



Public Service
Electric and Gas
Company

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United States Nuclear Regulatory Commission
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**REQUEST FOR LICENSE AMENDMENT
STEAM GENERATOR SURVEILLANCE INTERVAL
SALEM GENERATING STATION UNIT 2
FACILITY OPERATING LICENSE NOS. DPR-75
DOCKET NO. 50-311**

Gentlemen:

In accordance with the requirements of 10CFR50.90, Public Service Electric and Gas Company (PSE&G) hereby requests a revision to the Technical Specifications (TS) for Salem Generating Station Unit 2. As required by 10CFR50.91(b)(1), a copy of this submittal has been sent to the State of New Jersey.

The requested amendment to TS 3/4.4.6, STEAM GENERATORS, makes a one time change to the Unit 2 Steam Generator inspection schedule to require the next inspection within 24 months of Mode 2 for Unit 2 fuel cycle 10. This amendment does not change the bases for the TS. The proposed change will also eliminate description of an alternate sampling plan that was applicable only to Unit 2's fourth refueling outage. //

PSE&G has evaluated this change per 10CFR50.91(a)(1), using 10CFR50.92(c) criteria, and concluded that this request involves no significant hazards. Add

The basis for the requested change is provided in Attachment 1. The 10CFR50.92 analysis supporting the no significant hazards determination is provided in Attachment 2. The marked-up Technical Specification pages affected by the proposal are provided in Attachment 3.

Approval of this request is needed by March 1, 1998, in order to allow time to schedule a steam generator inspection outage for May 1998, should the request be denied.

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Upon NRC approval of this proposed revision, PSE&G requests that the amendment be made effective upon issuance, allowing a period of sixty days for implementation to provide sufficient time for associated administrative activities.

Should you have any questions regarding this request, we will be pleased to discuss them with you.

Sincerely,



Affidavit
Attachments (3)



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Attachment 1

SALEM GENERATING STATION UNIT 2
FACILITY OPERATING LICENSE NO. DPR-75
DOCKET NO. 50-311
CHANGE TO TECHNICAL SPECIFICATIONS (TS)
STEAM GENERATOR SURVEILLANCE INTERVAL

BASIS FOR REQUESTED CHANGE

BACKGROUND

Salem Unit 2 was removed from service in June of 1995. In May of 1996, a comprehensive inspection of the Salem Unit 2 steam generators was completed using advanced methods and equipment. After the May 1996 inspection, Unit 2 steam generators were placed in lay-up. The lay-up program was designed, using EPRI Guidelines, to protect the steam generators from deterioration. PSE&G has a high level of confidence that corrosion growth and new corrosion initiation during the time of lay-up were essentially halted, and the condition of the steam generators has not changed substantially since the May 1996 inspection.

Permission to restart Unit 2 was given by the NRC in June of 1997, and Mode 2 was first achieved on August 17, 1997. Based on previous inspection results and requirements of TS 3/4.4.6 for Unit 2, the next steam generator inspection would normally be scheduled to be performed within 24 months of May of 1996, or by May of 1998. Since the current Unit 2 fuel cycle 10 is expected to be 18 months, and since it commenced on or about August 17, 1997, adherence to the current inspection schedule would require a mid-cycle forced outage solely for that purpose. PSE&G believes that, since it can be established that the condition of the steam generators at the time of their return to service was not substantially different than their condition immediately after the latest inspection, extending the Unit 2 steam generator inspection interval to coincide with the upcoming Unit 2 fuel cycle 10 is reasonable, prudent, and consistent with protection of public health and safety.

REQUESTED CHANGE AND PURPOSE

This amendment modifies Technical Specification (TS)3/4.4.6, STEAM GENERATORS, on a one-time basis, for Salem Unit 2.

The proposed amendment will modify the TS such that the next steam generator inspection will be required within 24 months of Mode 2 for Unit 2 fuel cycle 10. Subsequent steam generator inspections will be scheduled accordingly, and in consideration of existing requirements of TS 3/4.4.6.

The purpose of this change is to compensate for the extended duration of the recent Salem Unit 2 outage by extending the steam generator inspection interval to coincide with Unit 2 fuel cycle 10, and to avoid the undesirable effects of an unnecessary mid-cycle steam generator inspection forced outage. This is accomplished through a one time amendment to TS 3/4.4.6.

JUSTIFICATION FOR REQUESTED CHANGES

BASES

According to TS 3/4.4.6, results of previous inspections, and because the last Unit 2 steam generator inspection was completed in May of 1996, the next Unit 2 inspection would normally be scheduled by May of 1998. If this requirement is maintained, a mid-cycle forced outage will be required, which will incur undesirable effects, including increased thermal cycles for the reactor vessel and other equipment, an increased probability of challenges to engineered safety features, unnecessary radiation exposure, and use of finite resources that would otherwise be allocated to activities more likely to contribute to operating safety.

TS 3/4.4.6 supports the Design Basis Accident (DBA) analysis discussed in Salem Unit 2 UFSAR, Chapter 15.4.4, Steam Generator Tube Rupture. The purpose of the surveillance is to provide reasonable assurance of equipment integrity as necessary to operate without experiencing tube rupture or tube leakage in excess of specified limits, by identifying and removing from service defective steam generator tubes.

During the time that Unit 2 was removed from service, a comprehensive steam generator inspection was performed, using advanced methods and equipment. This inspection was sufficiently thorough to assess the overall condition of the Unit 2 steam generators. After this inspection, the steam generators were placed in lay-up according to methods prescribed for that purpose in EPRI Guidelines. Since the steam generators were maintained in low temperature, corrosion prevention lay-up conditions, in compliance with EPRI Guidelines, the environment for corrosion was reduced to an inconsequential level. As a result, PSE&G has a high level of confidence that corrosion growth and new corrosion initiation during the time of lay-up was essentially halted, and the steam generators are prepared to

operate for a full fuel cycle without incident. In support of this conclusion, consider the following:

- TUBE INSPECTION - The 1996 Eddy Current Inspection was one of the most extensive in the industry, and was documented in the Annual Report, LR-N97105, issued February 28, 1997, to the NRC. A bobbin coil examination was performed on 100% of the in-service tubes in each steam generator. Motorized Rotating Pancake Coils (MRPC) plus point probes were used to examine all hot leg tube sheet transitions and all hot leg tube support plate intersections. This examination was expanded to include all cold leg tube sheet transitions and tube support locations in steam generator 22 only. Special interest MRPC examinations were performed on tube locations with a bobbin percent through-wall indication of 40% or greater, or with I-code indications. Single coil Zetec Plus-Point probes were used for row 2 U-bends. All examination techniques are qualified under Appendix H of EPRI document NP-6201, "PWR Steam Generator Examination Guidelines". All tubes with crack-like indications and tubes with degradation predicted to grow to unacceptable depths during the next cycle were plugged. This extensive level of inspection and conservative repair process provides a high level of assurance that the steam generators are prepared to operate a full cycle.
- REG. GUIDE 1.121 ASSESSMENT - In letter LR-N96220, issued August 19, 1996, PSE&G submitted document "Reg Guide 1.121 Assessment of Indications at Salem Unit 2" to the NRC. The document evaluated the structural and leakage integrity of the Unit 2 steam generator tubing over the next cycle of operation. The report concluded a full cycle of operation of Salem Unit 2 steam generators was justified. Per letter dated October 30, 1996, from USNRC to Leon Eliason titled, "Combined Inspection Report Nos. 50-272/96-10 and 50-311/96-10," the NRC staff found a full cycle of operation for Salem 2 justified and was supported by PSE&G's analysis.
- REDUCED TEMPERATURE - Intergranular attack/stress corrosion cracking (IGA/SCC) growth is well understood to be accelerated by increasing temperature, and reducing temperature is a proven method to slow both initiation and growth. The effect of reduced temperature can be estimated using the Arrhenius equation and assuming an average value of activation energy of 57 kcal/mole. This results in decrease by a factor of two in

corrosion rate for each 18°F temperature reduction. Since the steam generators were maintained in wet lay-up at approximately 80°F, instead of the normal operational hot leg temperature of 602°F, the corrosion rate during the lay-up period can be considered to have been essentially halted.

- WATER CHEMISTRY - The industry guide to water chemistry control is the EPRI Primary and Secondary Chemistry Guidelines. During wet lay-up, average measured water chemistry values for pH, hydrazine, sodium, chloride, sulfate, and oxygen were well within Secondary Guideline values. Water chemistry for the Unit 2 steam generators during this time was maintained in compliance with EPRI Guidelines for both primary and secondary sides. This careful control of impurities provides a considerable measure of added confidence that there was no significant change in the condition of the steam generator tubes during lay-up.

Salem employs radiation monitors in the condenser air ejector, in the steam generator blow down line, in the condensate polishing filter and in the main steam line. Main Steam line N-16 monitors have also been installed to enhance monitoring of main steam line activity. Furthermore, TS 3/4.4.7 limits primary to secondary leakage to 500 gpd total for all steam generators, but PSE&G maintains an administrative limit of 140 gpd and a rate of change limit of 60 gpd/hr. which conform with EPRI Primary to Secondary Leakage Guidelines. This provides assurance that, should a leak develop during the operating cycle, it would be quickly detected to allow immediate mitigating actions to be taken.

Activities associated with a steam generator inspection for Salem Unit 2 typically incur a radiation exposure of approximately 14 REM per inspection. Performing a Salem Unit 2 mid-cycle steam generator inspection solely to conform to the letter of the TS, without any corresponding safety benefit, is inconsistent with the principles of As Low As Reasonably Achievable (ALARA).

Finally, NRC Restart Plan Technical Item II.41, "Verify Adequate Corrective Action to Ensure Steam Generator Integrity", was closed in Inspection Report 97-05, dated 6/3/97. It said in part, "The Inspection Report [50-311/96-10] concluded that the licensee had taken sufficient actions to ensure the integrity of the Unit 2 steam generator tubes, and that this item, which is Item II.41 of the NRC Restart Plan for Salem, remains open

pending review and approval for closure by the Salem Assessment Panel (SAP) ”.

The SAP reviewed this item at its January 13, 1997, meeting (Meeting #97-01). As reflected in the minutes dated February 10, 1997, the SAP concluded that “a full cycle of operation of the Unit 2 steam generators is justified. Thus, NRC Restart Plan Item II.41 is closed for Unit 2.” This indicates that operating for a full fuel cycle without further steam generator inspection, as requested in this amendment, has been conceptually reviewed and approved by the NRC as part of its Salem Restart Plan.

CONCLUSION

In conclusion, the extensive inspection completed in May of 1996, together with the carefully controlled lay-up program in place since that inspection, work together to ensure that the Salem Unit 2 steam generators are in a condition that can be reasonably expected to safely and reliably support full power operation for the entire fuel cycle. However, should an unforeseen circumstance cause leakage which exceeds guidelines, a number of systems are available for timely detection and mitigation. Thus, there is no adverse consequence to public health and safety that might result from granting this request for TS amendment.

Attachment 2

**SALEM GENERATING STATION UNIT 2
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CHANGE TO TECHNICAL SPECIFICATIONS (TS)
STEAM GENERATOR SURVEILLANCE INTERVAL**

10CFR50.92 NO SIGNIFICANT HAZARDS EVALUATION

Public Service Electric & Gas (PSE&G) has concluded that the proposed amendment to the Salem Generating Station Unit 2 TS does not involve a significant hazard. In support of this determination, an evaluation of each of the three standards set forth in 10CFR50.92 is provided below.

REQUESTED CHANGE

This change is for an amendment to TS 3/4.4.6, STEAM GENERATOR, to compensate for the unusual duration of the recent Salem Unit 2 outage by extending the steam generator inspection interval on a one-time basis to coincide with the current Unit 2 fuel cycle 10, and to avoid the undesirable effects of a mid-cycle steam generator inspection forced outage. Without this amendment, the next Unit 2 steam generator inspection would be required to be performed by mid-May of 1998, approximately nine months after the beginning of the fuel cycle. With this amendment, the next, and subsequent steam generator inspections for Salem Unit 2 will coincide with their respective fuel cycles.

Specifically the change adds wording in surveillance requirement 4.4.6.3.a stating that the inspection interval for fuel cycle 10 begins at criticality. Additional information on the cycle 10 inspection frequency is provided after Table 4.4-2 (on page 3/4 4-15a). This information replaces the description of an alternate sampling plan applicable only to Unit 2's fourth refueling outage.

BASIS

1. *The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.*

The Design Basis Accident (DBA) analyzed in UFSAR Chapter 15.4.4, is Steam Generator Tube Rupture. The Technical Specification steam generator tube inspection attempts to avoid this DBA by maintenance of the integrity of the primary to secondary coolant

boundary represented by steam generator tubes. The process by which this integrity is maintained is inspection of steam generator tubes at prescribed intervals, and the removal of defective tubes from service. Inspection intervals are based on preventing corrosion growth from exceeding tube structural strength, thereby preventing tube failure. An extensive steam generator inspection in May of 1996 characterized existing steam generator tube degradation, and degraded tubes were removed from service at that time. Degradation growth rates were evaluated for the next operating interval and it was determined that full cycle operation would not challenge tube structural integrity. Because degraded tubes were plugged, the integrity of the steam generators has been restored, and, because further degradation was prevented by a strictly controlled wet lay-up program in place since the inspection, steam generator integrity has since been maintained at the May 1996 level. This is the level normally expected for commencement of full power operations at the beginning of a fuel cycle. Thus, it can be reasonably concluded that this request to extend the inspection interval to conclude 24 months after the start of Unit 2 fuel cycle 10 does not involve an increase in the probability of an accident previously analyzed.

Salem UFSAR Chapter 15, Section 15.4.4., discusses the Design Basis Accident involving steam generator tube rupture. Since the Salem Unit 2 steam generators were extensively inspected and all degraded tubes were removed from service by plugging, integrity of the generators was restored to fully serviceable condition at that time. Degradation of steam generator tubes has been prevented since the inspection by a carefully controlled, EPRI Guidelines based, corrosion prevention program. It follows, then, that the Unit 2 steam generators were in the same condition immediately prior to fill and vent as if the inspection had just been concluded. This is the condition assumed for commencement of normal operation. Thus, it is reasonable to conclude that this proposal to extend the current steam generator inspection interval to end 24 months after start of Unit 2 fuel cycle 10 represents no significant increase in the consequences of an accident previously analyzed.

- 2. The proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.***

Steam generator tube inspections determine tube integrity and provide reasonable assurance that a tube rupture or primary to secondary leak will not occur. Accidents involving steam generator tube rupture are analyzed in Salem UFSAR Section 15.4.4, Steam Generator Tube Rupture. The only type of accident that can be postulated from extending the steam generator inspection interval would be a tube leak or rupture. Thus, it can be concluded that extending the steam generator inspection interval on a one-time basis cannot create the possibility of a different kind of accident from any accident previously evaluated.

3. *The proposed change does not involve a significant reduction in a margin of safety.*

The margin of safety, as with any TS, depends upon maintenance of specific operating parameters within design limits. In the case of steam generators, that margin is maintained through assurance of tube integrity as the primary to secondary boundary. Assurance of tube integrity is provided through periodic in-service testing of tube integrity and removal from service of defective tubes. Additional margin is provided through protection from possible consequences of steam generator tube failure by detection and mitigation systems. As discussed in 1., above, there was an extensive steam generator inspection, and the steam generators have been maintained since the inspection, using a lay-up program that complies with EPRI Guidelines, to prevent further tube degradation. Also, N-16 monitors were added, enhancing detection capabilities. The margin as established by the latest inspection has been maintained by the corrosion control program of EPRI Primary and Secondary Guidelines based wet lay-up conditions. Thus, it can be reasonably concluded that this proposal to amend the Salem Unit 2 Technical Specifications, on a one-time basis, to extend the steam generator inspection interval to end 24 months after start of Unit 2 fuel cycle 10 does not involve a significant reduction in a margin of safety.

CONCLUSION

The Salem Unit 2 steam generators have been inspected to applicable standards, defective tubes removed from service, and have been maintained since that inspection in a condition designed to prevent further degradation of the tubes. Given these considerations, it follows that the steam generators were

in the same condition at the time of removal from lay-up as they were when just inspected. This fulfills conditions, with respect to steam generator operability, normally existing for commencement of full power operations, and does not create any new considerations. It can then be concluded that the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated. Nor does it create the possibility of a new or different kind of accident from any accident previously evaluated, nor does it involve a significant reduction in a margin of safety. Thus the proposal to begin the steam generator inspection interval for Unit 2 Cycle 10 at criticality does not create any significant hazards to safe operation.