perform the Code required examinations it would be an excessive burden on the licensee, because the subject components would be required to be redesigned. The licensee obtained 25 percent through 88 percent volumetric coverage (where required by the Code) and 27 percent through 100 percent of the surface examination (where required by the Code) for the subject welds. Therefore, the staff determined that reasonable assurance of the structural integrity of the subject components has been provided based on the examinations that were performed.

4.0 CONCLUSION

PSEG's requests for relief from the Code requirements for Salem, Unit No. 1, have been reviewed by the NRC staff with the assistance of its contractor, PNNL. The TLR provides PNNL's evaluation of these requests for relief. The staff has reviewed the TLR and adopts the evaluations and recommendations for granting the licensee's reliefs.

Therefore, the NRC staff concludes that for Request for Relief S1-RR-B01 (Parts A through G) and S1-RR-C01 (Parts A through D), the Code requirements are impractical, and that

reasonable assurance of the structural integrity of the subject components has been provided based on the examinations that were performed. Therefore, for the licensee's subject requests for relief are granted pursuant to 10 CFR 50.55a(g)(6)(i) for the second 10-year ISI interval.

Attachments: As stated

Principal Contributor: T. McLellan

Date: January 16, 2003

TECHNICAL LETTER REPORT
ON THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION
REQUESTS FOR RELIEF NOS. S1-RR-B01 AND S1-RR-C01
FOR
PSEG NUCLEAR
SALEM GENERATING STATION, UNIT 1
DOCKET NUMBER: 50-272

1.0 INTRODUCTION

By letter dated January 8, 2002, the licensee, PSEG Nuclear, submitted Requests for Relief S1-RR-B01 and S1-RR-C01, seeking relief from certain requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components*. In response to an NRC Request for Additional Information (RAI), the licensee revised the requests in a letter dated July 12, 2002, and provided further clarification in a letter dated November 12, 2002. These "close-out" relief requests are for the second 10-year inservice inspection (ISI) interval at Salem Generating Station, Unit 1 (Salem 1). The Pacific Northwest National Laboratory (PNNL) has evaluated the subject requests for relief in the following section.

2.0 EVALUATION

The information provided by PSEG Nuclear in support of the requests for relief from Code requirements has been evaluated and the bases for disposition are documented below. The Code of Record for Salem 1, second 10-year interval, which ended on May 19, 2001, is the 1983 Edition of ASME Section XI, including Summer 1983 Addenda. During the review of several relief requests, PNNL noted certain discrepancies between the component descriptions and their associated limitations, as listed in the attached relief request summary tables. These appeared to be errors introduced by the licensee when transposing similar information from one part of the table to another. When evaluating these requests, PNNL staff used knowledge of component configurations, plant operating conditions and inservice inspection practices to resolve the discrepancies.

2.1 Request for Relief S1-RR-B01 (Part A), Examination Category B-A, Items B1.11, B1.12, B1.21, B1.22, B1.30 and B1.40, Reactor Pressure Vessel Shell, Head and Flange Welds

Code Requirement: Examination Category B-A, Items B1.11 and B1.12 require essentially 100% volumetric examination, as defined by Figures IWB-2500-1 and -2, of one circumferential and one longitudinal reactor pressure vessel (RPV) beltline (core region) shell welds during successive operating intervals 2 through 4. Items B1.21 and B1.22 require essentially 100% volumetric examination of the "accessible length" of head welds, as defined by Figure IWB-2500-3. Items B1.30 and B1.40 require essentially 100% of the shell-to-flange and closure head-to-flange welds, as defined by Figures IWB-2500-4 and -5, respectively. "Essentially 100%," as clarified by ASME Code Case N-460, is greater than 90% coverage of the examination volume, or surface area, as applicable.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100% volumetric examination of RPV welds shown in Table 1.

Table 1 - Examination Category B-A		
Code Item	**Weld ID**	**Weld Type**
B1.11	1-RPV-10042	Lower shell-to-head circumferential
B1.12	1-RPV-1042B	Upper L-seam at 7°
B1.21	1-RPV-4043	Lower head disc-to-peel segments
B1.21	1-RPV-6046B	Dollar Plate Closure Head
B1.22	1-RPV-1043-A	Lower head meridional at 270°
B1.22	1-RPV-1043-B	Lower head meridional at 330°
B1.22	1-RPV-1043-C	Lower head meridional at 30°
B1.22	1-RPV-1043-D	Lower head meridional at 90°
B1.22	1-RPV-1043-E	Lower head meridional at 150°
B1.22	1-RPV-1043-F	Lower head meridional at 210°
B1.22	1-RPV-1046A	Closure head meridional at 300°
B1.22	1-RPV-1046B	Closure head meridional at 0°
B1.22	1-RPV-1046C	Closure head meridional at 60°
B1.22	1-RPV-1046D	Closure head meridional at 120°
B1.22	1-RPV-1046E	Closure head meridional at 180°
B1.22	1-RPV-1046F	Closure head meridional at 240°

Licensee's Basis for Relief Request:

Examinations of the subject components were conducted in April and May 2001, during the last refueling outage of the second ISI interval. Limitations to volumetric coverage(s) were caused by geometry of the component, access restrictions, or interferences by adjacent components. The specific limitations provided by the licensee are shown in Table 2, along with volumetric coverages obtained for each weld. The licensee stated:

Subject components contained herein have received inservice inspection NDE examinations to the "extent practical" within the limitations of design, geometry and materials of construction of the components as allowed by Code. These components have also undergone necessary volumetric examination by radiography and/or surface

examinations during fabrication, in accordance with approved construction/fabrication code requirements providing adequate assurance for the structural integrity of the components prior to plant operation. In addition, these components have been subjected to a visual examination for leakage after completion of each refueling outage. Full Code required coverage is impractical for the identified subject components since the Reactor Pressure Vessel (RPV) would require design modifications that would impose a significant burden to PSEG Nuclear. PSEG Nuclear has elected to examine the subject components to the extent practical and has determined them to be acceptable with no observed signs of degradation. In addition, other RPV welds have been examined to the extent required by the Code and also found to be acceptable with no observed signs of degradation. Also, VT-2 visual examinations performed in conjunction with system pressure testing after each refueling outage found these welds to be acceptable with no leakage observed.

Table 2 - RPV Examination Limitations

Weld ID	Limitation Description/Interference	Coverage
1-RPV-10042	Six integral core guide lugs located adjacent to weld	56%
1-RPV-1042B	Outlet nozzle boss located adjacent to longitudinal seam	66%
1-RPV-4043	Incore instrument penetrations limit scan access	14%
1-RPV-6046B	CRD penetration housings limit access for scans	40%
1-RPV-1043-A	Incore instrument penetrations limit scan access	59%
1-RPV-1043-B	Incore instrument penetrations limit scan access	59%
1-RPV-1043-C	Incore instrument penetrations limit scan access	59%
1-RPV-1043-D	Incore instrument penetrations limit scan access	59%
1-RPV-1043-E	Incore instrument penetrations limit scan access	59%
1-RPV-1043-F	Incore instrument penetrations limit scan access	59%
1-RPV-1046A	Outside surface transition limits scans near flange weld	83%
1-RPV-1046B	Outside surface transition and lifting lugs limit scans	68%
1-RPV-1046C	Outside surface transition limits scans near flange weld	83%
1-RPV-1046D	Outside surface transition and lifting lugs limit scans	68%
1-RPV-1046E	Outside surface transition limits scans near flange weld	83%
1-RPV-1046F	Outside surface transition and lifting lugs limit scans	68%

Licensee's Proposed Alternative Examination (as stated):

Where the component will not allow an ultrasonic angle beam examination from both sides of the weld, the following will be performed using the best available technology as demonstrated through the EPRI PDI program:

- Similar metal welds, will be examined to the extent practical using personnel and techniques qualified and demonstrated through the EPRI PDI, as necessary.
- System pressure test examinations will be performed per ASME XI requirements.

Evaluation: The Code requires essentially 100% volumetric examination of the accessible length of the subject RPV welds. However, as shown in Table 2, complete examinations are restricted by several factors, including the geometric configuration of the closure and lower heads, adjacent interferences caused by control rod drive (CRD) and incore instrument penetrations, and the outlet nozzle boss protrusion and core barrel locating lugs. These conditions make 100% volumetric examinations impractical to perform for these welds. To gain access for examination, the RPV would require design modifications. Imposition of this requirement would create a significant burden on the licensee, therefore, the Code-required 100% volumetric examinations are impractical.

Drawings and descriptions included in the licensee's submittal clearly show that examinations of the subject welds have been performed to the extent practical, with the licensee obtaining substantial volumetric coverages (from approximately 53% to 83%) for most of these welds (see Table 2). For lesser coverages on the lower head disc-to-peel segments (14%) and the dollar plate closure head (40%) welds, severe limitations caused by incore penetrations and CRD housings do not provide access to achieve additional volumetric examinations. All the examinations were performed using EPRI PDI qualified equipment, personnel and procedures. All recordable indications, when observed, were evaluated in accordance with ASME IWB-3000, and found to be acceptable for continued operation. In addition, other RPV shell welds have been examined to the extent required by the Code. Therefore, it is concluded that any significant patterns of degradation should have been detected by the examinations in the areas that were completed, providing reasonable assurance of continued structural integrity of the RPV. Based on the impracticality of examining 100% of the subject welds, and the examination coverages obtained, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.2 Request for Relief S1-RR-B01 (Part B), Examination Category B-B, Items B2.10, B2.11, and B2.40, Pressure Retaining Welds in Vessels Other than Reactor Vessels, Pressurizer Head-to-Shell and Longitudinal Shell Welds, and Lower Head-to-Tubesheet Welds on the Steam Generators

Code Requirement: Examination Category B-B, Items B2.10 and B2.11 require essentially 100% volumetric examination, as defined by Figures IWB-2500-1 and -2, of the circumferential shell-to-head weld and one foot of the intersecting longitudinal weld on the pressurizer. Item B2.40 requires essentially 100% volumetric examination, as

defined by Figure IWB-2500-6, of the tubesheet-to-lower head weld on steam generators. "Essentially 100%," as clarified by ASME Code Case N-460, is greater than 90% coverage of the examination volume, or surface area, as applicable.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100% volumetric examination of circumferential shell-to-head Weld 1-PZR-21, and one foot of intersecting longitudinal Weld 1-PZR-20 on the pressurizer, and the circumferential tubesheet-to-head Welds 11-STG-11, 12-STG-11, 13-STG-11 and 14-STG-11 on Steam Generators 11, 12, 13 and 14, respectively.

Licensee's Basis for Relief Request:

Examinations of the subject components were conducted in February 1997 and April 2001. Limitations to volumetric coverage(s) were caused by geometry of the component, access restrictions, or interferences by adjacent components. The specific limitations provided by the licensee are shown in Table 3, along with volumetric coverages obtained for each weld. The licensee stated:

Full Code required coverage is impractical for the subject components since these vessels would require design modifications that would impose a significant burden to PSEG Nuclear. PSEG Nuclear has examined these component welds to the extent practical and determined them to be acceptable with no observed signs of degradation. In addition, other similar vessel welds have been examined to the extent required by the Code and also found to be acceptable with no observed signs of degradation. Also, VT-2 visual examinations performed in conjunction with system pressure testing after each refueling outage found these welds to be acceptable with no leakage observed.

Table 3 - Category B-B Examination Limitations

Weld ID	Limitation Description/Interference	Coverage
1-PZR-21	Welded pads and insulation limit scan access	88%
1-PZR-20	Location of two insulation support rings limit scans	42%
11-STG-11	Lower vessel supports, data plate, channel head radius	77%
12-STG-11	Lower vessel supports, data plate, channel head radius	78%
13-STG-11	Lower vessel supports, data plate, channel head radius	70%
14-STG-11	Lower vessel supports, data plate, channel head radius	75%

Licensee's Proposed Alternative Examination (as stated):

Where the component will not allow an ultrasonic angle beam examination from both sides of the weld, the following will be performed using the best available technology as demonstrated through the EPRI PDI program:

- Similar metal welds, will be examined to the extent practical using personnel and techniques qualified and demonstrated through the EPRI PDI, as necessary.

- System pressure test examinations will be performed per ASME XI requirements.

Evaluation: The Code requires essentially 100% volumetric examination of the accessible length of the subject pressurizer and steam generator welds. However, as shown in Table 3, complete examinations are restricted by several factors, including welded pads and insulation rings on the pressurizer, and vessel supports, the attached Code data plate and the outer blend radii of the channel head for the steam generators. These conditions make 100% volumetric examinations impractical to perform for these welds. To gain access for examination, the vessels would require design modifications. Imposition of this requirement would create a significant burden on the licensee, therefore, the Code-required 100% volumetric examinations are impractical.

Drawings and descriptions included in the licensee's submittal clearly show that examinations of the subject welds have been performed to the extent practical, with the licensee obtaining substantial volumetric coverages (from approximately 70% to 88%) for most of these welds (see Table 3). For intersecting longitudinal Weld 1-PZR-20, only 42% of the required volume could be obtained due to the location of two welded insulation support bands that traverse the vertically-oriented weld. Removal of these bands would require extensive insulation removal on the head and shell of the pressurizer to enable increased coverage for the one-foot of longitudinal seam required, and would result in excessive radiation exposures for plant personnel. The examinations performed in April 2001 were completed using EPRI PDI qualified procedures, personnel and equipment (those performed in February 1997 were prior to required implementation of Appendix VIII). No problems or indications have been detected during these examinations. Therefore, any significant patterns of degradation should have been detected by the examinations in the areas that were completed, providing reasonable assurance of continued structural integrity of these welds. Based on the impracticality of examining 100% of the subject welds, and the examination coverages obtained, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.3 Request for Relief S1-RR-B01 (Part C), Examination Category B-D, Item B3.20, Full Penetration Welds of Nozzles in Vessels, Pressurizer Spray Nozzle Inside Radius Section

Code Requirement: Examination Category B-D, Item B3.20 requires essentially 100% volumetric examination, as defined by Figure IWB-2500-7, (a) through (d), as applicable, of the pressurizer spray nozzle inside radius section. "Essentially 100%," as clarified by ASME Code Case N-460, is greater than 90% coverage of the examination volume, or surface area, as applicable.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100% volumetric examination of the inside radius section on the pressurizer spray nozzle, licensee item number 4-PSN-1131-IRS.

Licensee's Basis for Relief Request (as stated):

Full Code-required coverage is impractical for the subject components since the nozzle identified within the table would require design modifications that would impose a significant burden to PSEG Nuclear. PSEG Nuclear has examined these component welds to the extent practical and determined them to be acceptable with no observed signs of degradation. In addition, other similar vessel welds have been examined to the extent required by the Code and also found to be acceptable with no observed signs of degradation. Also, VT-2 visual examinations performed in conjunction with system pressure testing after each refueling outage found these welds to be acceptable with no leakage observed.

These exams were performed in February 1991. A 53-degree shear wave transducer was used to conduct UT examinations. There were no recordable indications noted. The exam was limited due to the presence of a Code identification plate physically attached to the head of the PZR vessel. The identification plate is located between 59"-7" clockwise where the plate caused a scanning interference. There have been no problems noted associated with this or other similar welds. The examination was performed from the blend radius. This configuration has been modeled for the use of 53 degrees. The total weld length requiring examination was 66.5". The thickness is approximately 5-1/2". The total estimated coverage was 78%. System leakage tests (VT-2) are conducted at the conclusion of each outage to detect presence of leakage. No leakage has been noted in the area of the weld.

Licensee's Proposed Alternative Examination (as stated):

Where the component will not allow an ultrasonic angle beam examination from both sides of the weld or upon the nozzle inner radius section, the following will be performed using the best available technology as demonstrated through the EPRI PDI program:

- Similar metal welds and inner radius sections will be examined to the extent practical using personnel and techniques qualified and demonstrated through the EPRI PDI, as necessary.

- System pressure test examinations will be performed per ASME XI requirements.

Evaluation: The Code requires essentially 100% volumetric examination of the inside radius section of pressurizer spray nozzle, licensee-designated item number 4-PSN-1131-IRS. The inner radius section is a portion of the transition area between the nozzle and the shell of the pressurizer, and may be susceptible to cyclic thermal fatigue degradation. For this reason, the Code requires that the innermost part (nearest the inner surface) of this region be volumetrically examined to detect any cracking that would probably be generated from the inner surface of the component. However, complete volumetric examination of this inner radius area on the pressurizer spray nozzle is restricted by a permanently attached vessel identification plate. This restriction makes 100% volumetric examination impractical to perform on this inner radius region. To gain access for examination, the pressurizer identification plate would have to be removed and relocated. Imposition of this requirement would create a significant burden

on the licensee, therefore, the Code-required 100% volumetric examinations are impractical.

As shown on the sketches and technical descriptions provided by the licensee, a substantial amount (approximately 78%) of the required examination volume was completed. Scanning access is restricted by the vessel identification plate, which is usually permanently attached by welding at the vessel fabrication facility. The licensee reported that no recordable indications were observed during the examination. While the licensee cannot meet the Code-required 100% volumetric examination coverage, the examination completed should detect any general patterns of degradation that may occur in the areas examined, providing reasonable assurance of the continued structural integrity of this weld. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), it is recommended that relief be granted.

2.4 Request for Relief S1-RR-B01 (Part D), Examination Category B-F, Items B5.40 and B5.70, Pressure Retaining Dissimilar Metal Welds, Pressurizer and Steam Generator Nozzle-to-Safe-End Butt Welds

Code Requirement: Examination Category B-F, Items B5.40 and B5.70, require essentially 100% volumetric and surface examinations, as defined by Figure IWB-2500-8 of the pressurizer relief and spray nozzle-to-safe-end welds, and steam generator short radius nozzle-to-safe-end welds. "Essentially 100%," as clarified by ASME Code Case N-460, is greater than 90% coverage of the examination volume, or surface area, as applicable.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100% volumetric examination of the dissimilar metal welds shown in Table 4 below.

Table 4 - Examination Category B-F

Code Item	Weld ID	Weld Type
B5.40	6-PR-1104-1 6-PR-1103-1	PZR carbon steel relief nozzle-to-safe-end weld joined to 6" stainless steel pipe
B5.40	4-PR-1100-1	PZR carbon steel relief nozzle-to-safe-end weld joined to 4" stainless steel pipe
B5.40	4-PS-1131-29	PZR carbon steel spray nozzle-to-safe-end weld joined to 4" stainless steel pipe
B5.70	31-RC-1130-2R1 29-RC-1130-5R1 29-RC-1120-5R1 29-RC-1110-4R1	Steam generator primary channel head short radius nozzle-to-safe-end weld joining cast stainless steel reactor coolant piping

Licensee's Basis for Relief Request (as stated):

Required Code coverage is impractical for the subject welds since the piping system would require design modifications that would impose a significant burden to PSEG Nuclear. PSEG Nuclear has examined these welds to the extent practical and determined them to be acceptable with no observed signs of degradation. In addition, other similar piping welds have been examined to the extent required by the Code and also found to be acceptable with no observed signs of degradation. Also, VT-2 visual examinations performed in conjunction with system pressure testing after each refueling outage found these welds to be acceptable with no leakage observed.

Code required volumetric examinations are conducted by ultrasonic examination from both the upstream and downstream directions of piping welds [from both sides of the weld, where possible]. Ultrasonic examination of certain terminal ends and structural discontinuities [valves, pumps, etc.] are considered to be impractical due to their configuration and material acoustic properties.

The EPRI Performance Demonstration Initiative (PDI) is in agreement with the NRC's September 22, 1999 Final Rule regarding single side access for piping. The Final Rule requires if access is available, austenitic steel welds shall be scanned in each of the four directions (parallel and perpendicular to the weld) where required. PDI has not been able to qualify a single side examination procedure technique that is capable of demonstrating equivalency for a two-sided examination procedure technique on austenitic piping welds. Current technology is not capable of reliably detecting or sizing flaws on the far side of an austenitic weld for configurations common to nuclear applications. Ultrasonic examination of ferritic steel welds requires scanning in the two axial scan directions. Circumferential scanning is required in the remaining two directions only when axial indications were noted during preservice inspections. Coverage credit may be taken for single side exams on ferritic piping. However, for austenitic piping, a procedure must be qualified with flaws on the inaccessible side of the weld.

As stated earlier, current technology is not capable of reliably detecting or sizing flaws on the far side of austenitic weld for configurations common to US nuclear applications. To demonstrate that the best available technology was applied, PDI provides a best effort qualification instead of a complete single sided qualification. PDI Performance Demonstration Qualification Summary (PDQS) austenitic piping certificates list the limitation that single side examination is performed on a best effort basis. When performing single side access of austenitic stainless steel piping welds the best available techniques are used from the accessible side of the weld, as qualified through the PDI.

When the examination area is limited to one side of an austenitic weld, examination coverage does not comply with 10 CFR 50.55a(b)(2)(xv)(A) or the ASME Section XI requirements and proficiency demonstrations do not comply with 10 CFR 50.55a(b)(2)(xvi) and full coverage credit may not be claimed. PSEG Nuclear considers exams accessed from a single side of an austenitic piping welds to be fully examined to the extent practical.

The Nuclear Regulatory Commission staff discussed the subject relief requests with PSEG staff on October 18, 2002. In response to the Nuclear Regulatory Commission's request, PSEG Nuclear is providing written clarification of the material composition and configuration of piping associated with the pressurizer relief and spray lines and steam generator nozzle to cast stainless steel elbows.

The Pressurizer relief and spray line 'nozzle to safe-end' welds 6-PR-1104-1 (Summary No. 023400), 6-PR-1103-1 (Summary No. 024600), 4-PS-1131-29 (Summary No. 033500) and 4-PR-1100-1 (Summary No. 025900) do not contain Alloy 600 type material as evidenced by Attachment 1 drawing and information.

The Steam Generator nozzle-to-elbow welds 31-RC-1130-2R1 (Summary No. 039200), 29-RC-1130-5R1 (Summary No. 050210), and 29-RC-1120-5R1 (052600) contain a single bead of Alloy 600 material located on the outside of the pipe. The Alloy 600 material is not in contact with the primary reactor water coolant located on the inside of the piping as evidenced by Attachment 2 drawing and information.

Licensee's Proposed Alternative Examination (as stated):

Where the component will not allow an ultrasonic angle beam examination for axial scans (upstream and downstream), the following will be performed using the best available technology as demonstrated through the EPRI PDI program:

- Similar metal welds will be examined in at least one axial direction and two circumferential scans adjacent to the weld and upon the weld using personnel and techniques qualified and demonstrated through the EPRI PDI program for single sided access relating to the material type to be examined.

- Austenitic-to-Inconel dissimilar metal welds will be examined in at least one axial direction and two circumferential scans adjacent to the weld and upon the weld using personnel and techniques qualified and demonstrated through the EPRI PDI program for single sided access relating to the material type to be examined.

- The code required surface and system pressure test examinations will be performed per ASME XI requirements.

- PSEG Nuclear is currently preparing its submittal for a Risk Informed Inservice Inspection (RI-ISI) Program in accordance with NRCs EPRI approved methodology for both Salem Units class 1 and 2 systems for NRC approval. During the conduct of RI-ISI program preparation, PSEG Nuclear will consider the non-selection of those components that have been deemed inaccessible, physically limited or partially obstructed portions provided the NRCs approved RI-ISI EPRI methodology allows.

Evaluation: The Code requires essentially 100% volumetric and surface examination of the subject pressure retaining Category B-F nozzle-to-pipe welds. The volumetric examinations must be performed using two beam path directions from both sides of the weld, when accessible. For the small-bore welds on the pressurizer safety and relief nozzles, ultrasonic scanning is limited due to the outside surface geometries of the

nozzles and piping safe-ends. For the large-bore steam generator nozzle welds, the examinations are restricted due to the geometry of the nozzles and the coarse grain structure of the cast stainless steel short radius elbows. For the licensee to achieve 100% volumetric coverage from two beam directions would require that the subject welds be completely redesigned and modified. This would place a significant burden on the licensee; therefore, the Code-required 100% volumetric and surface examinations are impractical.

As indicated in the licensee's submittal, coverages of approximately 25-38% of the required examination volumes were obtained. Circumferential scans only could be performed over the weld regions, due to the access and material limitations described above. These components were examined from the outside surface with dual refracted longitudinal wave techniques to provide enhanced ultrasonic penetration into the weld material, while decreasing noise responses. Longitudinal waves are generally not useful beyond the first skip distance (½ vee-path) because most of the acoustic energy is mode converted to a shear wave at the inner surface of the component. Therefore, credit for extended beam path coverage using these techniques is not feasible. The licensee also performed 100% of the Code-required surface examinations on these welds. No recordable indications were noted during the volumetric and surface examinations.

In response to recent industry experience of primary water stress corrosion cracking (PWSCC) in dissimilar metal welds containing Inconel®, the licensee examined eight additional Category B-F welds on the primary coolant system during the last outage of the second 10-year interval (April 2001). These inspections included remote visual examinations on the inner surface of these nozzle-to-piping welds, and remote ultrasonic examinations using 50 and 70 degree refracted longitudinal waves. No indications of PWSCC were detected. Further, the PWSCC phenomena has been limited thus far to Inconel®-buttered welds. The pressurizer spray and relief nozzles, and the steam generator nozzles, included in this relief request do not contain Inconel® that would be in contact with primary water. The licensee has confirmed that all buttering in these welds has been made with stainless steel, therefore it is not believed that the subject welds are as susceptible to the current PWSCC phenomena that has occurred in Inconel®-buttered welds.

Based on the impracticality of performing full volumetric examinations, and considering the coverages obtained during volumetric and surface examination in conjunction with recent full volumetric examinations on other Category B-F welds, it is believed that any significant patterns of degradation would have been detected. Therefore, reasonable assurance of the continued structural integrity of these components has been provided. Pursuant to 10CFR50.55a(g)(6)(i), it is recommended that relief be granted.

2.5 Request for Relief S1-RR-B01 (Part E), Examination Category B-G-1, Items B6.180, Pressure Retaining Bolting, Greater Than 2-in. In Diameter, Reactor Coolant Pump Bolting

Code Requirement: Examination Category B-G-1, Item B6.180, requires 100% volumetric examinations, as defined by Figure IWB-2500-12, of pressure retaining bolting greater than 2-inches in diameter in Class 1 pumps. The bolting may be

examined in place under tension, when the connection is disassembled, or when the bolting is removed.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100% volumetric examination of all bolts on main reactor coolant pumps 11 and 12. The licensee's designation for these bolts is 11-PMP-Bolts 1-24, and 12-PMP-Bolts 1-24, respectively.

Licensee's Basis for Relief Request (as stated):

Full Code required coverage is impractical for the subject components since access to some bolting is obstructed. This would require design modifications and would impose a significant burden to PSEG Nuclear. PSEG Nuclear has examined several of these components contained within the same location and determined them to be acceptable with no observed signs of degradation. Also, similar bolting located on other pumps has been examined to the extent required by the Code and also found to be acceptable with no observed signs of degradation. In addition, a VT-2 visual examination is performed upon each stud in conjunction with the system pressure testing after each refueling outage. This bolting has been found to be acceptable with no leakage observed. Further, a visual examination is conducted of each installed stud to ensure no physical damage that may have resulted from the presence of boric acid and has been found to be acceptable with no damage observed.

These examinations were conducted during May 1992 in accordance with Code requirements using available state-of-the-art technology. Exams were conducted upon 17 of 24 bolts (70%) using a 60-degree shear wave transducer and an 88-degree shear wave transducer from the stud's heater hole using an extension pole. The remaining 7 studs (30%) were unable to be examined due to inaccessibility resulting from permanently installed miscellaneous piping (oil pans, CVCS piping and instrumentation lines) located approximately 4"-10" over the top of the stud that prevented access to the heater holes [on studs] 3, 4, 5, 6, 13, 22 and 23. No indications were noted. Studs were examined in-place and under tension. No maintenance was performed that supported removal of the studs [for examination].

Licensee's Proposed Alternative Examination (as stated):

NDE personnel will utilize the single side access straight beam ultrasonic exam technique having been satisfactorily demonstrated at the PDI. PSEG Nuclear has since elected to perform straight beam (0-degree) examinations from the accessible surface of the studs using PDI qualified individuals to perform these exams. PSEG Nuclear did not re-perform these exams (for the [number] 11 and 12 Reactor Coolant Pump studs) using the current state-of-the-art technique that would have resulted in 100% Code coverage being achieved. These exams are currently scheduled to be performed November 2005 during RF017. Straight beam UT examinations were conducted upon the [number] 13 and 14 Reactor Coolant Pump studs using this technique and determined to be satisfactory.

Evaluation: Examination Category B-G-1 requires 100% volumetric examination of all bolting greater than 2-inches in diameter in Class 1 pumps. The licensee conducted

examinations on studs for Reactor Coolant Pumps (RCPs) 11 and 12 early in the second 10-year ISI interval (May 1992). At that time, the standard industry method included using ultrasonic shear waves applied from the bore surface of the stud heater hole. This technique requires the transducers to be mounted on masts that are inserted into the heater holes from the accessible top surface of the stud. During examination of RCPs 11 and 12, seven of the twenty-four studs (for each RCP) were inaccessible to deploy the masts due to interferences from adjacent piping, oil drip-pans and instrumentation lines. In order to access the heater holes for these studs, these appurtenances would require redesign and modification. This would place a significant burden on the licensee. Therefore, these inspections were impractical for seven of the twenty-four studs on RCPs 11 and 12.

The licensee was able to inspect the remaining studs on these RCPs, which amounts to approximately 70% of the Code-required volumetric coverage. No indications of service-induced degradation were observed during these examinations. In addition, the licensee recently qualified through PDI for a new straight beam technique that will allow essentially 100% of these studs to be examined from the accessible top surface. This new technique has been successfully implemented on RCPs 13 and 14, with no detrimental indications being observed. Examinations are scheduled, using the PDI-qualified straight beam technique, for RCPs 11 and 12 during an upcoming refueling outage. Based on the examinations that were completed on RCPs 11 and 12, the recent examinations for studs in RCPs 13 and 14 showing no evidence of degradation, and the new examinations planned for an upcoming outage, reasonable assurance of the continued structural integrity has been provided. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), it is recommended that relief be granted.

2.6 Request for Relief S1-RR-B01 (Part F), Examination Category B-J, Items B9.11, B9.21, B9.31, and B9.40, Pressure Retaining Welds in Piping

Code Requirement: Examination Category B-J, Items B9.11 and B9.31, require essentially 100% volumetric and surface examinations, as defined by Figures IWB-2500-8, -9, -10, or -11, as applicable, for piping circumferential and branch connection welds $\geq$ 4-inch NPS. Items B9.21 and B9.40 require essentially 100% surface examinations, as defined in IWB-2500-8, of piping circumferential welds < 4-inch NPS and socket welds. “Essentially 100%,” as clarified by ASME Code Case N-460, is greater than 90% coverage of the examination volume, or surface area, as applicable.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100% volumetric and/or surface examination of the Class 1 piping welds shown in Table 5.

Table 5 - Examination Category B-J			
Code Item	**Weld ID**	**Weld Type**	**Exam Required**
B9.11	10-SJ-1121-8 6-SJ-1141-1 6-SJ-1121-2 6-SJ-1112-1 6-SJ-1111-1 4-SJ-1182-18 4-SJ-1172-28 4-PS-1131-1 4-PS-1111-23 31-RC-1140-3 31-RC-1110-4 10-SJ-1141-14 10-SJ-1131-10	Elbow-to-pipe Reducer-to-elbow Elbow-to-valve Reducer-to-valve Reducer-to-valve Pipe-to-elbow Tee-to-reducer Pipe-to-branch conn. Valve-to-tee Elbow-to-pipe Pipe-to-elbow Valve-to-tee Pipe-to-elbow	Surface and Volumetric
B9.21	3-CV-1141-14 3-PR-1107-10	Valve-to-elbow Pipe-to-valve	Surface and Volumetric
B9.31	RC-1140-1/10-SJ-1 RC-1110-1/4-PS-1	Branch conn.-to-pipe Branch conn.-to-pipe	Surface and Volumetric
B9.40	2-SJ-1128-57 1.5-SJ-1122-7	Coupling-to-pipe Tee-to-pipe	Surface

Licensee's Basis for Relief Request (as stated):

Examinations of the subject components were conducted through-out the second ISI interval. Limitations to volumetric coverage(s) were caused by geometry of the component, access restrictions, or interferences by adjacent components. The specific limitations provided by the licensee are shown in Table 6, along with volumetric coverages obtained for each weld. The licensee stated:

Required Code coverage is impractical for the subject welds since the piping system would require design modifications that would impose a significant burden to PSEG Nuclear. PSEG Nuclear has examined these welds to the extent practical and determined them to be acceptable with no observed signs of degradation. In addition, other similar piping welds have been examined to the extent required by the Code and also found to be acceptable with no observed signs of degradation. Also, VT-2 visual examinations performed in conjunction with system pressure testing after each refueling outage found these welds to be acceptable with no leakage observed.

Code required volumetric examinations are conducted by ultrasonic examination from both the upstream and downstream directions of piping welds. Ultrasonic examination of certain terminal ends and structural discontinuities are considered to be impractical due to their configuration and material acoustic properties.

The EPRI Performance Demonstration Initiative (PDI) is in agreement with the NRC's

September 22, 1999 Final Rule regarding single side access for piping. The Final Rule requires if access is available, austenitic steel welds shall be scanned in each of the four directions (parallel and perpendicular to the weld) where required. PDI has not been able to qualify a single side examination procedure technique that is capable of demonstrating equivalency for a two-sided examination procedure technique on austenitic piping welds. Current technology is not capable of reliably detecting or sizing flaws on the far side of an austenitic weld for configurations common to nuclear applications. Ultrasonic examination of ferritic steel welds requires scanning in the two axial scan directions. Circumferential scanning is required in the remaining two directions only when axial indications were noted during preservice inspections. Coverage credit may be taken for single side exams on ferritic piping. However, for austenitic piping, a procedure must be qualified with flaws on the inaccessible side of the weld.

As stated earlier, current technology is not capable of reliably detecting or sizing flaws on the far side of austenitic weld for configurations common to US nuclear applications. To demonstrate that the best available technology was applied, PDI provides a best effort qualification instead of a complete single sided qualification. PDI Performance Demonstration Qualification Summary (PDQS) austenitic piping certificates list the limitation that single side examination is performed on a best effort basis. When performing single side access of austenitic stainless steel piping welds the best available techniques are used from the accessible side of the weld, as qualified through the PDI.

When the examination area is limited to one side of an austenitic weld, examination coverage does not comply with 10 CFR 50.55a(b)(2)(xv)(A) or the ASME Section XI requirements and proficiency demonstrations do not comply with 10 CFR 50.55a(b)(2)(xvi) and full coverage credit may not be claimed. PSEG Nuclear considers exams accessed from a single side of an austenitic piping welds to be fully examined to the extent practical.

Table 6 - Piping Examination Limitations

Weld ID	Limitation Description/Interference	Coverage
10-SJ-1121-8	Downstream side of weld obstructed by penetration wall	PT 100% UT 47%
6-SJ-1141-1	Reducer outside surface geometry limits coverage	PT 100% UT 86%
6-SJ-1121-2	No scans from valve side of weld due to OD geometry	PT 100% UT 64%
6-SJ-1112-1	No scans from valve side of weld due to OD geometry	PT 100% UT 64%
6-SJ-1111-1	No scans from valve side of weld due to OD geometry	PT 100% UT 82%

Table 6 - Piping Examination Limitations		
Weld ID	**Limitation Description/Interference**	**Coverage**
4-SJ-1182-18	1” branch connection interferes with scan on pipe side of weld	PT 100% UT 87%
4-SJ-1172-28	No scans from tee side due to OD geometry and material properties	PT 100% UT 86%
4-PS-1131-1	Branch connection OD geometry limits scans to pipe side only	PT 100% UT 75%
4-PS-1111-23	OD configuration of valve limits scans to tee side	PT 100% UT 50%
31-RC-1140-3	No scans from cast elbow side of weld due to coarse-grained material	PT 100% UT 76%
31-RC-1110-4	No scans from cast elbow side of weld due to coarse-grained material	PT 100% UT 38%
10-SJ-1141-14	No scans due to OD geometry and coarse-grained material	PT 100% UT 0%
10-SJ-1131-10	Scans limited to pipe side due to elbow OD curvature	PT 100% UT 86%
3-CV-1141-14	No scans from valve side due to OD configuration	PT 100% UT 50%
3-PR-1107-10	Permanently attached restraints limit access for surface examination	PT 37%
RC-1140-1/10-SJ-1	Scans on pipe side only due to OD geometry of branch connection	PT 100% UT 75%
RC-1110-1/4-PS-1	Scans on pipe side only due to OD geometry of branch connection	PT 100% UT 75%
2-SJ-1128-57	Permanently welded support plate restricts access for surface examination	PT 83%
1.5-SJ-1122-7	Permanently welded pipe support restricts access for surface examination	PT 52%

Licensee’s Proposed Alternative Examination (as stated):

Where the component will not allow an ultrasonic angle beam examination for axial scans (upstream and downstream), the following will be performed using the best available technology as demonstrated through the EPRI PDI program:

- Similar metal welds will be examined in at least one axial direction and two circumferential scans adjacent to the weld and upon the weld using personnel and techniques qualified and demonstrated through the EPRI PDI program for single sided access relating to the material type to be examined.

- Austenitic-to-Inconel dissimilar metal welds will be examined in at least one axial direction and two circumferential scans adjacent to the weld and upon the weld using personnel and techniques qualified and demonstrated through the EPRI PDI program for single sided access relating to the material type to be examined

- The code required surface and system pressure test examinations will be performed per ASME XI requirements.

- PSEG Nuclear is currently preparing its submittal for a Risk Informed Inservice Inspection (RI-ISI) Program in accordance with NRCs EPRI approved methodology for both Salem Units class 1 and 2 systems for NRC approval. During the conduct of RI-ISI program preparation, PSEG Nuclear will consider the non-selection of those components that have been deemed inaccessible, physically limited or partially obstructed portions provided the NRCs approved RI-ISI EPRI methodology allows.

Evaluation: The Code requires 100% volumetric and/or surface examination, as applicable, for selected Class 1, Examination Category B-J pressure retaining welds in piping. The volumetric examinations must be performed using two beam path directions from both sides of the weld, when accessible. Only single-sided scan access is available for many of these components due to the outside geometrical shapes of valves, tees, branch connections and elbows, or limitations due to system design, such as weld locations at wall penetrations (see Table 6). The licensee uses both shear wave and dual element refracted longitudinal wave transducers; the latter are known to provide superior penetration in austenitic materials. However, these transmit-receive transducers are optimally focused on the component inside surface using a ½ vee metal path. Using the transducer beyond this focal range would not provide adequate sensitivity. Also, while 100% of the surface examinations have been completed for the majority of these welds, there exist limitations on several welds due to permanently attached pipe supports or restraints. For the licensee to achieve 100% volumetric coverage of these welds from two beam directions, or 100% surface examinations, as applicable, the subject welds and/or supports would need to be completely redesigned and modified. This would place a significant burden on the licensee; therefore, the Code-required 100% volumetric and surface examinations are impractical.

The licensee has examined a substantial portion of the Code-required volume or surface area, as applicable, obtaining coverages of 37 to 86% for the majority of the subject welds. The licensee was unable to perform ultrasonic examination on Weld 10-SJ-1141-14 due to the coarse-grained austenitic material and outside surface geometry. Further, there has been no historical industry degradation in cast stainless steel components. These welds are part of a larger population of B-J welds that are being examined to the extent required by Code. Therefore, it is concluded that any structurally-significant patterns of degradation that may be occurring in the areas examined would have been detected, providing reasonable assurance of the continued

integrity of these components. Based on the impracticality of performing the Code-required 100% volumetric and surface examinations, and considering the extent of coverages obtained by the licensee, it is recommended that relief be granted, pursuant to 10 CFR 50.55a(g)(6)(i).

2.7 Request for Relief S1-RR-B01 (Part G), Examination Category B-K-1, Item B10.20, Integral Attachments for Piping, Pumps, and Valves

Code Requirement: Examination Category B-K-1, Item B10.20 requires essentially 100% surface or volumetric examinations, as defined by Figures IWB-2500-13, -14, or -15, as applicable, for integrally welded support attachments on Class 1 pumps. "Essentially 100%," as clarified by ASME Code Case N-460, is greater than 90% coverage of the examination volume, or surface area, as applicable.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100% surface examination of integrally welded attachments on Reactor Coolant Pumps (RCPs) 11, 12, 13 and 14. The licensee's designations for these attachments are shown below. (Note that no relief was requested for 12-PMP-2LG.)

11-PMP-1LG	12-PMP-1LG	13-PMP-1LG	14-PMP-1LG
11-PMP-2LG	12-PMP-3LG	13-PMP-2LG	14-PMP-2LG
11-PMP-3LG		13-PMP-3LG	14-PMP-3LG

Licensee's Basis for Relief Request (as stated):

Full Code required coverage is impractical for the subject welds since the integral attachment would require design modifications and would impose a significant burden to PSEG Nuclear. In addition, removal of the component support attached to pump would result in the need to redesign the system's configuration in order to achieve access to the area obstructed. PSEG Nuclear has examined these welds to the extent practical and determined them to be acceptable with no observed signs of degradation. In addition, other similar vessel welds have been examined to the extent required by the Code and also found to be acceptable with no observed signs of degradation. In addition, VT-2 visual examinations performed in conjunction with system pressure testing after each refueling outage found these welds to be acceptable with no leakage observed.

The PT examination was limited due to the presence of the pump's permanently welded support structure that interfered with the exam upon the lower portion of the lug [integrally welded attachment] for approximately 18".

Licensee's Proposed Alternative Examination (as stated):

These examinations will be performed in accordance with the requirements of ASME Section XI 1995 Edition up through and including 1996 Addenda Article IWB-2500.

Evaluation: The Code requires essentially 100% surface or volumetric examination, as applicable, of the length of Class1 integral attachment welds (welded support lugs) on the RCPs at Salem 1. The design of the lugs requires a surface examination in accordance with IWB-2500-15. However, as indicated by sketches and descriptions in the licensee's submittal, complete examinations are restricted by portions of the pumps' lower support structures. These structures make 100% examinations impractical to perform for these welds. To gain access for examination, these structures would require design modifications. Imposition of this requirement would create a significant burden on the licensee, therefore, the Code-required 100% examinations are impractical.

The licensee has examined a significant length of the subject attachment welds, obtaining approximately 72 to 84% of the Code-required surface area on each of these lugs. No recordable indications were observed during these examinations. Therefore, it is concluded that any significant patterns of degradation should have been detected by the examinations in the areas that were completed, providing reasonable assurance of continued structural integrity of the RCP integrally welded attachments. Based on the impracticality of examining 100% of the subject welds, and the examination coverages obtained, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.8 Request for Relief S1-RR-C01 (Part A), Examination Category C-A, Items C1.10, C1.11, C1.12, C131.21, C131.22, 131.30 and 131.40 Pressure Retaining Welds in Pressure Vessels

Code Requirement: Examination Category C-A, requires essentially 100% volumetric weld examinations to be performed upon various pressure vessel shell circumferential, head and tubesheet welds (Items C1.1 0, C1.1 1 and C1.12, respectively); closure head circumferential and meridional welds (Items 131.21 and 131.22, respectively) and the associated reactor pressure vessel flange welds (Items 131.30 and 131.40). The examinations may be limited to one vessel among the group of vessels performing a similar function. “Essentially 100%,” as clarified by ASME Code Case N-460, is greater than 90% coverage of the examination volume, or surface area, as applicable.

Licensee’s Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100% volumetric examination of the Code Class 2 vessel welds shown in Table 7.

Table 7- Examination Category C-A

Code Item	Weld ID	Weld Type
C1.10	1-BIT-A	Shell Circ. Weld
C1.10	1-BIT-B	Transition piece to shell
C1.10	1-RCF-2	Flange to Shell
C1.10	11-RHRHEX-1	Flange to Shell

Table 7- Examination Category C-A		
Code Item	**Weld ID**	**Weld Type**
C1.10	11-RHRHEX-2	Shell Circ. Weld
C1.20	1-CVCT-2	Shell to lower head
C1.20	1-ELHEX-2	Shell to lower head
C1.20	1RCF-1	Upper head to flange
C1.20	1-RCF-3	Shell to lower head
C1.30	1-RHE-3	Tubesheet to shell

Licensee's Basis for Relief Request:

Examinations of the subject components were conducted in April and May 2001, during the last refueling outage of the second ISI interval. Limitations to volumetric coverage(s) were caused by geometry of the component, access restrictions, or interferences by adjacent components. The specific limitations provided by the licensee are shown in Table 8, along with volumetric coverages obtained for each weld. The licensee stated:

Full Code required coverage is impractical for the identified subject components since the Reactor Pressure Vessel (RPV) would require design modifications that would impose a significant burden to PSEG Nuclear. PSEG Nuclear has elected to examine the subject components to the extent practical and has determined them to be acceptable with no observed signs of degradation. In addition, other RPV welds have been examined to the extent required by the Code and also found to be acceptable with no observed signs of degradation. Also, VT-2 visual examinations performed in conjunction with system pressure testing after each refueling outage found these welds to be acceptable with no leakage observed.

Table 8 - Examination Category C-A Limitations		
Weld ID	**Limitation Description/Interference**	**Coverage**
1-BIT-A	Vessel Supports and branch connection lines	86%
1-BIT-B	Examination limited due to 2-1/2" inch Insulation ring	66%
1-RCF-2	Examination limited due to flange configuration and shell side weld support	73%
11-RHRHEX-1	Examination limited due to flange configuration	75%
11-RHRHEX-2	Examination limited due to flange configuration and vessel supports	16%

Weld ID	Limitation Description/Interference	Coverage
1-CVCT-2	Examination limited due to vessel support plate	82%
1-ELHEX-2	Examination limited due to branch connections	72%
1RCF-1	Examination limited due to flange configuration and vessel head curvature	48%
1-RCF-3	Examination limited due to nozzle configuration and support lugs	57%
1-RHE-3	Examination limited due to two branch connections, hanger and whip restraint	68%

Licensee's Proposed Alternative Examination (as stated):

Where the component will not allow an ultrasonic angle beam examination from both sides of the weld, the following will be performed using the best available technology as demonstrated through the EPRI PDI program:

- Similar metal welds, 100% of the weld will be examined to the extent practical using personnel and techniques qualified and demonstrated through the EPRI PDI, as necessary.
- System pressure test examinations will be performed per ASME XI requirements.

Evaluation: The Code requires essentially 100% volumetric examination of the length of the subject Code Class 2 vessel welds. However, as shown in Table 8, complete examinations are restricted by several factors, including the geometric configuration of the closure and lower heads, adjacent interferences caused by pipe branch connections, pipe whip restraints, insulation rings and vessel support plates. These conditions make 100% volumetric examinations impractical to perform for these welds. Access for examinations would require design modifications to several Class 2 vessels including the boron injection tank, residual heat exchanger, reactor coolant filter housing, and chemical volume control tank. Imposition of this requirement would create a significant burden on the licensee; therefore, the Code-required 100% volumetric examinations are impractical.

Drawings and descriptions included in the licensee's submittal clearly show that examinations of the subject welds have been performed to the extent practical, with the licensee obtaining substantial volumetric (57-86%) coverages for most of these welds (see Table 8). All the examinations were performed using EPRI PDI qualified equipment, personnel and procedures. All recordable indications, when observed, were evaluated in accordance with ASME IWC-2420, and found to be acceptable for continued operation. In addition, other Class 2 vessel shell welds were examined to the extent required by the Code and there has been no recorded degradation of these components. Therefore, any significant patterns of degradation should have been

detected by the examinations in the areas that were completed, providing reasonable assurance of continued structural integrity of the subject Class 2 vessels. Based on the impracticality of examining 100% of the subject welds, and the examination coverages obtained, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.9 Request for Relief S1-RR-C01 (Part B), Examination Category C-B, Item C2.21, Pressure Retaining Nozzle Welds in Vessels

Code Requirement: Examination Category C-B, Item C2.21 requires essentially 100% volumetric and surface examinations, as defined by Figures IWC-2500-4 (a) and (b), of the nozzle-to-shell welds in Class 2 vessels. "Essentially 100%," as clarified by ASME Code Case N-460, is greater than 90% coverage of the examination volume, or surface area, as applicable.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required volumetric and/or surface examination, based on thickness and the presence of reinforcement, of the nozzle-to-shell welds shown in Table 9.

Table 9 - Examination Category C-B Pressure Retaining Welds in Nozzles

Code Item	Weld ID	Weld Type
C2.21	16-BFN-2111-1	Nozzle to Shell
C2.21	1-BIT-2	Nozzle to Shell
C2.21	11-RHRHEX-IN	Nozzle to Shell
C2.21	11-RHRHEX-OUT	Nozzle to Shell
C2.21	1-BIT-1	Inlet nozzle to shell

Licensee's Basis for Relief Request:

Examinations of the subject components were conducted in February 1991 and April 2001. Limitations to volumetric coverage(s) were caused by geometry of the component, access restrictions, or interferences by adjacent components. The specific limitations provided by the licensee are shown in Table 10, along with volumetric and surface examination coverages obtained for each weld. The licensee stated:

Full Code required coverage is impractical for the subject components since these vessels would require design modifications that would impose a significant burden to PSEG Nuclear. PSEG Nuclear has examined these component welds to the extent practical and determined them to be acceptable with no observed signs of degradation. In addition, other similar vessel welds have been examined to the extent required by the Code and also found to be acceptable with no observed signs of degradation. Also, VT-2 visual examinations performed in conjunction with system pressure testing after each refueling outage found these welds to be acceptable with no leakage observed.

Table 10 - Category C-B Examination Limitations		
Weld ID	**Limitation Description/Interference**	**Coverage**
16-BFN-2111-1	Insulation ring limits approximately 16" of weld examination; the weld is 109” in length.	71% UT 85% MT
1-BIT-2	The examination is limited due to the nozzle OD configuration which permits examination from the head side only.	21.2% UT 100% MT
11-RHRHEX-IN	The examinations were limited due to the nozzle configuration and adjacent RHR heat exchanger welds	23% UT 87% PT
11-RHRHEX-OUT	The examinations were limited due to the nozzle configuration and adjacent RHR heat exchanger welds	23.2% UT 100% PT
1-BIT-1	The examinations were limited due to nozzle head to shell configuration	36% UT

Licensee’s Proposed Alternative Examination (as stated):

Where the component will not allow an ultrasonic angle beam examination from both sides of the weld, the following will be performed using the best available technology as demonstrated through the EPRI PDI program:

- Similar metal welds, 100% of the required weld volume will be examined to the extent practical using personnel and techniques qualified and demonstrated through the EPRI PDI, as necessary.

- System pressure test examinations will be performed per ASME XI requirements.

Evaluation: The Code requires essentially 100% volumetric and surface examination of the subject pressure retaining nozzle welds as defined by figures IWC-2500-4 (a) and (b). However, as shown in Table 10, complete examinations are restricted by several factors, including nozzle configuration and adjacent welds. These conditions make 100% volumetric examinations impractical to perform for these welds. To gain access for examination, the vessels would require design modifications. Imposition of this requirement would create a significant burden on the licensee; therefore, the Code-required 100% volumetric examinations are impractical.

Because of the component configurations and access restrictions, the licensee obtained volumetric examination coverages from 23% to 71%. Drawings and descriptions included in the licensee’s submittal clearly show that examinations of the subject welds have been performed to the extent practical, with the licensee obtaining substantial surface examination coverages (from approximately 85% to 100%) for these welds (see Table 10). The limitations for ultrasonic examination cannot be overcome without entirely redesigning the subject nozzles and portions of the associated piping systems.

The examinations performed in April 2001 were completed using EPRI PDI qualified procedures, personnel and equipment (those performed in February 1991 were prior to required implementation of Appendix VIII). No problems or indications have been detected during these examinations. Therefore, any significant patterns of degradation should have been detected by the examinations in the areas that were completed, providing reasonable assurance of continued structural integrity of these welds. Based on the impracticality of examining 100% of the subject welds, and the examination coverages obtained, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.10 Request for Relief S1-RR-C01 (Part C), Examination Category C-C, Item 3.20, Integral Attachments for Piping, Pumps and Valves

Code Requirement: Examination Category C-C, Item C3.20 requires essentially 100% surface examinations, as defined by Figure IWC-2500-5, of integrally attachments for piping, pumps and valves. "Essentially 100%," as clarified by ASME Code Case N-460, is greater than 90% coverage of the examination volume, or surface area, as applicable.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required surface examination of the integral attachment welds shown in Table 11.

Table 11- Examination Category C-C Integral Attachments for Piping, Pumps and Valves

Code Item	Attachment ID	Type
C3.20	14-BF-2121-3PL-1	Pipe Lug
C3.20	-BF-2111-3PL-1	Pipe Lug
C3.20	-BF-2111-3PL-2	Pipe Lug
C3.20	-BF-2111-3PL-4	Pipe Lug
C3.20	-BF-2111-3PL-3	Pipe Lug
C3.20	-BF-2111-3PL-5	Pope Lug
C3.20	-BF-2111-3PL-6	Pipe Lug
C3.20	-BF-2111-3PL-7	Pipe Lug
C3.20	-BF-2111-3PL-8	Pipe Lug
C3.20	34-MS-2131-1-PL-17	Pipe Lug
C3.20	12-MS-2141-2PS-2	Pipe Support
C3.20	32-MS-2141-2PL 1 thru 12	Pipe Lugs
C3.20	32-MS-2131-2PL 1 thru 12	Pipe Lugs
C3.20	14-BF-2111-3PS-1	Pipe Support

Table 11- Examination Category C-C Integral Attachments for Piping, Pumps and Valves		
Code Item	**Attachment ID**	**Type**
C3.20	34-MS-2131-1-PL-3	Pipe Lug
C3.20	34-MS-2131-1-PL-7	Pipe Lug
C3.20	34-MS-2131-1-PL-13	Pipe Lug
C3.20	32-MS-2121-2PS-2	Pipe Support
C3.20	32-MS-2121-2PL 1 thru 12	Pipe Lugs
C3.20	32-MS-2111-2PS-2	Pipe Support
C3.20	32-MS-2111-2PL 1 thru 12	Pipe Lugs
C3.20	14-RH-2112-7PS-3	Pipe Support
C3.20	14-RH-2112-7PS-4	Pipe Support
C3.20	11-CHG/SI-PMP-1A (1-4)	Integrally Welded Supports
C3.20	12-MS-167-VS-1	Valve Support
C3.20	12-MS-167-VS-1A	Valve Support
C3.20	12-MS-167-VS-1B	Valve Support
C3.20	13-MS-167-VS-1A	Valve Support
C3.20	13-MS-167-VS-2A	Valve Support
C3.20	14-MS-167-VS-1A	Valve Support
C3.20	14-MS-157-VS-2A	Valve Support

Licensee's Basis for Relief Request (as stated):

Examinations of the subject components were conducted in May 1989 and October 1999. Limitations to surface coverage(s) were caused by access restrictions, or interferences by adjacent components. The specific limitations provided by the licensee are shown in Table 12, along with surface examination coverages obtained for each weld. The licensee stated:

Full Code required coverage is impractical for the subject components since these integral attachments would require design modifications that would impose a significant burden to PSEG Nuclear. In addition, the removal of the component support attached to the pump would require a redesign of the system configuration to achieve access to the required area. PSEG Nuclear has examined these component welds to the extent practical and determined them to be acceptable with no observed signs of degradation. In addition, other similar vessel welds have been examined to the extent required by the

Code and also found to be acceptable with no observed signs of degradation. Also, VT-2 visual examinations performed in conjunction with system pressure testing after each refueling outage found these welds to be acceptable with no leakage observed.

Table 12- Limitations for Category C-C Integral Attachments for Piping, Pumps and Valves

Attachment ID	Limitation	% Coverage
14-BF-2121-3PL-1	The examination was limited due to limited due to inadequate access between the lug welds and the wall penetration.	27%
-BF-2111-3PL-1	The examination was limited due to limited due to inadequate access at the backside of the attached lug.	67%
-BF-2111-3PL-2	The examination was limited due to limited due to inadequate access at the backside of the attached lug.	67%
-BF-2111-3PL-4	The examination was limited due to limited due to inadequate access at the backside of the attached lug.	67%
-BF-2111-3PL-3	The examination was limited due to limited due to inadequate access at the backside of the attached lug.	67%
-BF-2111-3PL-5	The examination was limited due to limited due to inadequate access at the backside of the attached lug.	67%
-BF-2111-3PL-6	The examination was limited due to limited due to inadequate access at the backside of the attached lug.	67%
-BF-2111-3PL-7	The examination was limited due to limited due to inadequate access at the backside of the attached lug.	67%
-BF-2111-3PL-8	The examination was limited due to limited due to inadequate access at the backside of the attached lug.	67%
34-MS-2131-1-PL-17	The examination was limited due to limited due to inadequate access resulting from adjacent support structures and attachment configuration.	75%
12-MS-2141-2PS-2	The examination was limited due to limited due to inadequate access resulting from instrumentation lines in close proximity to the weld and component configuration.	50%
32-MS-2141-2PL 1 thru 12	The examination was limited due to limited due to inadequate access resulting from adjacent components and attachment configuration.	65%
32-MS-2131-2PL 1 thru 12	The examination was limited due to limited due to inadequate access resulting from adjacent components and attachment configuration.	65%

Table 12- Limitations for Category C-C Integral Attachments for Piping, Pumps and Valves		
Attachment ID	**Limitation**	**% Coverage**
14-BF-2111-3PS-1	The examination was limited due to limited due to inadequate access resulting from adjacent components and attachment configuration.	32%
34-MS-2131-1-PL-3	The examination was limited due to limited due to inadequate access resulting from adjacent support structures and attachment configuration.	75%
34-MS-2131-1-PL-7	The examination was limited due to limited due to inadequate access resulting from adjacent support structures and attachment configuration.	75%
34-MS-2131-1-PL-13	The examination was limited due to limited due to inadequate access resulting from adjacent support structures and attachment configuration.	75%
32-MS-2121-2PS-2	The examination was limited due to limited due to inadequate access resulting from instrumentation lines in close proximity to the weld and component configuration.	13%
32-MS-2121-2PL 1 thru 12	The examination was limited due to limited due to inadequate access resulting from adjacent components and attachment configuration.	65%
32-MS-2111-2PS-2	The examination was limited due to limited due to inadequate access resulting from instrumentation lines in close proximity to the weld and component configuration.	36%
32-MS-2111-2PL 1 thru 12	The examination was limited due to limited due to inadequate access resulting from adjacent components and attachment configuration.	65%
14-RH-2112-7PS-3	The examination was limited due to limited due to a permanent obstruction that is within 1" of the far side examination surface.	67%
14-RH-2112-7PS-4	The examination was limited due to limited due to a permanent obstruction that is within 1" of the far side examination surface.	67%
11-CHG/SI-PMP-1A (1-4)	The examination was limited due to limited due to a permanent obstruction of the pump support.	73%
12-MS-167-VS-1	The examination was limited due to limited due to surrounding support structures.	82%
12-MS-167-VS-1A	The examination was limited due to limited due to surrounding support structures.	82%

Table 12- Limitations for Category C-C Integral Attachments for Piping, Pumps and Valves		
Attachment ID	**Limitation**	**% Coverage**
12-MS-167-VS-1B	The examination was limited due to limited due to surrounding support structures.	64%
13-MS-167-VS-1A	The examination was limited due to limited due to surrounding support structures.	82%
13-MS-167-VS-2A	The examination was limited due to limited due to surrounding support structures.	82%
14-MS-167-VS-1A	No examination was possible because the of the support structure of the Main Steam Header.	0%
14-MS-157-VS-2A	No examination was possible because the of the support structure of the Main Steam Header.	0%

Licensee's Proposed Alternative Examination (as stated):

Theses examinations will be performed in accordance with the requirements of ASME Section XI 1995 Edition up through and including the 1996 Addenda, Article IWC-2500.

Evaluation: The Code requires surface examination of the subject integrally welded attachments, as specified in figure IWC-2500-5. However, as shown in Table 12, complete examinations are restricted by several factors, including the geometric configuration of the component, adjacent interferences caused by instrument lines, adjacent components, and location of wall penetrations. These conditions make 100% surface examinations to the extent required by figure IWC-2500-5 impractical to perform for these welded attachments. Substantial portions of the plant would have to be redesigned to enable better access to these integrally welded attachments and there would be no assurance that 100% compliance with Code requirements could be achieved even with the redesign effort. Where limitations exist, consideration was given to alternative surface examination methods, however, these methods (e.g. liquid penetrant examination) could not be performed with any degree of reliability because the carbon steel components could not be adequately cleaned. Based upon the existing access limitations, compliance with the Code-required surface examinations is impractical.

Drawings and descriptions included in the licensee's submittal clearly show that examinations of the subject welded attachments have been performed to the extent practical, with the licensee obtaining substantial surface examination coverages (from approximately 32% to 82%) for most of these welds (see Table 12). For lesser, or 0% coverages, severe limitations caused by the main steam header prevent the necessary access to achieve additional surface examination coverage. No recordable indications were observed during any of the examinations that have been conducted. Therefore, any significant patterns of degradation should have been detected by the examinations in the areas that were completed, providing reasonable assurance of continued structural integrity of these integrally welded attachments. Based on the impracticality of

examining the subject welds to the extent required by code, and the examination coverages obtained, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.11 Request for Relief S1-RR-C01 (Part D), Examination Category C-F-1, Item C5.10 and Category C-F-2, Item C5.20, Pressure Retaining Welds in High and Low Alloy Steel

Code Requirement: Examination Category C-F-1, Item C5.10 requires volumetric and surface examinations, as defined by Figure IWC-2500-7 of essentially 100% of selected austenitic stainless steel or high alloy piping welds. Examination Category C-F-2, Item C5.20 requires volumetric and surface examinations, as defined by Figure IWC-2500-7 of essentially 100% of selected carbon or low alloy steel piping.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required volumetric and surface examinations of the high and low alloy piping welds shown in Table 13.

Table 13 - Examination Categories C-F-1 and C-F-2 Pressure Retaining Welds in High Alloy Piping

Code Item	Weld ID	Weld Type
C5.10	8-RH-2173-2	Valve to Elbow
C5.10	8-RH-2116-2	Valve to Pipe
C5.10	8-RH-2116-4R1	Flange to Valve
C5.10	8-CS-2123-46	Valve to Elbow
C5.10	8-CS-2114-46	Valve to Tee
C5.11	6-PR-2102-13	Pipe to Branch Connection
C5.11	14-RH-2114-15	Flange to Pump
C5.11	8-RH-2115-1	Pump to Valve
C5.11	6-SJ-2104-4	Safe-End to Nozzle
C5.21	3-CV-2156-1	Tee to Pipe
C5.21	4-SJ-2113-19	Tee to Valve
C5.21	3-SJ-2121-2	Pipe to Valve
C5.21	3-SJ-2121-3R1	Valve to Valve
C5.21	3-SJ-2121-4R1	Valve to Valve
C5.51	34-MS-2131-1	Pipe to Pipe
C5.51	34-MS-2131-2	Pipe to Valve
C5.51	34-MS-2121-1	Pipe to Pipe

Table 13 - Examination Categories C-F-1 and C-F-2 Pressure Retaining Welds in High Alloy Piping		
Code Item	**Weld ID**	**Weld Type**
C5.51	34-MS-2111-1	Pipe to Pipe
C5.51	34-MS-2111-2	Pipe to Valve
C5.51	32-MS-2121-3	Pipe to Elbow
C5.51	32-MS-2121-4	Elbow to Pipe
C5.51	32-MS-2111-4	Elbow to Pipe
C5.51	8-MS-2141-1	Weld-o-let to Elbow
C5.51	8-MS-2124-2	Elbow to Valve
C5.52	32-MS-2131-4LU-O	Piping Long-seam
C5.52	32-MS-2131-3LD-1	Piping Long-seam
C5.52	32-MS-2111-4LU-1	Piping Long-seam

Licensee's Basis for Relief Request (as stated):

Required Code coverage is impractical for the subject welds since the piping system would require design modifications and would impose a significant burden to PSEG Nuclear. [The specific limitations provided by the licensee are shown in Table 14, along with examination coverages obtained for each weld]. PSEG Nuclear has examined these welds to the extent practical and determined them to be acceptable with no observed signs of degradation. In addition, other similar piping welds have been examined to the extent required by the Code and also found to be acceptable with no observed signs of degradation. Further, VT-2 visual examinations performed in conjunction with system pressure testing have found these welds to be acceptable with no leakage observed.

Code required volumetric examinations are conducted by ultrasonic examination from both the upstream and downstream directions of piping welds. Ultrasonic examination of certain terminal ends and structural discontinuities are considered to be impractical due to their configuration and material acoustic properties.

The EPRI Performance Demonstration Initiative (PDI) is in agreement with the NRCs September 22, 1999 Final Rule regarding single side access for piping. The Final Rule requires that if access is available, austenitic steel weld shall be scanned in each of the four directions (parallel and perpendicular to the weld) where required. PDI has not been able to qualify a single side examination procedure technique that is capable of demonstrating equivalency for a two-sided examination procedure technique on austenitic piping welds. Current technology is not capable of reliably detecting or sizing flaws on the far side of an austenitic weld for configurations common to nuclear applications. Ultrasonic examination of ferritic steel welds requires scanning in the two

axial scan directions. Circumferential scanning is required in the remaining two directions only when axial indications were noted during preservice inspections. Coverage credit may be taken for single side exams on ferritic piping. However, for austenitic piping, a procedure must be qualified with flaws on the inaccessible side of the weld.

As previously stated, current technology is not capable of reliably detecting or sizing flaws on the far side of austenitic weld for configurations common to US nuclear applications. To demonstrate that the best available technology was applied, PDI provides a best effort qualification instead of a complete single sided qualification. PDI Performance Demonstration Qualification Summary (PDQS) austenitic piping certificates list the limitation that single side examination is performed on a best effort basis. When performing single side access of austenitic stainless steel piping welds the best available techniques are used from the accessible side of the weld, as qualified through the PDI.

When the examination area is limited to one side of an austenitic weld, examination coverage does not comply with 10 CFR 50.55a(b)(2)(xv)(A) or the ASME Section XI requirements and proficiency demonstrations do not comply with 10 CFR 50.55a(b)(2)(xvi) and full coverage credit may not be claimed. PSEG Nuclear considers exams accessed from a single side of an austenitic piping welds to be fully examined to the extent practical.

Table 14- Examination Category C-F-1 Pressure Retaining Welds in High Alloy Piping

Attachment ID	Limitation	% Coverage
8-RH-2173-2	The ultrasonic examination was limited to scanning from the elbow side of the weld, no examination was possible from the valve side of the weld	PT 100% UT 57%
8-RH-2116-2	The ultrasonic examination was limited to scanning from the elbow side of the weld, no examination was possible from the valve side of the weld	PT 100% UT 57%
8-RH-2116-4R1	The ultrasonic examination was limited to scanning from the flange side of the weld, no examination was possible from the valve side of the weld	PT 100% UT 50%
8-CS-2123-46	The ultrasonic examination was limited to scanning from the elbow side of the weld, no examination was possible from the valve side of the weld	PT 100% UT 50%
8-CS-2114-46	The ultrasonic examination was limited to scanning from the tee side of the weld, no examination was possible from the valve side of the weld	PT 100% UT 74%

Table 14- Examination Category C-F-1 Pressure Retaining Welds in High Alloy Piping		
Attachment ID	**Limitation**	**% Coverage**
6-PR-2102-13	The ultrasonic examination was limited to scanning from the pipe side of the weld, no examination was possible from the branch connection side of the weld	PT 100% UT 57%
14-RH-2114-15	The ultrasonic examination was limited to scanning clockwise and counter clockwise on the weld and heat affected zone of the weld. No axial scanning was possible from the flange or pump side	PT 100% UT 50%
8-RH-2115-1	The ultrasonic examination was limited to scanning clockwise and counter clockwise on the weld and heat affected zone of the weld. No axial scanning was possible from the valve or pump side	PT 100% UT 23%
6-SJ-2104-4	The ultrasonic examination was limited to scanning from the safe end side. The nozzle OD configuration and an adjacent weld prevented scanning from the nozzle side	PT 100% UT 38%
3-CV-2156-1	The ultrasonic examination was limited due to the tee's OD configuration	PT 100% UT 58%
4-SJ-2113-19	The ultrasonic examination was limited to scanning from the tee side of the weld, no examination was possible from the valve side of the weld	PT 100% UT 77%
3-SJ-2121-2	The ultrasonic examination was limited to scanning from the pipe side of the weld, no examination was possible from the valve side of the weld	PT 100% UT 57%
3-SJ-2121-3R1	No ultrasonic examination could performed due to the valve to valve configuration	PT 100% UT 0%
3-SJ-2121-4R1	No ultrasonic examination could performed due to the valve to valve configuration	PT 100% UT 0%
34-MS-2131-1	No ultrasonic examination could performed due to permanently installed structural elements	MT 100% UT 0%
34-MS-2131-2	No ultrasonic examination could performed due to permanently installed structural elements	MT 70% UT 0%

Table 14- Examination Category C-F-1 Pressure Retaining Welds in High Alloy Piping		
Attachment ID	**Limitation**	**% Coverage**
34-MS-2121-1	No ultrasonic examination could performed due to permanently installed structural elements	MT 18% UT 0%
34-MS-2111-1	No ultrasonic examination could performed due to permanently installed structural elements	MT 50% UT 0%
34-MS-2111-2	The ultrasonic examination was limited to scanning from the pipe side of the weld, no examination was possible from the valve side of the weld	MT 50% UT 58%
32-MS-2121-3	The ultrasonic and magnetic particle examinations were limited due to a permanently installed I-beam.	MT 87% UT 83%
32-MS-2121-4	The ultrasonic and magnetic particle examinations were limited due to a permanently installed I-beam.	MT 48% UT 81%
32-MS-2111-4	The ultrasonic examination was limited due to a permanently installed I-beam.	MT 100% UT 61%
8-MS-2141-1	The surface examination was limited due to adjacent support structures.	MT 68% UT 100%
8-MS-2124-2	The surface examination was limited due to adjacent support structures.	MT 57% UT 100%
32-MS-2131-4LU-O	The surface examination was limited due to adjacent support structures.	MT 70% UT 100%
32-MS-2131-3LD-1	The surface examination was limited due to adjacent support structures.	MT 65% UT 100%
32-MS-2111-4LU-1	The surface examination was limited due to adjacent support structures.	MT 0% UT 100%

Licensee's Proposed Alternative Examination (as stated):

Where the component will not allow an ultrasonic angle beam examination for axial scans (upstream and downstream), the following will be performed using the best available technology as demonstrated through the EPRI PDI program:

- Similar metal welds, 100% of the required volume will be examined in at least one axial direction and two circumferential scans adjacent to the weld and upon the weld will be conducted by ultrasonic examination using personnel and techniques qualified and demonstrated through the EPRI PDI program for single sided access relating to the material type to be examined.

- Austenitic to Inconel dissimilar metal welds, 100% of the required volume will be examined in at least one axial direction and two circumferential scans adjacent to the weld and upon the weld will be conducted by ultrasonic examination using personnel and techniques qualified and demonstrated through the EPRI PDI program for single sided access relating to the material type to be examined.

- The code required surface and system pressure test examinations will be performed per ASME XI requirements.

- PSEG Nuclear is currently preparing its submittal for a Risk Informed Inservice Inspection (RI-ISI) Program in accordance with NRCs EPRI approved methodology for both Salem Units class 1 and 2 systems for NRC approval. During the conduct of RI-ISI program preparation, PSEG Nuclear will consider the non-selection of those components that have been deemed inaccessible, physically limited or partially obstructed portions provided the NRCs approved RI-ISI EPRI methodology allows.

Evaluation: The Code requires essentially 100% volumetric and surface examination of the subject pressure retaining high and low alloy piping welds as defined by figures IWC-2500-7. However, as shown in Table 14, complete examinations are restricted by several factors, including nozzle configurations, component configurations (e.g., valve-to-valve or elbow-to-pipe), or adjacent permanently installed structural components. These conditions make compliance with code required volumetric and surface examinations impractical to perform for these welds. To gain access for examination substantial portions of the piping runs and plant structural components would need to be redesigned. Imposition of this requirement would create a significant burden on the licensee, therefore, the Code-required 100% examinations are impractical.

Drawings and descriptions included in the licensee's submittal clearly show that examinations of the subject welds have been performed to the extent practical, with the licensee obtaining substantial surface and/or volumetric examination coverages (from approximately 50% to 100%) for many of these welds (see Table 14). For lesser, or 0% coverages, severe limitations caused by the component configurations and adjacent structural supports prevent the necessary access to achieve additional examination coverages. The limitations for these restricted examinations cannot be overcome without entirely redesigning the subject piping welds or components and portions of the associated structural and piping systems. The examinations performed in April 2001 were completed using EPRI PDI qualified procedures, personnel and equipment (those performed in February 1991 were prior to required implementation of Appendix VIII). No problems or reportable indications have been detected during any of these examinations. Therefore, any structurally-significant patterns of degradation should have been detected by the examinations in the areas that were completed, providing reasonable assurance of continued integrity of these welds. Based on the impracticality of examining 100% of the subject welds, and the examination coverages obtained, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.0 CONCLUSIONS

The PNNL staff has reviewed the licensee's submittal and concludes that the Code examination coverage requirements are impractical for the subject components listed in Requests for Relief Nos. S1-RR-B01, Parts A through G, and S1-RR-C01, Parts A through D. Further, reasonable assurance of the structural integrity of the subject components has been provided by the examinations that were performed. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), it is recommended that relief be granted for the second 10-year ISI interval at Salem Generating Station, Unit 1, which ended on May 19, 2001.

SALEM GENERATING STATION, UNIT 1
Second 10-Year ISI Interval

TABLE 1
SUMMARY OF RELIEF REQUESTS

Relief Request Number	PNNL RR Sec.	System or Component	Exam. Category	Item No.	Volume or Area to be Examined	Required Method	Licensee Proposed Alternative	Relief Request Disposition
S1-RR-B01 (Part A)	2.1	RPV head and shell welds	B-A	B1.11 B1.12 B1.21 B1.22	100% of full penetration welds in closure and lower heads, and longitudinal/circumferential welds in shell	Volumetric and/or Surface, as applicable	Perform exams to extent practical	Granted 10 CFR 50.555a(g)(6)(i)
S1-RR-B01 (Part B)	2.2	Pressurizer and steam generator shell welds	B-B	B2.10 B2.11 B2.40	100% of full penetration welds in the pressurizer and steam generator (PZR head-to-shell and steam generator lower tubesheet-to-channel head)	Volumetric and Surface	Perform exams to extent practical	Granted 10 CFR 50.555a(g)(6)(i)
S1-RR-B01 (Part C)	2.3	Pressurizer spray nozzle	B-D	3.20	100% of nozzle inside radius area	Volumetric	Perform exams to extent practical	Granted 10 CFR 50.555a(g)(6)(i)
S1-RR-B01 (Part D)	2.4	Pressurizer and steam generator nozzle-to-safe-end welds	B-F	B5.40 B5.70	100% of dissimilar metal welds in primary side nozzles	Volumetric and Surface	Perform exams to extent practical	Granted 10 CFR 50.555a(g)(6)(i)
S1-RR-B01 (Part E)	2.5	Reactor coolant pump bolting	B-G-1	B6.180	100% of bolting greater than 2-inches in diameter in pumps	Volumetric	Perform exams to extent practical	Granted 10 CFR 50.555a(g)(6)(i)
S1-RR-B01 (Part F)	2.6	Class 1 piping	B-J	B9.11 B9.21 B9.31 B9.40	100% of full penetration and socket welds in circumferential and branch connections	Volumetric and/or Surface	Perform exams to extent practical	Granted 10 CFR 50.555a(g)(6)(i)
S1-RR-B01 (Part G)	2.7	Integrally welded attachments	B-K-1	B10.20	100% of integrally welded attachments in Class 1 piping, pumps and valves	Surface or Volumetric, as applicable	Perform exams to extent practical	Granted 10 CFR 50.555a(g)(6)(i)
S1-RR-C01 (Part A)	2.8	Pressure retaining welds in pressure vessels	C-A	C1.10 C1.20	100% volumetric examination of the pressure retaining welds in Class 2 vessels	Volumetric	Perform exams to extent practical	Granted 10 CFR 50.555a(g)(6)(i)
S1-RR-C01 (Part B)	2.9	Pressure retaining nozzle welds in vessels	C-B	C2.21	100% of the inspection volume as defined by Figures IWC-2500-4 (a) and (b), of the nozzle to shell weld	Volumetric and surface	Perform exams to extent practical	Granted 10 CFR 50.555a(g)(6)(i)
S1-RR-C01 (Part C)	2.10	Integral attachments for piping, pumps and valves	C-C	C3.20	100% of the surface area as defined by Figure IWC-2500-5	Surface	Perform exams to extent practical	Granted 10 CFR 50.555a(g)(6)(i)
S1-RR-C01 (Part D)	2.11	Pressure retaining welds in piping (high and low alloy)	C-F-1 C-F-2	C5.10 C5.11 C5.21 C5.51 C5.52	100% of the inspection volume as defined by Figure IWC-2500-7	Volumetric and surface	Perform exams to extent practical	Granted 10 CFR 50.555a(g)(6)(i)

ATTACHMENT 2