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APR 1 3 2001

PSEG Nuclear LLC

LRN-01-0113

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

INSERVICE INSPECTION PROGRAM
RELIEF REQUEST RR-B11
SALEM UNIT 1 GENERATING STATION
FACILITY OPERATING LICENSES DPR-70
DOCKET NOS. 50-272

Pursuant to 10CFR50.55a(a)(3)(i), PSEG Nuclear is resubmitting Inservice Inspection (ISI) relief request RR-B11 for NRC approval. This request supersedes the previously submitted RR-B11 in its entirety. This relief request provides supplemental information discussed during conference call with NRC.

The attached relief request addresses the completion of the ultrasonic testing (UT) examination of the Reactor Pressure Vessel (RPV) vessel-to-flange weld from the vessel side of the weld to be performed in accordance with ASME Section XI, Div. 1, 1995 Edition, 1996 Addenda, Appendix VIII, Supplements 4 and 6 as amended by the Federal Register Notice 64FR 51370 through 51400, dated September 22, 1999. This would be in lieu of UT examination in accordance with ASME Section V Article 4 and the subsequent guideline requirements of Reg. Guide 1.150 Rev 1.

This relief request is for the PSEG Nuclear Salem Unit 1, 10-year second interval vessel examination scheduled for the spring of 2001. The use of Supplements 4 and 6 for the completion of the vessel-to-flange weld from the shell side will allow the use of a PDI qualified procedure to complete the UT examination and is expected to reduce examination time, which translates to significant cost.

The attachment to this letter includes the proposed alternative and supporting justification for the relief. Based on the evaluation contained in the attachment, PSEG Nuclear has concluded that the proposed alternative provides an acceptable level of quality and safety. Accordingly, this proposal satisfies the requirements of 10 CFR 50.55a(a)(3)(i).

Should you have any questions regarding this request, please contact Mr. Howard Berrick at 856-339-1862.

Sincerely,

G. Salamon
Manager – Nuclear Safety and Licensing

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Attachment:
1. ISI Relief Request No. RR-B11
2. TABLE 1 – Comparison Of Reactor Pressure Vessel Shell Weld Examination Techniques

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COMPONENT DESCRIPTION:

Salem Unit 1 Class 1, Category B-A Pressure Retaining Welds In Reactor Vessel Item No. B1.30 Shell-to-Flange Weld.

ASME CODE CLASS:

ASME Section XI Class 1

ASME EXAMINATION REQUIREMENTS:

ASME Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, 1983 Edition with Summer 1983 Addenda, IWA-2232 requires Ultrasonic examination of the RPV to flange weld be in accordance with ASME Section V Article 4.

In addition the NRC has issued Regulatory Guide 1.150 Rev 1 "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations" as regulatory guidance for the UT examination of RPV welds.

RELIEF REQUESTED:

An acceptable partial examination of the RPV vessel-to-flange weld was performed from the flange surface during the 2nd period of the second interval, satisfying the requirements of ASME Section V Article 4 and the Regulatory Guide 1.150 Rev 1.

Pursuant to 10CFR50.55a(a)(3)(i), PSEG Nuclear requests relief to use ASME Section XI, Div. 1,1995 Edition, 1996 Addenda, Appendix VIII Supplement 4 and 6 as amended by the Federal Register Notice 64FR 51370 through 51400, dated September 22, 1999 to complete the UT examination of the RPV-to-flange weld from the vessel shell side. This is in lieu of performing the examination per ASME Section V Article 4 and the subsequent guideline requirements of Reg. Guide 1.150 Rev 1.

This relief request is for the Salem Unit One 10 year 2nd interval vessel examination scheduled for the spring of 2001.

BASIS FOR RELIEF:

PSEG Nuclear Salem Unit 1 is required to perform in-service examination of the RPV flange weld in accordance with the requirements of ASME Section V Article 4 and the subsequent guideline requirements of Regulatory Guide 1.150 Rev 1.

Federal Register Notice 64FR 51370 through 51400, dated September 22, 1999, revised the 1999 Edition of 10 CFR 50.55(a) Codes and Standards. This revision requires that ASME Section XI, Appendix VIII, Supplements 4, *Qualification Requirements For The Clad/Base Metal Interface of Reactor Vessel*, and Supplement 6, *Qualification Requirements For Reactor Vessel Welds Other Than Clad/Base Metal Interface,* be implemented for most of the RPV welds by Nov 22, 2000. The RPV vessel-to-flange weld is the only RPV circumferential weld not included in Appendix VIII.

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This relief is requested to allow the use of a PDI qualified procedure to complete the UT examination of the RPV vessel-to-flange weld from the vessel side of the weld in accordance with ASME Section XI, Div. 1,1995 Edition, 1996 Addenda, Appendix VIII Supplement 4 and 6 as amended by the Federal Register Notice 64FR 51370 through 51400, dated September 22, 1999 in lieu of ASME Section V Article 4.

During the upcoming ten (10) year RPV weld examinations, we will be employing personnel, procedures and equipment, demonstrated and qualified by a Performance Demonstration Initiative (PDI) and in accordance with ASME Section XI, Div.1, 1995 Edition, 1996 Addenda, Appendix VIII Supplements 4 and 6 as amended by the Federal Register Notice 64FR 51370 through 51400, dated September 22, 1999 for the adjacent welds.

The remote examinations will be performed using the Framatome Technologies, Inc. (FTI) remote RPV manipulator ("URSULA") and their "ACCUSONEX™ UT system in accordance with a PDI qualified procedure. The Framatome procedure 54-ISI-800-03, *Remote Ultrasonic Examination of Reactor Vessel Welds in Accordance with ASME Section XI, Appendix VIII, Supplements 4 and 6*, was demonstrated at the PDI qualification session dated June 7, 1996 (Performance Demonstration Qualification Sheet (PDQS) No. 310). The procedure complies with ASME Section XI, Appendix VIII, 1995 edition, 1996 Addenda as modified in final rule. [See Attachment 2, Comparison of Reactor Pressure Vessel Shell Weld Examination Techniques]

Appendix VIII was developed to ensure the effectiveness of UT examinations within the nuclear industry by means of a rigorous, item specific performance demonstration. The performance demonstration was conducted on a RPV mockup containing flaws of various sizes and locations. The demonstration established the capability of equipment, procedures and personnel to find flaws that could be detrimental to the integrity of the RPV.

Although Appendix VIII is not a requirement for this weld, the qualification process to Appendix VIII criteria demonstrates that the examination and evaluation techniques are equal or surpass the requirements of paragraph IWA-2232, "Ultrasonic Examination" of Section XI of the ASME Code and the guidance in RG 1.150.

A comparison between the ASME Section V Article 4 based UT methods and the procedures developed to satisfy the PDI/Appendix VIII can be best described as a comparison between a compliance-based procedure (ASME Section V Article 4) and a results-based procedure (PDI/Appendix VIII). ASME Section V procedures use an amplitude-based technique and a known reflector. The proposed alternate UT method was established independently from the acceptance standards for flaw size found in ASME Section XI.

The PDI qualified sizing method is considered more accurate than the method used in ASME Section V Article 4 The proposed alternate UT examination technique provides an acceptable level of quality and examination repeatability as compared to the Article 4 requirements

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The PDI Program's PDQS No. 310 attests that FTI procedure 54-ISI-800-03 is in compliance with the detection and sizing tolerance requirements of Appendix VIII. The PDI qualification method is based on group of samples, which validate the acceptable flaw sizes in ASME Section XI. The sensitivity to detect these flaws is considered to be equal to or greater than the sensitivity obtained through ASME Section V Article 4 because the Framatome 54-ISI-800-03 procedure relies on a smaller scan index and a higher scan sensitivity for the detection of the UT signals.

The examination and sizing procedure use echo-dynamic motion and tip diffraction characteristics of the flaw instead of the amplitude characteristics required by ASME Section V Article 4. The search units interrogate the same examination volume as depicted by ASME Section XI, Figure IWB 2500-4, *Shell-to-Flange Weld Joint.*

The use of procedures for satisfying the requirements of ASME Section V Article 4 for the UT examination of the RPV to flange weld from the vessel shell has not received the same qualifications as PDI qualified procedure.

The use of Appendix VIII Supplements 4 and 6 for the completion of the RPV vessel-to-flange weld from the shell side (which PDI has qualified) is expected to reduce examination time, which translates to reduce personnel radiation exposure.

Additionally, this relief would allow a smooth transition to the welds adjacent to the RFV circumferential and longitudinal welds (welds B1.11 and B1.12) which do require an examination in accordance with Appendix VIII Supplement 4 and 6. This would eliminate the need to switch to the different calibration, procedure and technique required by ASME Section V Article 4 and the Regulatory Guide 1.150 Rev 1. This would result in a reduction in transition time to the different calibration, procedure and technique required which translates to reduce personnel radiation exposure and is more cost effective.

ALTERNATIVE EXAMINATIONS:

The remaining automated shell-to-flange weld examinations shall be performed using a qualified procedure in accordance with ASME Code, Section XI, Div. 1, 1995 Edition, 1996 Addenda, Appendix VIII Supplement 4 and 6 as amended by the Federal Register Notice 64FR 51370 through 51400, dated September 22, 1999.

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Comparison of Reactor Pressure Vessel Shell Weld Examination Techniques

Description (Code Reference)	ASME Section V Article 4, 1983, Summer Edition ASME Section XI, 1983 Summer Edition NRC Regulatory Guide 1.150 Revision 1, February 1983	FTI Examination Procedure 54-ISI-800-03 Requirements
Examination Angle	Section V, Article 4, T-441 requires the volume of weld and adjacent base material be scanned by straight and angle beam techniques. Two angle beams, having nominal angles of 45 and 60 degrees with respect to a perpendicular to the examination surface shall generally be used. Other pairs of angle beams are permitted provided the measured difference between the angles is at least 10 degrees.	Examination was conducted with angles of 45° shear wave and 45° longitudinal wave transducers. Additionally, a 70° longitudinal wave transducer was used for examining the near surface region. These examination angles were successfully qualified under the PDI protocol using the PDI program test blocks.
Instrument Calibrations	Section V, Article 4, T-431 requires that instrument screen height and amplitude linearity be evaluated at least every three months. Section XI, IWA-2232 requires that these screen height and linearity checks be performed at the beginning and end of the weld examination performed on a vessel during one outage.	Instrument screen height and amplitude linearity are checked prior to and following completion of the examinations of the PSEG Nuclear Salem Unit 1 reactor vessel.
System Calibrations	Section V, Article 4, T-432 requires that the original system calibration be performed on the Code basic calibration block. T-432 allows the use of different types of reference blocks and electronic simulators to perform system calibration verifications.	Initial calibration of the data acquisition system was performed on the Code basis calibration block. Periodic system checks and final calibration check are performed using simulator blocks as permitted by Section V, Article 4, T-432.
Scanning Sensitivity	Section V, Article 4, T-425 permits scanning to be performed at the reference level when electronic distance-amplitude correction (DAC) is used with automated recording.	Scanning is performed at 10% of DAC.

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Description (Code Reference)	ASME Section V Article 4, 1983, Summer Edition ASME Section XI, 1983 Summer Edition NRC Regulatory Guide 1.150 Revision 1, February 1983	FTI Examination Procedure 54-ISI-800-03 Requirements
Recording Level	Section V, Article 4, T-441 requires recording and evaluation of reflectors that produce a response equal to or greater than 50% DAC. Regulatory Guide 1.150 requires recording and evaluation at 20% DAC for the inner 25% of material thickness.	In the near surface region, non-geometric indications with a maximum amplitude greater than or equal to 20% DAC were recorded. In the subsurface region, non-geometric indications which have a maximum amplitude greater than 10% DAC for the 45° shear wave were recorded
Scan Index and Pulse Repetition Rate	Section V, Article 4, T-425 requires each pass of the search unit overlap a minimum of 10% of the transducer piezoelectric element dimension perpendicular to the direction of the scan. Section XI, IWA-2232 requires each pass of the search unit overlap at least 50% of the transducer piezoelectric element dimension perpendicular to the direction of the scan. NRC Regulatory Guide 1.150 requires a 25% maximum overlap for detection and 0.25-inch maximum increments for sizing.	A scan index of 0.50" is used for flaw detection. A scan index of 0.20" is used for additional sizing. This scan index meets the requirements of T-425, IWA-2232 and Regulatory Guide 1.150.
Flaw Sizing and Evaluation	Section V, article 4, T-441 requires amplitude based sizing at 50% DAC. Section V, Article 4, T-451 permits evaluation to alternative standards.	All recorded indications are elevated and categorized as either geometric or non-geometric indications. Tip diffraction or satellite signals are used for measuring flaw through wall dimension. If the flaw image cannot identify evidence of flaw tips or satellite signals, amplitude based sizing techniques are used. Length sizing is performed using amplitude-based techniques.