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APR 08 2014

LR-N14-0099

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: Request for Relief from System Pressure Test Pressurization
Requirements on Class 1 and Class 2 Reactor Vessel Flange O-ring Leak
Detection System

On February 25, 2014, the U.S. Nuclear Regulatory Commission (NRC) issued Information Notice (IN) 2014-02, *Failure to Properly Pressure Test Reactor Vessel Flange Leak-off Lines*, identifying instances in which inspection of the reactor vessel flange leak-off lines were not performed as required by Section XI of the American Society of Mechanical Engineers (ASME) Code and 10 CFR 50.55a.

In accordance with 10 CFR 50.55a(a)(3), "Codes and standards," PSEG Nuclear LLC (PSEG), hereby requests NRC approval of proposed Relief Request SC-I4R-140 for Salem Units 1 and 2. Salem is requesting relief from the system pressurization requirements of ASME Section XI, IWB-5220 and IWC-5220 for the reactor vessel head flange O-ring leak detection system.

PSEG requests approval of the proposed request by October 17, 2014 to align with the first scheduled Unit 1 refueling outage in the second period of fourth Inservice Inspection (ISI) interval. Relief Request SC-I4R-140 applies to the Unit 1 fourth interval which began on May 20, 2011 and is scheduled to end on May 20, 2021, and to the Unit 2 fourth interval which began on November 27, 2013 and is scheduled to end on November 27, 2023.

The Code of Record for both Salem Unit 1 and 2 fourth ISI intervals is the American Society of Mechanical Engineers (ASME) Code, Section XI, 2004 Edition. The proposed relief request is provided in Attachment 1.

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10 CFR 50.55a

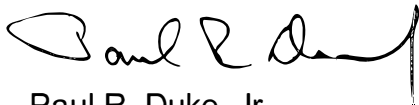
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Salem Unit 1 is currently still in the first period of the Fourth Ten-Year Inservice Inspection (ISI) Interval. The Salem Unit 1 cycle 23 refueling outage scheduled for fall 2014 will be the first outage of the second period and is within 12 months after the end of the first period which will conclude on May 20, 2014. Therefore, performance of the proposed alternative pressure test could be credited towards the first period and subsequently scheduled again in the second period.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this matter, please contact Mr. Brian Thomas at 856-339-2022.

Sincerely,



Paul R. Duke, Jr.
Manager - Licensing
PSEG Nuclear LLC

Attachment 1: 10 CFR 50.55a Relief Request SC-I4R-140

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

Attachment 1
LR-N14-0099

Attachment 1
10 CFR 50.55a Relief Request SC-I4R-140

ATTACHMENT 1

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

Relief Request - SC-I4R-140

Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(ii)
Hardship or Unusual Difficulty without Compensating
Increase in Level of Quality or Safety

1. ASME Code Component(s) Affected

Code Class:	1 and 2
Examination Category:	B-P and C-H
Item Number:	B15.10 and C7.10
Description:	Reactor Vessel Head Flange O-ring Class 1 and 2 leak detection system pressure retaining boundary.
Unit/Inspection Intervals:	Salem Unit 1 & 2 / Fourth (4 th) 10-Year

Each Salem Unit has approximately 140 linear feet of Class 1 stainless steel 3/4" schedule 160 piping and 45 linear feet of Class 2 stainless steel 3/8" tubing.

2. Applicable Code Edition and Addenda

American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection and Testing of Components of Light-Water Cooled Plants," 2004 Edition with no Addenda. For Unit 1 the fourth interval began on May 20, 2011 and is scheduled to end on May 20, 2021 and for Unit 2 the fourth interval began on November 27, 2013 and is scheduled to end on November 27, 2023.

3. Applicable Code Requirement

ASME Code, Section XI, Table IWB-2500-1, Examination Category B-P, Item Number B15.10, requires certain Class 1 pressure retaining components be subject to a system leakage test with a VT-2 visual examination in accordance with paragraph IWB-5220.

ASME Code, Section XI, subparagraph IWB-5221(a) states "The system leakage test shall be conducted at a pressure not less than the pressure corresponding to 100% rated reactor power."

ASME Section XI, subparagraph IWB-5222(b) states, "The pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval shall extend to all Class 1 pressure retaining components within the system boundary."

ASME Code, Section XI, Table IWC-2500-1, Category C-H, Item Number C7.10, requires that a system leakage test with a VT-2 visual examination of Class 2 pressure retaining components be performed each inspection period in accordance with paragraph IWC-5220.

ASME Section XI, paragraph IWC-5221 states, "the system leakage test shall be conducted at the system pressure obtained while the system, or portion of the system, is in service performing its normal operating function or at the system pressure developed during a test conducted to verify system operability."

ASME Section XI, subparagraph IWC-5222(a) states, "the pressure retaining boundary includes only those portions of the system required to operate or support the safety function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required."

4. Reason for Request

PSEG recently determined, through issuance of NRC Information Notice 2014-02, *Failure to Properly Pressure Test Reactor Vessel Flange Leak-Off Lines*, that Salem is susceptible to the concern regarding compliance with ASME Section XI for examination pressure of the reactor vessel flange leak-off piping. Salem currently performs VT-2 examinations on all Class 1 and 2 portions of the reactor vessel head flange O-ring leak-off lines each refueling outage during Mode 3 Class 1 walkdown but only at reactor coolant drain tank system pressure.

In accordance with the provisions of 10 CFR 50.55a(a)(3)(ii), Salem requests relief from the Section XI code requirement for system leakage tests of the reactor vessel flange O-ring leak-off lines on the basis that compliance with the Code specified pressure test requirement to test the leak-off lines at system operating pressure would result in undue hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The ASME Code Section XI, 2004 Edition with no Addenda requires that Class 1 pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval to extend to all Class 1 pressure retaining components within the system boundary and the Class 2

pressure retaining boundary includes only those portions of the system required to operate or support the safety function up to and including the first normally closed valve (including a safety or relief valve) or valve capable of automatic closure when the safety function is required.

The reactor vessel flange seal leak detection piping is separated from the reactor coolant pressure boundary by one passive metallic seal, which is the first of two O-rings. The pressure tap for the leak detection piping is located on the vessel flange mating surface. A second O-ring is located on the outside of the pressure tap in the vessel flange. Failure of the inner O-ring is the only condition under which this line is pressurized. Therefore, the line is not expected to be pressurized during the system pressure test following a refueling outage. During normal operation, the lines are typically pressurized to Reactor Coolant Drain Tank (RCDT) pressure (less than 5 psig). The lines are designed to 2485 psig at 650° F. The 3/4 inch Class 1 lines are schedule 160, SA376, TP316 stainless steel piping and the fittings are 6000 psi, SA182, F316 stainless steel. The 3/8 inch Class 2 lines are 0.065 inch wall SA213, TP304 seamless tubing and SA403 WP316 fittings. The tubing connections are welded.

Additionally, isolation valves 1(2)RC2 and control valves 1(2)RC4 are normally open during plant operations with flow directed to RCDT through air operated valve 1(2)RC4. This configuration prevents significant pressure build-up in the piping in the event of an inner O-ring leak. The configuration of this piping precludes system pressure testing while the vessel head is removed because the pressure tap would have to be plugged. This would require a design modification to install a plug into the pressure tap on the vessel flange. A threaded or pressure test type plug would need to be installed in the flange face to act as a pressure boundary for each test, and then removed after the test.

The installation of the mechanical modification and subsequent use would incur significant dose (radiation level at the RPV flange is estimated at 30 to 40 milliroentgen equivalent man per minute (mrem/min), which would be inconsistent with keeping dose as low as reasonably achievable (ALARA)). Installation of the plug would also present a foreign material exclusion issue for the handling of a very small diameter plug that would be required to be installed to complete a leakage test at RCS pressure.

The configuration of the leak-off line also precludes pressurizing the line externally with the head installed. The closure head contains two concentric grooves that hold the inner and outer O-rings. The O-rings are held in place by a series of retainer clips that are housed in recessed cavities in the flange face. If a pressure test were to be performed with the head installed, the inner O-ring would be pressurized in a direction opposite to its design function. This test pressure would result in a net inward force on the inner O-

ring that would tend to push it into the recessed cavity that houses the retainer clips. The thin O-ring material could be damaged by the inward force. Purposely failing or not installing the inner O-ring in order to perform a pressure test would require a new O-ring set to be installed. The time and radiation exposure associated with removing and reinstalling the closure head, replacing the outer O-ring and re-cleaning of the vessel flange mating surface prior to head installation would be an undue hardship. In addition, this special test would require a reactor coolant system heat-up / cool down cycle. Therefore, compliance with the IWB-5222(b) and IWC-5220 system pressure test pressurization requirements will result in an unnecessary hardship without a sufficient compensating increase in the level of quality and safety.

5. Proposed Alternative and Basis for Use

In lieu of the requirements of IWB-5222(b) and IWC-5220, a VT-2 visual examination of the Class 1 and Class 2 accessible portions of the leak detection system piping will be performed while the system is subjected to the static pressure from the head of water when the reactor cavity is filled to its normal refueling water level for at least four hours. A static pressure of approximately 10 psig is expected to be experienced at the top of the RPV flange with a minimum of 23 feet of water above the flange. The test will be performed during each ISI period for Class 1 and 2 portions of reactor vessel flange seal leak-off system.

If the inner O-ring should leak during the operating cycle it will be identified by an increase in temperature of the leak-off line above ambient temperature. This leak detection piping has a temperature indicator in the Control Room and is monitored procedurally with compensatory actions when required.

Additionally, the reactor vessel flange seal leak detection piping would only function as a pressure boundary if the inner O-ring fails; thereby, pressurizing the line. If any significant leakage does occur in the leak detection piping during this time of pressurization, it would exhibit boric acid accumulation that would be discernible during the VT-2 visual examination to be performed as proposed in this request.

This proposed test methodology is identical to that presented in Code Case N-805 (Reference 1). However, this Code Case has not yet been approved by the NRC and is not yet identified in the current revision of Regulatory Guide 1.147, "In-service Inspection Code Case Acceptability, ASME Section XI, Division 1" (Reference 2).

6. Duration of Proposed Alternative

The duration of the request for proposed alternative for Salem Unit 1 is through the end of the fourth interval currently scheduled to end on 05/20/2021; and for Salem Unit 2, the duration is through the end of the fourth interval currently scheduled to end on 11/27/2023.

7. Precedents

Similar relief requests have been previously approved by the NRC for the following (with ADAMS Accession No. references):

- 1) NRC Safety Evaluation, "South Texas Project Units 1 and 2 - Request for Relief from the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Requirements for Reactor Pressure Vessel Head Flange O-Ring Leak-off Lines Non-Destructive Examination (TAC Nos. ME9863 and ME9864)," dated March 12, 2013 (ML13004A339).
- 2) NRC Safety Evaluation, "Palo Verde Nuclear Generating Station Units 1, 2, and 3 - Request for Relief from the ASME Code, Section XI, Requirements Regarding the Reactor Vessel Head Flange Seal Leak Detection Piping (TAC Nos. MF0447, MF0448, and MF0449)," dated April 4, 2013 (ML13085A254).
- 3) NRC Safety Evaluation, "Arkansas Nuclear One, Unit 2 – Request for Relief ANO2-ISI-015 From ASME Code, Section XI, for Periodic Pressure Sealing Requirements on the Reactor Vessel Flange Leak Detection Piping (TAC No. MF0941)," dated June 27, 2013 (ML13161A241)
- 4) NRC Safety Evaluation, "Oyster Creek Nuclear Generating Station – Relief from the Requirements of the ASME Code, Relief Request No. I5R-02 (TAC No. ME9491)," dated August 5, 2013 (ML13175A100)
- 5) NRC Safety Evaluation, "Callaway Plant, Unit 1 – Request for Relief I3R-14, Proposed Alternative Regarding Leakage Testing of Reactor Pressure Vessel Head Flange Leakoff Lines (TAC No. MF1745)," dated August 13, 2013 (ML13221A091).
- 6) NRC Safety Evaluation, "Diablo Canyon Power Plant, Unit Nos. 1 and 2 – Relief Request No. RVFLNG-INT3 – U1 & U2 – Alternative to ASME Code, Section XI Pressure Test Requirements for Class 1 Reactor Vessel Flange Leakoff Lines (TAC Nos. MF0408 and MF0409)," dated September 12, 2013 (ML13192A354).

- 7) NRC Safety Evaluation, "Watts Bar Nuclear Plant, Unit No. 1 – Request for Alternative ISPT-02 Regarding System Leakage Test of Reactor Pressure Vessel Head Flange Seal Leak-Off Piping (TAC No. MF3354)," dated March 27, 2014 (ML14079A477)

8. Reference

- 1) Code Case N-805, "Alternative to Class 1 Extended Boundary End of Interval or Class 2 System Leakage Testing of the Reactor Vessel Head Flange O-Ring Leak-Detection System," approved by the American Society of Mechanical Engineers (ASME) on February 25, 2011
- 2) Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 16 dated October 2010