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LR-N22-0022

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Salem Generating Station Units 1
Renewed Facility Operating License No. DPR-70
NRC Docket No. 50-272

Subject: Response to Request for Additional Information Relief Request S1-I4R-210,
Alternative Examination of Welds

- References:
1. PSEG Letter LR-N21-0066, "Submittal of Relief Request Associated with the Fourth Inservice Inspection (ISI) Interval Limited Examinations," dated November 10, 2021 (ADAMS Accession No. ML21314A579)
 2. NRC E-mail, "Final RAI - Salem Unit 1 Relief Request S1-I4R-210 regarding Examination Coverage of Welds (L-2021-LLR-0085)," dated February 22, 2022 (ADAMS Accession No. ML22055A070)

In Reference 1, PSEG Nuclear LLC (PSEG) requested NRC approval of proposed relief request S1-I4R-210 for Salem Generating Station Unit 1. The proposed relief request addresses limitations for examinations performed in accordance with the 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," for Class 1 and 2 components during the Fourth ISI interval.

In Reference 2, the NRC staff provided PSEG with a Request for Additional Information (RAI) regarding the Reference 1 relief request. Attachment 1 to this submittal provides the responses to the RAI.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this matter, please contact Brian Thomas at 856-339-2022.

Sincerely,

A handwritten signature in black ink, appearing to be "RM", written over a circular stamp or mark.

Richard Montgomery
Manager - Licensing
PSEG Nuclear LLC

Attachment 1: Response to Request for Additional Information Relief Request S1-I4R-210,
Revision 0, Alternative Examination of Welds, Salem Generating Station Unit 1
PSEG Nuclear LLC, Docket No. 50-272, EPID L-2021-LLR-0085

cc: Administrator, Region I, NRC
NRC Senior Resident Inspector, Salem
James Kim, Project Manager, NRC
A. Pfaff, Manager, NJBNE
L. Marabella, Corporate Commitment Tracking Coordinator
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Response to Request for Additional Information
Relief Request S1-I4R-210, Revision 0
Alternative Examination of Welds
Salem Generating Station Unit 1
PSEG Nuclear LLC
Docket No. 50-272
EPID L-2021-LLR-0085

By letter dated November 10, 2021 (Agencywide Documents and Access Management System (ADAMS) Accession No. ML21314A579), PSEG Nuclear LLC (the licensee) requested relief from the examination coverage requirement of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," at Salem Generating Station Unit 1. The licensee submitted Request for Relief Number S1-I4R-210 which discusses limitations for examinations performed in accordance with the requirements of the ASME Code, Section XI, for Class 1 and 2 welds during the fourth inservice inspection (ISI) interval.

To complete its review, the Nuclear Regulatory Commission (NRC) requests the following additional information. The NRC staff notes that Enclosure 1 to the licensee's November 10, 2021 letter contains the relief request. Attachment 1 to Enclosure 1 contains the detailed examination coverage information. Below are questions that are related to the information in Attachment 1.

RAI-1

Issue

Section 1.2 of Attachment 1 states that the licensee detected a recordable subsurface indication in upper shell at 7°, longitudinal seam weld 1-RPV-1042B during the examination. The licensee's flaw evaluation is discussed in Tables 1.2-3 and 1.2-4 of Attachment 1.

Request

(1) Discuss whether the recordable indication is oriented in the circumferential or axial direction. (2) Confirm that the length and depth of the indication are 0.9 inches and 0.05 inches, respectively as shown in Table 1.2-4. (3) Confirm that "S" is the distance of the indication from the inside diameter surface of the weld (i.e., distance from the inside diameter surface). (4) Section 1.2 of Attachment 1 states that the indication was detected during this examination. However, it is not clear whether this is the first time the indication was detected. State whether the indication was detected the very first time during this examination. If applicable, discuss whether the licensee reviewed the results from previous examinations (a look-back) to determine whether this indication has grown and provide a discussion of the results of that review. (5) Discuss whether this indication will be examined in future ISI intervals; if not, provide justification.

PSEG Response:

- (1) W02 (1-RPV-1042B) is a longitudinal weld. The scan that detected the indication in W02 was the Theta (circ) scan on W01 which is a circumferential weld which intersects the W02 longitudinal weld. The indication in W02 runs parallel to the axis of the W02 (1-RPV-1042B) longitudinal weld.
- (2) The length of the indication detected in W02 (1-RPV-1042B) is 0.85" with a depth (flaw height) of 0.13".
- (3) The "S" dimension which is 0.35" as shown in the "Flaw Evaluation Summary Sheet" for W02 (1-RPV-1042B), Flaw No. 1 (Reference 1, Attachment 1, Table 1.2-4) is to the nearest surface of the component which in this case is the outside "unclad" surface.

- (4) The indication was compared to previous results and was found to be the first occurrence. The following is an excerpt from Section 3.0 of Framatome's Final Report 180-9320274-000, Salem Unit 1 (1R27) 10-Year Reactor Vessel Ultrasonic Examination Report: "It should be recognized that the examination performed in 2001 was different in technology, recording methodology, and procedure requirements. The main difference between the number of indications recorded in the previous examination and the current examination is a difference in recording thresholds and use of PAUT techniques."
- (5) Longitudinal seam weld 1-RPV-1042B is currently scheduled to be examined during the 5th ISI 10-year Interval refueling outage S1R33 (Fall 2029).

RAI-2

Issue

Section 1.3 of Attachment 1 states that the examination coverage achieved for the circumferential weld of the reactor vessel lower head disc to peel segments, 1-RPV-4043, is 27.9% because the examination was limited due to the proximity of the reactor vessel incore nozzles.

Request

(1) Discuss whether the ultrasonic interrogation covered anything beyond the 27.9% achieved of the required weld volume that was not credited, but could be considered, in the coverage calculation. (2) Figure 1.3-3 of Attachment 1 shows the examination location and coverage map of weld 1-RPV-4043 and the locations of incore nozzles. However, based on the map, it seems that some weld areas do not have an incore nozzles in the vicinity. For those areas not proximate to incore nozzles that were not examined, it is not clear why more coverage could not be achieved. Clarify whether attempts were made to perform maximum extent possible and/or discuss best effort examinations in the areas that were not covered. (3) Discuss how the licensee will ensure that there are no flaws in the unexamined weld volume.

PSEG Response:

- (1) Framatome took credit for single side coverage when applicable. All areas were modeled in 3-D space to achieve maximum coverage with 2 different UT head configurations. Robotic manipulator limitations and physical obstructions are considered during the scan plan generation process.
- (2) The coverage map is a 2-D plan view which doesn't show all incore penetrations or the ability of the robotic manipulator to reach these areas successfully without damage to the robotic manipulator or plant equipment. During outage preparations, the scan limitations are determined by using a 3-D model to run the planned scans in a simulation mode. This allows the scan areas which are obtainable to be determined and takes into account the location of all incore nozzles, the transducer UT head configuration, and any manipulator limitations which may exist.
- (3) There is no current technology to ensure there are no flaws in the unexamined weld volume. Section 6 of the Reference 1 relief request provides a discussion of the alternative measures that provide reasonable assurance of structural integrity.

RAI-3

Issue

Section 1.4 of Attachment 1 states that the licensee detected a subsurface indication in meridional weld 1-RPV-1043A at 270°, lower head. The licensee stated that this flaw is characteristic of slag inclusion from the welding process during fabrication. The licensee's flaw evaluation is discussed in Table 1.4-3 of Attachment 1.

Request

(1) Discuss whether the indication is oriented in the circumferential or axial direction. (2) The staff notes that the licensee was able to determine that the slag inclusion from the welding process for weld 1-RPV-1043A is the cause of the indication but did not include such information for welds 1-RPV-1042B and 1-RPV-1043E. Discuss the cause of the indication in welds 1-RPV-1042B and 1-RPV-1043E. (3) Section 1.4 of Attachment 1 states that the indication was detected during this examination. However, it is not clear whether this is the first time the indication was detected. State whether the indication was detected the very first time during this examination. If applicable, discuss whether the licensee reviewed the results from previous examinations (a look-back) to determine whether this indication has grown and provide a discussion of the results of that review. (4) Discuss whether this indication will be examined in future ISI intervals; if not, provide justification.

PSEG Response:

- (1) The indication is in one of the Meridional welds 1-RPV-1043A and is parallel to the weld axis.
- (2) 1-RPV-1042B – one recordable indication was detected in this weld. Per the Weld W02 summary for this weld in Framatome's Final Report 180-9320274-000, Salem Unit 1 (1R27) 10-Year Reactor Vessel Ultrasonic Examination Report, the flaw is characteristic of a slag inclusion from the welding process during fabrication, it is not however noted on the Flaw Evaluation Summary Sheet (Reference 1, Attachment 1, Table 1.2-4) for this weld.

1-RPV-1043E – two recordable indications were detected in this weld. Per the "Flaw Evaluation Summary Sheets" for W33 (1-RPV-1043E) Flaw No. 1 and Flaw No. 2 (Reference 1, Attachment 1, Section 1.8) the summary states: The flaws are located within the weld and are indicative of fabrication flaws typical of small slag inclusions and per the "Flaw Evaluation Summary Sheets" for W33 (1-RPV-1043E) Flaw No. 1 and Flaw No. 2 (Reference 1, Attachment 1, Tables 1.8-4 and 1.8-5) the comments section states: There were two recordable indications detected during this examination. The indications are classified as subsurface welding process indications.
- (3) Per the Weld W35 (1-RPV-1043A) summary for this weld (Reference 1, Attachment 1, Section 1.4) the summary states: The flaw is characteristic of a slag inclusion from the welding process during fabrication. In addition, per the "Flaw Evaluation Summary Sheet" for W35 (1-RPV-1043A) (Reference 1, Attachment 1, Table 1.4-3) the comments section states: This indication was not recorded during the previous examination. This was therefore the first time the indication was detected and therefore there was no comparison to previous results.

- (4) Meridional welds 1-RPV-1043A, 1-RPV-1042B and 1-RPV-1043E are currently scheduled to be examined during the 5th ISI 10-year Interval refueling outage S1R33 (Fall 2029).

RAI-4

Issue

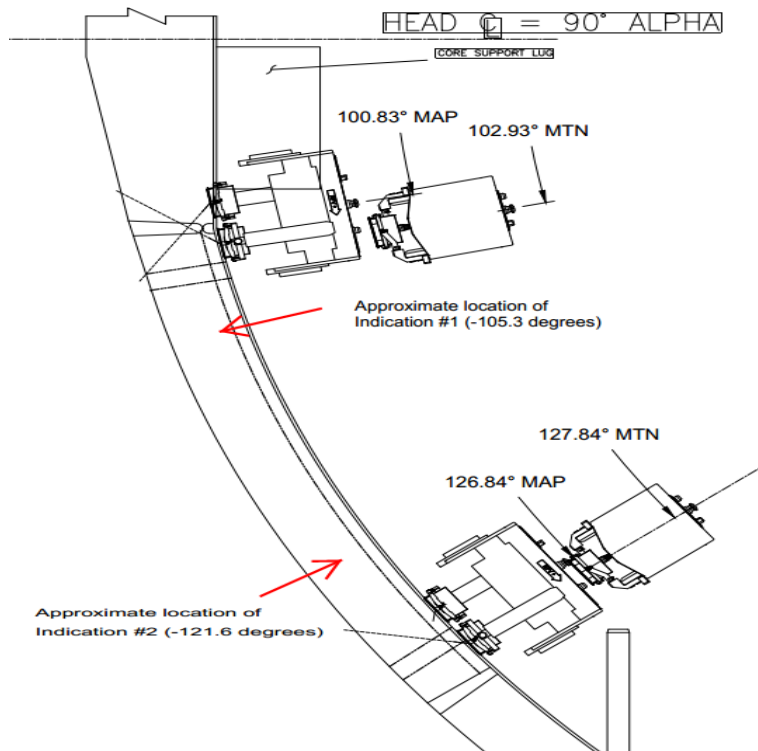
Section 1.8 of Attachment 1 states that the licensee detected two subsurface indications in meridional weld 1-RPV-1043E, at 150°, lower head, during this examination. The licensee evaluated each recordable flaw for acceptance as shown in Tables 1.8-3, 1.8-4, and 1.8-5 of Attachment 1.

Request

(1) Provide additional information (e.g., a sketch) regarding the approximate locations of the two indications with respect to the inside diameter surface of the weld and to each other, including cladding thickness. (2) Discuss whether these two indications are located in the vicinity of each other such that they should be combined and considered as a single indication. (3) Section 1.8 of Attachment 1 states that the indication was detected during this examination. However, it is not clear whether this is the first time the indication was detected. State whether the indication was detected the very first time during this examination. If applicable, discuss whether the licensee reviewed the results from previous examinations (a look-back) to determine whether this indication has grown and provide a discussion of the results of that review. (4) Discuss whether these two indications will be examined in future ISI intervals; if not, provide justification.

PSEG Response:

(1) .



- (2) These are two separate indications. Both are located circumferentially at approximately the same degree location however they are separated in the vertical dimension by approximately 16 degrees. Note: since the head is spherical the vertical and horizontal dimensions are both specified in degrees, Alpha and Theta respectively.

	Theta Location	Alpha Location	Flaw Depth (excluding clad)
Indication #1	207.96° - 208.62°	-105.3°	1.769" - 2.005"
Indication #2	207.05° - 208.11°	-121.6°	2.142" - 2.332"

As a result these two indications are separated by approximately 16° (approximately 25") in the vertical (Alpha) dimension.

- (3) Per the "Flaw Evaluation Summary Sheets" for W33 (1-RPV-1043E) for Flaw No. 1 and Flaw No. 2 (Reference 1, Attachment 1, Table 1.8-4 and 1.8-5) the comments section states: This indication was not recorded during the previous examination. This was therefore the first time these indications were detected and therefore there was no comparison to previous results.
- (4) Meridional weld 1-RPV-1043E is currently scheduled to be examined during the 5th ISI 10-year Interval refueling outage S1R33 (Fall 2029).

RAI-5

Issue

Section 1.10 of Attachment 1 states that the examination coverage achieved for circumferential weld 1-PZR-21 of pressurizer shell "J" to upper head is 42.15% because the weld examination was limited due to the proximity of insulation support straps, permanent vessel support ring and welded pads.

Request

(1) Discuss whether a similar weld exists that could be examined with a higher examination coverage in lieu of examining weld 1-PZR-21. (2) Discuss why the insulation support straps were not removed completely to facilitate a higher examination coverage. (3) Discuss whether the permanent vessel support ring could be removed to facilitate a higher examination coverage. (4) Discuss whether the ultrasonic interrogation covered anything beyond the 42.15% achieved of the required weld volume that was not credited, but could be considered, in the coverage calculation.

PSEG Response:

- (1) The only other similar weld (1-PZR-1) Lower Head to Shell A, Circ Weld was also examined during the 4th ISI 10-year interval with acceptable results (no recordable indications) and 96.8% examination coverage.

- (2) The removal of the insulation support straps would require cutting and welding in elevated dose area with limited access to perform work. This would be a personnel safety hazard.
- (3) The permanent vessel support ring would require cutting and welding to the Pressurizer resulting in a considerable hardship and possibly inducing additional stresses to the vessel.
- (4) No additional coverage can be credited beyond the 42.15% achieved examination volume.