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PSEG
Nuclear LLC

10 CFR 50.55a

LR-N13-0302
January 8, 2014

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

Salem Generating Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-70 and DPR-75
NRC Docket Nos. 50-272 and 50-311

Subject: **Response to Request for Additional Information (RAI 31 and RAI 32) – Relief Request SC-I4R-133, Alternative Repair for Service Water System Piping**

References:

(1) PSEG letter LR-N13-0064, "Request for Relief from ASME Code Defect Removal for Service Water Buried Piping," dated April 3, 2013, ADAMS Accession No. ML13093A382

(2) PSEG letter LR-N13-0171, "Response to Request for Additional Information - Relief Request SC-I4R-133, Alternative Repair for Service Water System Piping," dated August 15, 2013, ADAMS Accession No. ML13227A338

(3) NRC email to PSEG, "Request For Additional Information: Salem Units 1 and 2 - Relief Request SC-I4R-133 Repair of Service Water piping (TAC MF1375 & 1376)," dated October 29, 2013

In Reference 1, as supplemented by Reference 2, PSEG Nuclear LLC (PSEG) requested NRC approval of proposed relief request SC-I4R-133 for Salem Generating Station, Units 1 and 2. The proposed relief will allow PSEG to repair bell and spigot joints in the buried portions of Service Water System piping in lieu of defect removal requirements in ASME Section XI, IWA 4422.1.

In Reference 3, the NRC staff provided PSEG with a Request for Additional Information (RAI). Attachment 1 to this submittal provides the responses to the RAI.

There are no commitments contained in this letter.

If you have any questions or require additional information, please do not hesitate to contact Ms. Emily Bauer at 856-339-1023.

A047
NRR

Sincerely,

Paul R. Duke, Jr.
Manager – Licensing

Attachment 1 – Response to Request for Additional Information, RAI 31 and RAI 32

cc: Mr. W. Dean, Administrator, Region I, NRC
Mr. J. Hughey, Project Manager, NRC
NRC Senior Resident Inspector, Salem
Mr. P. Mulligan, Manager IV, NJBNE
Mr. L. Marabella, Corporate Commitment Tracking Coordinator
Mr. T. Cachaza, Salem Commitment Tracking Coordinator

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Attachment 1

Response to Request for Additional Information, RAI 31 and RAI 32

RAI 31:

In the licensee's August 15, 2013, letter, in response to NRC Request for Additional Information (RAI) number 7(c), the licensee stated that "...The WEKO seal can be used as a repair for remaining bell thickness of less than 0.042 inch in localized areas, including completely corroded (i.e. , thickness of 0 inch), provided that the harness assemblies are intact..."

(a) Discuss how a localized area with a thickness of 0 inch can be repaired using the WEKO seal. Describe how the through wall hole can be backfilled to prevent groundwater ingression into the pipe or service water leaking from the pipe and whether the exterior coating will be applied at the defect area.

(b) Discuss the maximum allowable defect area having zero thickness that can be repaired using the WEKO seal and that would not affect the structural integrity of the bell-spigot joint. Provide structural analysis that supports the maximum allowable defect area of zero thickness.

(c) Provide a sketch or drawing showing the potential location(s) of such defect area on the bell-spigot joint.

PSEG Response to RAI 31:

a. The existing bell and spigot joints provide hoop strength and axial strength to the joint and also provide a fluid boundary for the service water system. The proposed repair methodology fully replaces these capabilities, so that the repaired piping would be structurally adequate with through wall thinning of the bell ring (i.e., a thickness of 0 inch).

For structural adequacy with respect to hoop and axial loads, see the response to RAI 31.b for details on structural evaluations of the proposed WEKO seal repair.

For providing a fluid boundary for the service water system, the WEKO seal repair combined with the remaining portion of the bell and spigot joint prevents both water ingress and egress as follows:

- During construction of the service water system piping, the exterior of each bell and spigot joint was sealed with a pre-formed flexible sealant (e.g., Ram-Neck), which prevents ground water intrusion into the bell and spigot joint, even if the steel bell ring is degraded (see Figure 1). PSEG has excavated several buried service water pipe joints and has not identified any instances of degradation of the exterior joint sealant that would result in exposure of the joint to groundwater.

- The exterior of the bell has a mortar coating that includes a welded wire fabric. As discussed in Relief Request SC-I4R-133, if PSEG identifies a bell thickness of less than 0.042 inch, the joint will be excavated to inspect the harness bolts. This step will also enable inspection and repair (if necessary) of the mortar coating on the bell ring.

- PSEG cleans and coats the degraded bell ring as part of the WEKO seal repair. If there were any service water leakage past the WEKO seal, the coating would prevent further degradation of the bell ring from exposure to service water and provide another barrier to leakage (See Figure 1).

- After installation of the WEKO seal repair, PSEG will perform a pressure test of the WEKO seal to ensure a leak tight joint. Compressed air is introduced to the void under the WEKO seal. Any leakage path, internal or external, would be identified during this leak check.

- In cases where this relief request is invoked, the repaired joint's WEKO seal will be periodically removed and the joint will be inspected. The inspection interval will be determined based on the condition of the joint upon initial inspection.

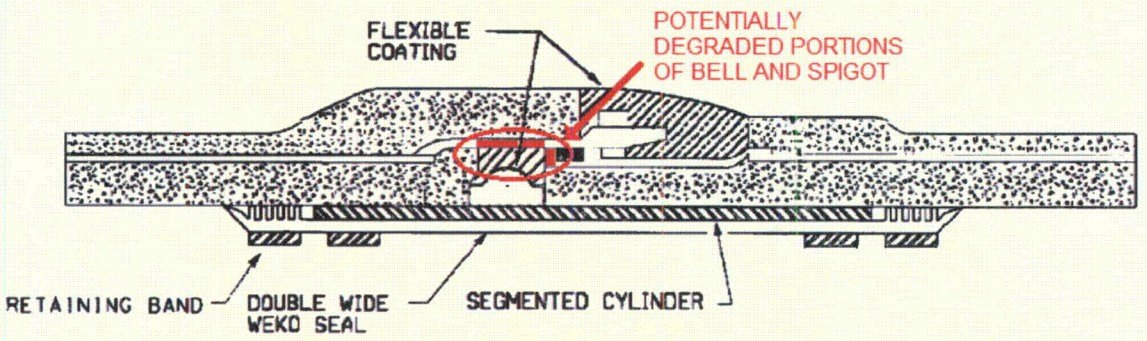
b. The structural integrity of the bell and spigot joint is compromised if bell thickness is less than 0.042 inch. The structural backing of the WEKO seal replaces the hoop strength function of the bell and spigot joint. The harness assembly performs the axial strength function for the bell and spigot joint. Accordingly, there is no maximum allowable defect area for the bell and spigot joint. Reference 1 provides the structural analysis of the WEKO seal structural backing. Reference 2 provides the structural analysis of the harness assembly. A summary of the hoop strength and axial strength capabilities of the WEKO seal repair is provided as follows:

- Hoop Strength - The existing bell and spigot joint provides hoop strength to resist circumferential loads (e.g., internal pressure of the pipe). The WEKO seal repair includes a stainless steel plate (shown as "segmented cylinder" in Figure 1) that fits over the joint and is secured to the mortar interior of the piping by retaining bands. The stainless steel plate bears circumferential loads and removes the existing bell and spigot joint from the load path. Accordingly, the WEKO seal repair fulfills the hoop strength function of the bell and spigot joint.

- Axial Strength - The existing bell and spigot joint includes bell bolts and a bolt stop that provide axial strength to the joint if the external harness bolt fails and the joint extends. If bell thickness is less than 0.042 inch, the joint would not be able to carry the design basis axial loading. In this case, the repair methodology proposed would require an inspection of the external harness assembly to ensure that it can carry the axial loading. Therefore, the harness assembly would fulfill the axial strength function of the bell and spigot joint.

c. Figure 1 highlights the portions of the bell and the portions of the spigot that could be degraded by exposure to service water. Figure 1 shows how these portions would be protected from future exposure to service water by the WEKO seal and a flexible coating. Additionally, the flexible coating on the outside of the joint provides protection from groundwater intrusion. Note that the portion of the spigot that is exposed to service water is not part of the load path for axial loading and is therefore not relevant for structural evaluations.

Figure 1 - Potential Areas of Degradation



There is no evidence that portions of the bell and spigot joint other than surfaces exposed to service water have been potentially degraded (e.g., by corrosion from groundwater). However, as discussed in the response to RAI 31a. and 31b., the WEKO seal repair and harness assembly completely replace the design function of the bell and spigot joint. Even if the entire bell ring, the entire spigot ring, and the bell bolts were completely corroded, the combination of the WEKO seal repair and the harness assembly would be technically satisfactory.

RAI 32:

Relief Request SC-I4R-133 was submitted pursuant to 10 CFR 50.55a(a)(3)(i). The NRC staff has determined that consideration of the relief request under the requirements of 10 CFR 50.55a(a)(3)(i) may not be appropriate. Please advise if PSEG requests that the NRC consider the request pursuant to 10 CFR 50.55a(a)(3)(ii) based on hardship or unusual difficulty justification.

PSEG Response to RAI 32:

PSEG requests that the NRC consider the request pursuant to 10 CFR 50.55(a)(3)(ii), because compliance with the defect removal requirements in ASME Section XI, IWA 4422.1 would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Internal service water piping inspections are completed during refuel outages. If a degraded joint was found, the defect removal requirements of ASME Section XI, IWA 4422.1 would require emergent replacement of the joint, along with a length of adjacent piping. The Salem service water bell and spigot piping is laid out and constructed with specific interlocking connections. Any bell and spigot joint requiring replacement would have to be physically cut out and have flanged sections installed.

Since much of the service water piping is buried (approximately 8 feet below grade), a large excavation would most likely be required for the joint replacement. Sections of the service water piping are located under the Independent Spent Fuel Storage Installation (ISFSI) turning pads and the service water accumulator tank buildings, which would potentially have to be dug up. Additionally, the redundant service water headers for both Salem units are located in close proximity to each other, which could result in PSEG having to uncover the operating header to make a repair on the header that is out of service. Completing the repair using the proposed alternative in lieu of defect removal requirements in ASME Section XI, IWA 4422.1 would

reduce the inoperability time of the impacted service water header. The excavation and joint replacement would require an emergent design change package, extensive vendor support, and would present industrial safety concerns due to the potentially large excavation.

Completing the emergent replacement of a degraded joint during a refuel outage presents potential safety concerns, increased service water header inoperability time, outage duration impact, and budgetary concerns. The proposed alternative of installing a WEKO seal with a structural backing plate can be completed in a timely fashion during a refuel outage and provides reasonable assurance of bell and spigot joint structural integrity, as demonstrated in Relief Request SC-I4R-133.

References:

1. MPR Calculation 108-255-1, Revision 0, "Evaluation of WEKO Seals on Bell and Spigot Joints." (PSEG VTD 327717, Sheet 1, which is Reference 7.7 of Relief Request SC-I4R-133)

2. MPR Calculation 108-264-DEC-01, Revision 0, "Minimum Dimensions of SW Piping Harness." (Appendix D of MPR-2449 / PSEG VTD 325626, Sheet 0, which is Reference 7.9 of Relief Request SC-I4R-133)