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LR-N10-0362

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

Salem Nuclear Generating Station, Unit No. 1 and Unit No. 2
Facility Operating License Nos. DPR-70 and DPR-75
NRC Docket Nos. 50-272 and 50-311

Subject: Supplement to the Salem Generating Station, Unit No. 1 and Unit No. 2 License Renewal Application to Provide Additional Information Related to Salem Steam Generator Aging Management Activities

References:

1. PSEG Letter LR-N10-0313 to USNRC, "Responses to 1) NRC Request for Additional Information, dated August 3, 2010, related to Bolting Integrity; 2) NRC Request for Additional Information, dated July 30, 2010, related to Steam Generators, and 3) A question posed during the August 2010 NRC Region I Inspection related to Steam Generators; all associated with the Salem Nuclear Generating Station, Units 1 and 2 License Renewal Application", dated August 26, 2010

2. PSEG Letter LR-N10-316 to USNRC, "Supplement to the Salem Generating Station License Renewal Application, Unit No. 1 and Unit No. 2", dated August 26, 2010

3. Teleconference between representatives of PSEG Nuclear LLC and USNRC pertaining to aging management of Salem Steam Generators, September 9, 2010

In both Reference 1 and Reference 2, PSEG Nuclear, LLC (PSEG) provided the NRC staff with information involving aging management activities associated with the Salem Steam Generators in support of its License Renewal Application (LRA). Following review of this information, the NRC staff and representatives of PSEG conducted the Reference 3 teleconference, resulting in agreement that additional revisions to the LRA would be appropriate.

PSEG believes that the Enclosure to this letter provides the additional information on Steam Generator aging management needed for the staff to complete its review of this aspect of the Salem License Renewal Application.

There are no new or revised regulatory commitments contained in this letter.

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If you have any questions, please contact Mr. Ali Fakhar, PSEG Manager - License Renewal, at 856-339-1646.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 10/8/10

Sincerely,

Paul J. Davison

Paul J. Davison
Vice President, Operations Support
PSEG Nuclear LLC

Enclosure: Update to the Salem Unit No. 1 and Unit No. 2 License Renewal Application related to aging management activities associated with the Salem Steam Generators resulting from a September 9, 2010 teleconference between PSEG Nuclear and NRC Staff

cc: Regional Administrator – USNRC Region I
B. Brady, Project Manager, License Renewal – USNRC
R. Ennis, Project Manager - USNRC
NRC Senior Resident Inspector - Salem
P. Mulligan, Manager IV, NJBNE
L. Marabella, Corporate Commitment Tracking Coordinator
Howard Berrick, Salem Commitment Tracking Coordinator

Enclosure

Update to the Salem Unit No. 1 and Unit No. 2 License Renewal Application related to aging management activities associated with the Salem Steam Generators resulting from a September 9, 2010 teleconference between PSEG Nuclear and NRC Staff

Introduction

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of PSEG Nuclear, LLC (PSEG) held a telephone conference call on September 9, 2010, to discuss and clarify the following Salem responses to Request for Additional Information (RAIs).

1. PSEG Letter LR-N10-0313 dated August 26, 2010, RAI 3.1.1.66-01

2. PSEG Letter LR-N10-0313 dated August 26, 2010, RAI 3.1.1.84-01

3. PSEG Letter LR-N10-0313 dated August 26, 2010, NRC Request for Clarification from Region I License Renewal Inspection – August 2010

4. PSEG Letter LR-N10-0316 dated August 26, 2010, Update to Response to RAI 3.4.1-01

During the September 9, 2010 telephone conference, NRC Staff and PSEG representatives discussed several questions related to the above RAI responses. Below are PSEG's revisions to the License Renewal Application (LRA) in response to questions posed by the NRC. Salem also noted other inconsistencies and these are discussed and addressed below.

Changes have been made to Salem LRA Tables 2.3.1-4, 3.1.1, 3.1.2-4, 3.4.1, and Sections 3.1.2.2.2.2, 3.4.2.2.6, and 3.4.2.2.7.1. A majority of the changes pertain to the use of the Steam Generator Tube Integrity aging management program as a substitute to the GALL Report recommended One-Time Inspection program to manage the aging effects and mechanisms for several Steam Generator component types.

The NRC questions and PSEG responses are described below, followed by an additional clarification, a summary of the impact on the LRA, and the affected marked-up LRA sections.

1. PSEG Letter LR-N10-0313 dated August 26, 2010, RAI 3.1.1.66-01:

Question: In the response to RAI 3.1.1.66-01, the applicant revised the LRA Table with a "carbon or low alloy steel with stainless steel cladding" component whereas in the text it said the component is made in carbon steel. We would like to clarify this inconsistency.

PSEG Response:

The component type Steam Generators (Inspection Ports and Diaphragm, Handholes and Covers) does not have the material "carbon or low alloy steel with stainless steel cladding", however this component type contains both low alloy steel and stainless steel. To provide distinction between the materials, Salem separates component type Steam Generators (Inspection Ports and Diaphragm, Handholes and Covers) into two component types; Steam Generators (Inspection Ports, Handholes and Covers) and Steam Generators (Inspection Port Diaphragm). To address the above question, Salem revises the material for the component type Steam Generators (Inspection Ports, Handholes and Covers) from "carbon or low alloy steel with stainless steel cladding" to "low alloy steel". The component type Steam Generators (Inspection Port Diaphragm) is constructed of stainless steel and only applies to the Unit 2 Steam Generators. With this revision to the materials associated with the component type Steam Generators (Inspection Ports, Handholes and Covers), the aging effect and mechanism of loss of material due to pitting and crevice corrosion is replaced with loss of material due to general, pitting and crevice corrosion. To be consistent with GALL items for Steam Generators, Salem revises Table 3.1.2-4 to refer to GALL item IV.D1-12 instead of VIII.F-23 for this component type.

With the deletion of the stainless steel cladding from the component type Steam Generators (Inspection Ports, Handholes and Covers), the aging effect and mechanism of cracking due to stress corrosion cracking of stainless steel in the environment of treated water > 140°F is no longer applicable, and is deleted from LRA Table 3.1.2-4.

The Salem response to RAI 3.1.1.66-01 added the aging effect and mechanism of loss of material due to erosion for the component types Steam Generators (Inspection Ports, Handholes and Covers) and Steam Generators (Secondary Manways and Covers). To be consistent with other component types in LRA Table 3.1.2-4, Salem replaces plant specific note "A" with plant specific note "C".

2. PSEG Letter LR-N10-0313 dated August 26, 2010, RAI 3.1.1.84-01:

Question: In the response to RAI 3.1.1.84-01, the applicant revised the LRA Table. There may be confusion between the nozzle that can be addressed by piping elements AMRs and the J-nozzle that is a steam generator (SG) secondary internal component, and therefore it should be addressed with the Steam Generator Tube Integrity AMP. Moreover, the staff questions whether the note C or F would be more appropriate than Note A.

PSEG Response:

As discussed in the response to RAI 3.1.1.84-01 in PSEG letter LR-10-0313 dated August 26, 2010, Salem revised the component type description from Spray Nozzles to Spray Nozzles (Unit 1), and added a new component type, Spray Nozzles (Unit 2). Salem used the One-Time Inspection program to manage the aging effects and mechanisms of Loss of Material due to Pitting and Crevice Corrosion, and Cracking due to Stress Corrosion Cracking for the component types Spray Nozzles (Unit 1) and Spray Nozzles (Unit 2). Salem revises LRA Table 3.1.2-4 to replace the One-Time Inspection Program with the Steam Generator Tube Integrity Program to manage the aging effects and mechanisms of Loss of Material due to Pitting and Crevice Corrosion, and Cracking due to Stress Corrosion Cracking for the component types Spray Nozzles (Unit 1), Spray Nozzles (Unit 2), and Steam Generators (Feedwater Ring – Unit 2). Since the nickel alloy Spray Nozzles (Unit 1) are considered an internal nozzle, i.e., j-nozzle, Salem revises the GALL Item from IV.D2-9 to IV.D1-14 in LRA Table 3.1.2-4, and the associated Table 1 Item from 3.1.1-84 to 3.1.1-74.

Additionally, Salem adds line items to LRA Table 3.1.2-4 for the external surfaces for the following component types; Spray Nozzles (Unit 1), Spray Nozzles (Unit 2), Steam Generators (Feedwater Ring - Unit 1), and Steam Generators (Feedwater Ring - Unit 2) for the treated water and treated water > 140°F environments since these environments affected both the internal and external surfaces of these component types. The Steam Generator Tube Integrity Program will be used to manage the applicable aging effects and mechanisms for the internal and external surfaces of these component types.

Plant Specific Note 2 is revised to replace the One-Time Inspection Program with the Steam Generator Tube Integrity program.

3. PSEG Letter LR-N10-0313 dated August 26, 2010, NRC Request for Clarification from Region I License Renewal Inspection – August 2010:

Question: In regards to the supplemental clarification from the inspection, the staff would like to add the "direct flow" function that is more appropriate to some of the concerned components, and replace the One-Time Inspection AMP by the Steam Generator Tube Integrity AMP. Here, also, the staff questions whether the note C or F would be more appropriate than Note A.

PSEG Response:

As discussed during the September 9, 2010 telephone conference, Salem will not include a separate intended function of "direct flow" for the component type Steam Generators (Secondary Internals).

For the component type Steam Generators (Secondary Internals), Salem replaces the One-Time Inspection program with the Steam Generator Tube Integrity program to manage the aging effect and mechanism of Loss of Material due to Pitting and Crevice Corrosion for the stainless steel materials exposed to treated water.

Salem revises the Plant Specific Note from "C" to "E, 3" and from "A" to "C" associated with the Steam Generator Tube Integrity program and from "A" to "C" associated with the Water Chemistry program for this component type.

4. PSEG Letter LR-N10-0316 dated August 26, 2010, Update to Response to RAI 3.4.1-01

Question: In the response to RAI 3.4.1-01, we would like to discuss the modification made by the applicant of replacing the Steam Generator Tube Integrity AMP by the One-Time Inspection AMP.

PSEG Response:

In the clarification to RAI 3.4.1-01 response in PSEG letter LR-10-0316 dated August 26, 2010, Salem replaced the Steam Generator Tube Integrity program with the One-Time Inspection program to manage the aging effect and mechanism of Loss of Material due to Pitting and Crevice Corrosion for the component type Steam Generators (Tube Support Plates). Based on the September 9, 2010 telephone conference, Salem is reverting back to the Steam Generator Tube Integrity program as originally submitted in the LRA to manage the aging effect and mechanism of Loss of Material due to Pitting and Crevice Corrosion for the component type Steam Generators (Tube Support Plates). Further, to be consistent within LRA Table 3.1.2-4, Salem is replacing the GALL item VIII.B1-4 with VIII.F-23 for this component type exposed to treated water > 140°F.

Salem is also revising Plant Specific Note "C" to "E, 3" associated with the Steam Generator Tube Integrity program for this component type.

Additional Clarifications to the LRA:

For the component type Steam Generators (Tubesheet), Salem is correcting the plant specific note of "E, 4" to "E, 3".

Overall Impact to Salem LRA Tables and Sections:

Due to the above changes, Salem LRA Table 2.3.1-4, LRA Table 3.1.2-4, LRA Table 3.1.1, Item Numbers 3.1.1-16, 3.1.1-74, 3.1.1-84, and LRA Table 3.4.1, Item Numbers 3.4.1-14 and 3.4.1-16, and LRA Sections 3.1.2.2.2.2, 3.4.2.2.6, and 3.4.2.2.7.1 are updated and are shown below.

Due to the extent of the changes, the previous revisions, and to provide the table changes in context of their locations in the LRA, the following format was followed:

- Table 3.1.2-4 is presented with the affected Steam Generator component types, including line items for these components types unaffected by this response.
- Additions based on previous RAIs are indicated in *italicized* fonts and all deletions are not shown.
- Revisions based on this submittal are indicated with ***bolded italics*** for inserted text and ~~strikethroughs~~ for deleted text.

Steam Generators
Summary of Aging Management Evaluation

Table 3.1.2-4 Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Spray Nozzles *(Unit 1)*	Direct Flow	Nickel Alloy	Treated Water (Internal)	Loss of Material/Pitting and Crevice Corrosion	~~One-Time Inspection~~ ***Steam Generator Tube Integrity***			H, 2
Spray Nozzles *(Unit 1)*	Direct Flow	Nickel Alloy	Treated Water (Internal)	Loss of Material/Pitting and Crevice Corrosion	Water Chemistry			H, 2
Spray Nozzles (Unit 1)	***Direct Flow***	***Nickel Alloy***	***Treated Water (External)***	***Loss of Material/Pitting and Crevice Corrosion***	***Steam Generator Tube Integrity***			***H, 2***
Spray Nozzles (Unit 1)	***Direct Flow***	***Nickel Alloy***	***Treated Water (External)***	***Loss of Material/Pitting and Crevice Corrosion***	***Water Chemistry***			***H, 2***
Spray Nozzles (Unit 1)	*Direct Flow*	*Nickel Alloy*	*Treated Water (Internal) > 140 F*	*Cracking/Stress Corrosion Cracking*	~~*One-Time Inspection*~~ ***Steam Generator Tube Integrity***	~~*IV.D2-9*~~ ***IV.D1-14***	~~*3.1.1-84*~~ ***3.1.1-74***	~~A~~ ***C***
Spray Nozzles (Unit 1)	*Direct Flow*	*Nickel Alloy*	*Treated Water (Internal) > 140 F*	*Cracking/Stress Corrosion Cracking*	*Water Chemistry*	~~*IV.D2-9*~~ ***IV.D1-14***	~~*3.1.1-84*~~ ***3.1.1-74***	~~A~~ ***C***
Spray Nozzles (Unit 1)	***Direct Flow***	***Nickel Alloy***	***Treated Water (External) > 140 F***	***Cracking/Stress Corrosion Cracking***	***Steam Generator Tube Integrity***	***IV.D1-14***	***3.1.1-74***	***C***
Spray Nozzles (Unit 1)	***Direct Flow***	***Nickel Alloy***	***Treated Water (External) > 140 F***	***Cracking/Stress Corrosion Cracking***	***Water Chemistry***	***IV.D1-14***	***3.1.1-74***	***C***
Spray Nozzles (Unit 2)	*Direct Flow*	*Stainless Steel*	*Treated Water (Internal)*	*Loss of Material/Pitting and Crevice Corrosion*	~~*One-Time Inspection*~~ ***Steam Generator Tube Integrity***	*VIII.F-23*	*3.4.1-16*	~~A~~ ***E, 3***
Spray Nozzles (Unit 2)	*Direct Flow*	*Stainless Steel*	*Treated Water (Internal)*	*Loss of Material/Pitting and Crevice Corrosion*	*Water Chemistry*	*VIII.F-23*	*3.4.1-16*	~~A~~ ***C***

Table 3.1.2-4 Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Spray Nozzles (Unit 2)	***Direct Flow***	***Stainless Steel***	***Treated Water (External)***	***Loss of Material/Pitting and Crevice Corrosion***	***Steam Generator Tube Integrity***	***VIII.F-23***	***3.4.1-16***	***E, 3***
Spray Nozzles (Unit 2)	***Direct Flow***	***Stainless Steel***	***Treated Water (External)***	***Loss of Material/Pitting and Crevice Corrosion***	***Water Chemistry***	***VIII.F-23***	***3.4.1-16***	***C***
Spray Nozzles (Unit 2)	*Direct Flow*	*Stainless Steel*	*Treated Water (Internal) > 140 F*	*Cracking/Stress Corrosion Cracking*	~~*One-Time Inspection*~~ ***Steam Generator Tube Integrity***	*VIII.F-24*	*3.4.1-14*	~~*A*~~ ***E, 3***
Spray Nozzles (Unit 2)	*Direct Flow*	*Stainless Steel*	*Treated Water (Internal) > 140 F*	*Cracking/Stress Corrosion Cracking*	*Water Chemistry*	*VIII.F-24*	*3.4.1-14*	~~*A*~~ ***C***
Spray Nozzles (Unit 2)	***Direct Flow***	***Stainless Steel***	***Treated Water (External) > 140 F***	***Cracking/Stress Corrosion Cracking***	***Steam Generator Tube Integrity***	***VIII.F-24***	***3.4.1-14***	***E, 3***
Spray Nozzles (Unit 2)	***Direct Flow***	***Stainless Steel***	***Treated Water (External) > 140 F***	***Cracking/Stress Corrosion Cracking***	***Water Chemistry***	***VIII.F-24***	***3.4.1-14***	***C***
Steam Generators (Feedwater Ring – *Unit 1*)	Direct Flow	Carbon Steel	Treated Water (Internal)	Loss of Material/General, Pitting and Crevice Corrosion	Steam Generator Tube Integrity	IV.D1-12	3.1.1-16	E, 3
Steam Generators (Feedwater Ring – *Unit 1*)	Direct Flow	Carbon Steel	Treated Water (Internal)	Loss of Material/General, Pitting and Crevice Corrosion	Water Chemistry	IV.D1-12	3.1.1-16	A

Table 3.1.2-4 Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Steam Generators (Feedwater Ring– *Unit 1*)	Direct Flow	Carbon Steel	Treated Water (Internal)	Wall Thinning/Flow Accelerated Corrosion	Steam Generator Tube Integrity	IV.D1-26	3.1.1-32	E, 3
Steam Generators (Feedwater Ring – Unit 1)	***Direct Flow***	***Carbon Steel***	***Treated Water (External)***	***Loss of Material/ General, Pitting and Crevice Corrosion***	***Steam Generator Tube Integrity***	***IV.D1-12***	***3.1.1-16***	***E, 3***
Steam Generators (Feedwater Ring – Unit 1)	***Direct Flow***	***Carbon Steel***	***Treated Water (External)***	***Loss of Material/ General, Pitting and Crevice Corrosion***	***Water Chemistry***	***IV.D1-12***	***3.1.1-16***	~~***A***~~ ***C***
Steam Generators (Feedwater Ring – Unit 2)	*Direct Flow*	*Stainless Steel*	*Treated Water (Internal)*	*Loss of Material/ Pitting and Crevice Corrosion*	~~*One-Time Inspection*~~ ***Steam Generator Tube Integrity***	*VIII.F-23*	*3.4.1-16*	~~*A*~~ ***E, 3***
Steam Generators (Feedwater Ring – Unit 2)	*Direct Flow*	*Stainless Steel*	*Treated Water (Internal)*	*Loss of Material/ Pitting and Crevice Corrosion*	*Water Chemistry*	*VIII.F-23*	*3.4.1-16*	~~*A*~~ ***C***
Steam Generators (Feedwater Ring – Unit 2)	***Direct Flow***	***Stainless Steel***	***Treated Water (External)***	***Loss of Material/ Pitting and Crevice Corrosion***	***Steam Generator Tube Integrity***	***VIII.F-23***	***3.4.1-16***	***E, 3***
Steam Generators (Feedwater Ring – Unit 2)	***Direct Flow***	***Stainless Steel***	***Treated Water (External)***	***Loss of Material/ Pitting and Crevice Corrosion***	***Water Chemistry***	***VIII.F-23***	***3.4.1-16***	***C***
Steam Generators (Feedwater Ring – Unit 2)	*Direct Flow*	*Stainless Steel*	*Treated Water (Internal) > 140 F*	*Cracking/Stress Corrosion Cracking*	~~*One-Time Inspection*~~ ***Steam Generator Tube Integrity***	*VIII.F-24*	*3.4.1-14*	~~*A*~~ ***E, 3***

Table 3.1.2-4 Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Steam Generators (Feedwater Ring – Unit 2)	*Direct Flow*	*Stainless Steel*	*Treated Water (Internal) > 140 F*	*Cracking/Stress Corrosion Cracking*	*Water Chemistry*	*VIII.F-24*	*3.4.1-14*	~~A~~ ***C***
Steam Generators (Feedwater Ring – Unit 2)	***Direct Flow***	***Stainless Steel***	***Treated Water (External) > 140 F***	***Cracking/Stress Corrosion Cracking***	***Steam Generator Tube Integrity***	***VIII.F-24***	***3.4.1-14***	***E, 3***
Steam Generators (Feedwater Ring – Unit 2)	***Direct Flow***	***Stainless Steel***	***Treated Water (External) > 140 F***	***Cracking/Stress Corrosion Cracking***	***Water Chemistry***	***VIII.F-24***	***3.4.1-14***	***C***
Steam Generators *(Feedwater Ring Support)*	Structural Support	Carbon Steel	Treated Water ~~(Internal)~~ ***(External)***	Loss of Material/General, Pitting and Crevice Corrosion	Steam Generator Tube Integrity	IV.D1-12	3.1.1-16	E, 3
Steam Generators *(Feedwater Ring Support)*	Structural Support	Carbon Steel	Treated Water ~~(Internal)~~ ***(External)***	Loss of Material/General, Pitting and Crevice Corrosion	Water Chemistry	IV.D1-12	3.1.1-16	~~A~~ ***C***
Steam Generators (Feedwater Ring Support)	*Structural Support*	*Carbon Steel*	*Treated Water (Internal)*	*Wall Thinning/Flow Accelerated Corrosion*	*Steam Generator Tube Integrity*	*IV.D1-26*	*3.1.1-32*	*E, 3*
Steam Generators (Inspection Ports ~~and Diaphragm~~, Handholes and Covers)	Pressure Boundary	~~Carbon or~~ Low Alloy Steel ~~with Stainless Steel Cladding~~	Air - Indoor (External)	Loss of Material/General Corrosion	External Surfaces Monitoring	VIII.H-7	3.4.1-28	A
Steam Generators (Inspection Ports ~~and Diaphragm~~, Handholes and Covers)	Pressure Boundary	~~Carbon or~~ Low Alloy Steel ~~with Stainless Steel Cladding~~	Air with Borated Water Leakage (External)	Loss of Material/Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3	3.1.1-58	A

Table 3.1.2-4 Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
~~Steam Generators (Inspection Ports and Diaphragm, Handholes and Covers)~~	~~Pressure Boundary~~	~~Carbon or Low Alloy Steel with Stainless Steel Cladding~~	~~Treated Water (Internal) > 140 F~~	~~Cracking/Stress Corrosion Cracking~~	~~One-Time Inspection~~	~~VIII.F-24~~	~~3.4.1-14~~	~~C~~
~~Steam Generators (Inspection Ports and Diaphragm, Handholes and Covers)~~	~~Pressure Boundary~~	~~Carbon or Low Alloy Steel with Stainless Steel Cladding~~	~~Treated Water (Internal) > 140 F~~	~~Cracking/Stress Corrosion Cracking~~	~~Water Chemistry~~	~~VIII.F-24~~	~~3.4.1-14~~	~~C~~
Steam Generators (Inspection Ports ~~and Diaphragm~~, Handholes and Covers)	Pressure Boundary	~~Carbon or~~ Low Alloy Steel ~~with Stainless Steel Cladding~~	Treated Water (Internal) > 140 F	Loss of Material/***General,*** Pitting and Crevice Corrosion	~~One-Time Inspection~~ ***ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD***	~~VIII.F-23~~ ***IV.D1-12***	~~3.4.1-16~~ ***3.1.1-16***	C
Steam Generators (Inspection Ports ~~and Diaphragm~~, Handholes and Covers)	Pressure Boundary	~~Carbon or~~ Low Alloy Steel ~~with Stainless Steel Cladding~~	Treated Water (Internal) > 140 F	Loss of Material/***General,*** Pitting and Crevice Corrosion	Water Chemistry	~~VIII.F-23~~ ***IV.D1-12***	~~3.4.1-16~~ ***3.1.1-16***	C
Steam Generators (Inspection Ports ~~and Diaphragm~~, Handholes and Covers)	*Pressure Boundary*	*~~Carbon or~~ Low Alloy Steel ~~with Stainless Steel Cladding~~*	*Air with leaking secondary-side water and/or steam* ***(External)***	*Loss of Material/Erosion*	*ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD*	*IV.D2-5*	*3.1.1-66*	~~A~~ ***C***
Steam Generators (Inspection Ports ~~and~~ Diaphragm – ***Unit 2 only***~~, Handholes and Covers~~)	Pressure Boundary	Stainless Steel ~~(Unit 2 only)~~	Air - Indoor (External)	None	None	IV.E-2	3.1.1-86	~~A~~ ***C***

Table 3.1.2-4 Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Steam Generators (Inspection Port~~s and~~ Diaphragm – ***Unit 2 only***~~, Handholes and Covers~~)	Pressure Boundary	Stainless Steel ~~(Unit 2 only)~~	Air with Borated Water Leakage (External)	None	None	IV.E-3	3.1.1-86	C
Steam Generators (Inspection Port~~s and~~ Diaphragm – ***Unit 2 only***~~, Handholes and Covers~~)	Pressure Boundary	Stainless Steel ~~(Unit 2 only)~~	Treated Water (Internal) > 140 F	Cracking/Stress Corrosion Cracking	~~One-Time Inspection~~ ***Steam Generator Tube Integrity***	VIII.F-24	3.4.1-14	~~C~~ ***E, 3***
Steam Generators (Inspection Port~~s and~~ Diaphragm – ***Unit 2 only***~~, Handholes and Covers~~)	Pressure Boundary	Stainless Steel ~~(Unit 2 only)~~	Treated Water (Internal) > 140 F	Cracking/Stress Corrosion Cracking	Water Chemistry	VIII.F-24	3.4.1-14	C
Steam Generators (Inspection Port~~s and~~ Diaphragm – ***Unit 2 only***~~, Handholes and Covers~~)	Pressure Boundary	Stainless Steel ~~(Unit 2 only)~~	Treated Water (Internal) > 140 F	Loss of Material/Pitting and Crevice Corrosion	~~One-Time Inspection~~ ***Steam Generator Tube Integrity***	VIII.F-23	3.4.1-16	~~C~~ ***E, 3***
Steam Generators (Inspection Port~~s and~~ Diaphragm – ***Unit 2 only***~~, Handholes and Covers~~)	Pressure Boundary	Stainless Steel ~~(Unit 2 only)~~	Treated Water (Internal) > 140 F	Loss of Material/Pitting and Crevice Corrosion	Water Chemistry	VIII.F-23	3.4.1-16	C

Table 3.1.2-4 Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Steam Generators (Secondary Internals)	*Structural Support*	*Carbon Steel*	*Treated Water (External)*	*Loss of Material/General, Pitting and Crevice Corrosion*	*Steam Generator Tube Integrity*	*IV.D1-12*	*3.1.1-16*	*E, 3*
Steam Generators (Secondary Internals)	*Structural Support*	*Carbon Steel*	*Treated Water (External)*	*Loss of Material/General, Pitting and Crevice Corrosion*	*Water Chemistry*	*IV.D1-12*	*3.1.1-16*	~~A~~ ***C***
Steam Generators (Secondary Internals)	*Structural Support*	*Carbon Steel*	*Treated Water (External)*	*Wall Thinning/Flow Accelerated Corrosion*	*Steam Generator Tube Integrity*	*IV.D1-26*	*3.1.1-32*	*E, 3*
Steam Generators (Secondary Internals)	***Structural Support***	***Stainless Steel***	***Treated Water (External)***	***Loss of Material/Pitting and Crevice Corrosion***	~~One-Time Inspection~~ ***Steam Generator Tube Integrity***	***VIII.F-23***	***3.4.1-16***	~~C~~ ***E, 3***
Steam Generators (Secondary Internals)	***Structural Support***	***Stainless Steel***	***Treated Water (External)***	***Loss of Material/Pitting and Crevice Corrosion***	***Water Chemistry***	***VIII.F-23***	***3.4.1-16***	~~A~~ ***C***
Steam Generators (Secondary Internals)	*Structural Support*	*Stainless Steel*	*Treated Water (External) > 140 F*	*Cracking/Stress Corrosion Cracking*	*Steam Generator Tube Integrity*	*IV.D1-14*	*3.1.1-74*	~~A~~ ***C***
Steam Generators (Secondary Internals)	*Structural Support*	*Stainless Steel*	*Treated Water (External) >140 F*	*Cracking/Stress Corrosion Cracking*	*Water Chemistry*	*IV.D1-14*	*3.1.1-74*	~~A~~ ***C***
Steam Generators (Secondary Manways and Covers)	Pressure Boundary	Low Alloy Steel	Air - Indoor (External)	Loss of Material/General Corrosion	External Surfaces Monitoring	VIII.H-7	3.4.1-28	A
Steam Generators (Secondary Manways and Covers)	Pressure Boundary	Low Alloy Steel	Air with Borated Water Leakage (External)	Loss of Material/Boric Acid Corrosion	Boric Acid Corrosion	IV.D1-3	3.1.1-58	A

Table 3.1.2-4 Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Steam Generators (Secondary Manways and Covers)	Pressure Boundary	Low Alloy Steel	Treated Water (Internal)	Loss of Material/General, Pitting and Crevice Corrosion	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	IV.D1-12	3.1.1-16	A
Steam Generators (Secondary Manways and Covers)	Pressure Boundary	Low Alloy Steel	Treated Water (Internal)	Loss of Material/General, Pitting and Crevice Corrosion	Water Chemistry	IV.D1-12	3.1.1-16	A
Steam Generators (Secondary Manways and Covers)	*Pressure Boundary*	*Low Alloy Steel*	*Air with leaking secondary-side water and/or steam* ***(External)***	*Loss of Material/Erosion*	*ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD*	*IV.D2-5*	*3.1.1-66*	~~*A*~~ ***C***
Steam Generators (Tube Support Plates)	Structural Support	Stainless Steel	Treated Water (External) > 140 F	Cracking/Stress Corrosion Cracking	Steam Generator Tube Integrity	IV.D1-14	3.1.1-74	C
Steam Generators (Tube Support Plates)	Structural Support	Stainless Steel	Treated Water (External) > 140 F	Cracking/Stress Corrosion Cracking	Water Chemistry	IV.D1-14	3.1.1-74	C
Steam Generators (Tube Support Plates)	Structural Support	Stainless Steel	Treated Water (External) > 140 F	Loss of Material/Pitting and Crevice Corrosion	~~One-Time Inspection~~ ***Steam Generator Tube Integrity***	~~VIII.B1-4~~ ***VIII.F-23***	3.4.1-16	~~C~~ ***E, 3***
Steam Generators (Tube Support Plates)	Structural Support	Stainless Steel	Treated Water (External) > 140 F	Loss of Material/Pitting and Crevice Corrosion	Water Chemistry	~~VIII.B1-4~~ ***VIII.F-23***	3.4.1-16	C

Table 3.1.2-4 Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Steam Generators (Tubesheet)	Pressure Boundary	Carbon or Low Alloy Steel with Nickel Alloy Cladding	Reactor Coolant (External)	Cracking/Stress Corrosion Cracking	Steam Generator Tube Integrity	IV.D1-20	3.1.1-73	C
Steam Generators (Tubesheet)	Pressure Boundary	Carbon or Low Alloy Steel with Nickel Alloy Cladding	Reactor Coolant (External)	Cracking/Stress Corrosion Cracking	Water Chemistry	IV.D1-20	3.1.1-73	C
Steam Generators (Tubesheet)	Pressure Boundary	Carbon or Low Alloy Steel with Nickel Alloy Cladding	Reactor Coolant (External)	Loss of Material/Pitting and Crevice Corrosion	Water Chemistry	IV.C2-15	3.1.1-83	C
Steam Generators (Tubesheet)	Pressure Boundary	Low Alloy Steel	Treated Water (External)	Loss of Material/General, Pitting and Crevice Corrosion	Steam Generator Tube Integrity	IV.D1-12	3.1.1-16	E, 4 3
Steam Generators (Tubesheet)	Pressure Boundary	Low Alloy Steel	Treated Water (External)	Loss of Material/General, Pitting and Crevice Corrosion	Water Chemistry	IV.D1-12	3.1.1-16	A

Plant Specific Notes:

1. The TLAA designation in the Aging Management Program column indicates fatigue of this component is evaluated in Section 4.3.

2. NUREG-1801 does not have an Aging Management Program for loss of material/pitting and crevice corrosion for nickel alloy in a treated water (secondary feedwater/steam) environment. The Water Chemistry and ~~One-Time Inspection~~ ***Steam Generator Tube Integrity*** programs will be used to manage the aging effects applicable to this component type, material, and environment combination.

3. The Steam Generator Tube Integrity program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

4. This environment is not in NUREG-1801 for this component and material. The nickel alloy material located indoors and subject to an air with borated water leakage environment is not subject to aging effects beyond those experienced in a reactor coolant environment that includes cracking/stress corrosion cracking. These aging effects are already accounted for and are managed by the Nickel Alloy Aging Management Program that inspects the external surfaces of the nickel alloy materials.

5. The aging effect/mechanism of loss of material due to pitting and crevice corrosion is not in NUREG-1801 for this component, material, and environment, however, it is applicable to this combination. The Water Chemistry and Steam Generator Tube Integrity programs are used to manage the aging effects for this component, material, and environment combination.

6. The aging effect/mechanism of reduction of heat transfer due to fouling is not in NUREG-1801 for this component, material, and environment, however, it is applicable to this combination. The Water Chemistry program and Steam Generator Tube Integrity program are used to manage the aging effects for this component, material, and environment combination.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-16	Steel steam generator upper and lower shell and transition cone exposed to secondary feedwater and steam	Loss of material due to general, pitting and crevice corrosion	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry and, for Westinghouse Model 44 and 51 S/G, if general and pitting corrosion of the shell is known to exist, additional inspection procedures are to be developed.	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.2.1.1, will be used to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage the loss of material due to general, pitting and crevice corrosion in the steel steam generator components (***inspection ports/handholes and covers,*** secondary manways and covers, ~~tubesheets,~~ upper head, upper shell, conical shell, lower shell), piping components and connections, and main feedwater and main steam nozzles exposed to steam and treated water in the Steam Generators. Components in the Steam Generators system have been aligned to this item number based on material, environment and aging effect. The Steam Generator Tube Integrity program, B.2.1.10, will be substituted to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage the loss of material due to general, pitting and crevice corrosion in the steel steam generator feedwater ring and supports, ***tubesheets****, and secondary internals* exposed to treated water for this system. See subsection 3.1.2.2.2.2.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-74	Chrome plated steel, stainless steel, nickel alloy steam generator anti-vibration bars exposed to secondary feedwater/ steam	Cracking due to stress corrosion cracking, loss of material due to crevice corrosion and fretting	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801. The Steam Generator Tube Integrity program, B.2.1.10, and the Water Chemistry program, B.2.1.2, will be used to manage cracking due to stress corrosion cracking and loss of material due to crevice corrosion and fretting of the carbon steel (Unit 1 Tube Bundle Tie Rod Assemblies and Anti-Vibration Bars only), nickel alloy and stainless steel tube bundle tie rod assemblies, anti-vibration bars, ***Unit 1 spray nozzles,*** tubes, tube support plates, and tube plugs exposed to treated water > ***140°F*** in the Steam Generators.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-84	Nickel alloy steam generator components such as, secondary side nozzles (vent, drain, and instrumentation) exposed to secondary feedwater/ steam	Cracking due to stress corrosion cracking	Water Chemistry and One-Time Inspection or ASME Inservice Inspection (IWB, IWC, and IWD).	No	~~Consistent with NUREG-1801. The Water Chemistry program, B.2.1.2 and One-Time Inspection program, B.2.1.20, will be used to manage cracking due to stress corrosion cracking for the Salem Unit 1 nickel alloy steam generator components (i.e., the spray nozzles) exposed to secondary feedwater/ steam.~~ ***Not Applicable. The Salem Steam Generators do not have attached nozzles constructed of nickel alloy exposed to secondary feedwater/ steam. The Unit 1 Steam Generators nickel alloy internal nozzles (spray nozzles) are considered Steam Generator internal components and are evaluated under Item Number 3.1.1-74.***

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-14	Stainless steel piping, piping components, and piping elements, tanks, and heat exchanger components exposed to treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. The One-Time Inspection program, B.2.1.20, will be used to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage cracking due to stress corrosion cracking in stainless steel piping, piping components, piping elements, heat exchanger components, ~~steam generator components,~~ and tanks exposed to treated water. ***Components in the Steam Generators system have been aligned to this item number based on material, environment, and aging effect. The Steam Generator Tube Integrity program, B.2.1.10, will be substituted to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage cracking due to stress corrosion cracking in the stainless steel Unit 2 steam generator feedwater ring, Unit 2 spray nozzles, and the Unit 2 inspection port diaphragms exposed to treated water >140°F for this system.*** See Subsection 3.4.2.2.6.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-16	Stainless steel piping, piping components, and piping elements; tanks, and heat exchanger components exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. The One-Time Inspection program, B.2.1.20, will be used to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage the loss of material due to ~~stress corrosion cracking~~ ***pitting and crevice corrosion*** in stainless steel piping, piping components, piping elements, heat exchanger components, ~~steam generator components,~~ and tanks exposed to treated water. ***Components in the Steam Generators system have been aligned to this item number based on material, environment, and aging effect. The Steam Generator Tube Integrity program, B.2.1.10, will be substituted to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage the loss of material due to pitting and crevice corrosion in the stainless steel Unit 2 steam generator feedwater ring , Unit 2 spray nozzles, Unit 2 inspection port diaphragms, secondary internals, and tube support plates exposed to treated water for this system.*** See Subsection 3.4.2.2.7.1.

Due to the change to LRA Table 3.1.1, Item No. 3.1.1-16, LRA Section 3.1.2.2.2.2 is revised as follows.

3.1.2.2.2 <u>Loss of Material due to General, Pitting, and Crevice Corrosion</u>

2. *Loss of material due to general, pitting, and crevice corrosion could occur in the steel PWR steam generator upper and lower shell and transition cone exposed to secondary feedwater and steam. The existing program relies on control of chemistry to mitigate corrosion and In-service Inspection (ISI) to detect loss of material. The extent and schedule of the existing steam generator inspections are designed to ensure that flaws cannot attain a depth sufficient to threaten the integrity of the welds. However, according to NRC Information Notice (IN) 90-04, the program may not be sufficient to detect pitting and crevice corrosion, if general and pitting corrosion of the shell is known to exist. The GALL Report recommends augmented inspection to manage this aging effect. Furthermore, the GALL Report clarifies that this issue is limited to Westinghouse Model 44 and 51 Steam Generators where a high stress region exists at the shell to transition cone weld. Acceptance criteria are described in Branch Technical Position RLSB-1.*

   Salem will implement an ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.2.1.1, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage the loss of material due to general, pitting and crevice corrosion in steel steam generator components (***inspection ports/handholes and covers,*** secondary manways and covers, ~~tubesheets,~~ upper head, upper shell, conical shell, lower shell), piping components and connections, and main feedwater and main steam nozzles exposed to steam and treated water in the Steam Generators. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD and Water Chemistry programs are described in Appendix B.

   Salem will implement a Steam Generator Tube Integrity program, B.2.1.10, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage the loss of material due to general, pitting and crevice corrosion in the steel steam generator feedwater ring and supports, ~~and~~ *secondary internals*, ***and tubesheets***) exposed to treated water in the Steam Generators. The Steam Generator Tube Integrity and Water Chemistry programs are described in Appendix B.

Due to the change to LRA Table 3.4.1, Item No. 3.4.1-14, LRA Section 3.4.2.2.6 is revised as follows.

3.4.2.2.6 Cracking due to Stress Corrosion Cracking (SCC)

Cracking due to SCC could occur in the stainless steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to treated water greater than 60°C (>140°F), and for stainless steel piping, piping components, and piping elements exposed to steam. The existing aging management program relies on monitoring and control of water chemistry to manage the effects of cracking due to SCC. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause SCC. Therefore, the GALL Report recommends that the effectiveness of the water chemistry control program should be verified to ensure that SCC is not occurring. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that SCC is not occurring and that the component's intended function will be maintained during the period of extended operation.

Salem will implement a One-Time Inspection program, B.2.1.20, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage cracking due to stress corrosion cracking in stainless steel piping, piping components, piping elements, heat exchanger components, steam generator components and tanks exposed to treated water > 60 deg C (>140 °F) in the Auxiliary Feedwater System, Demineralized Water System, Main Condensate and Feedwater System, Main Steam System, ***and*** Sampling System~~, and Steam Generators~~. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

Salem will implement a Steam Generator Tube Integrity program, B.2.1.10, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage cracking due to stress corrosion cracking in stainless steel components (Unit 2 steam generator feedwater ring, Unit 2 spray nozzles, and the Unit 2 inspection port diaphragms) exposed to treated water >140°F in the Steam Generators. The Steam Generator Tube Integrity program is described in Appendix B.

Due to the change to LRA Table 3.4.1, Item No. 3.4.1-16, LRA Section 3.4.2.2.7.1 is revised as follows.

3.4.2.2.7 Loss of Material due to Pitting and Crevice Corrosion

1. *Loss of material due to pitting and crevice corrosion could occur for stainless steel, aluminum, and copper alloy piping, piping components and piping elements and for stainless steel tanks and heat exchanger components exposed to treated water. The existing aging management program relies on monitoring and control of water chemistry to manage the effects of loss of material due to pitting, and crevice corrosion. However, control of water chemistry does not preclude corrosion at locations of stagnant flow conditions. Therefore, the GALL Report recommends that the effectiveness of the water chemistry program should be verified to ensure that corrosion is not occurring. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.*

   Salem will implement a One-Time Inspection program, B.2.1.20, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage the loss of material due to pitting and crevice corrosion in aluminum, copper alloy and stainless steel piping, piping components and piping element, tanks and heat exchanger components exposed to treated water in the Auxiliary Feedwater System, Chemical and Volume Control System, Component Cooling System, Demineralized Water System, Main Condensate and Feedwater System, Main Condenser and Air Removal System, Main Steam System, Reactor Coolant System, ***and*** Sampling System~~ and Steam Generators~~. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

   Salem will implement a Steam Generator Tube Integrity program, B.2.1.10, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.2.1.2, to manage the loss of material due to pitting and crevice corrosion in stainless steel components (Unit 2 feedwater ring, Unit 2 spray nozzles, Unit 2 inspection port diaphragms, tube support plates, and secondary internals) exposed to treated water in the Steam Generators. The Steam Generator Tube Integrity program is described in Appendix B.

The above changes to the LRA Table 3.1.2-4 are incorporated into LRA Table 2.3.1-4 as follows.

Table 2.3.1-4 **Steam Generators**

Subject to Aging Management Review

Component Type	Intended Function
Spray Nozzles ***(Unit 1)***	Direct Flow
Spray Nozzles (Unit 2)	Direct Flow
Steam Generators (Feedwater Ring – ***Unit 1*** ~~and Support~~)	Direct Flow
Steam Generators (Feedwater Ring – Unit 2)	***Direct Flow***
Steam Generators (Feedwater Ring ~~and~~ Support)	Structural Support
Steam Generators (Inspection Ports ~~and Diaphragm~~, Handholes and Covers)	Pressure Boundary
Steam Generators (Inspection ~~Ports and~~ Diaphragm – ***Unit 2 only***~~, Handholes and Covers~~)	Pressure Boundary