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U S Nuclear Regulatory Commission
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REQUEST FOR AMENDMENT TO TECHNICAL SPECIFICATIONS
MAXIMUM ALLOWABLE POWER
WITH INOPERABLE STEAM LINE SAFETY VALVES
SALEM NUCLEAR GENERATING STATION UNIT 2
FACILITY OPERATING LICENSE DPR-75
DOCKET NO. 50-311

Pursuant to 10 CFR 50.90, PSEG Nuclear LLC (PSEG) hereby requests revision to the Technical Specifications (TS) for the Salem Nuclear Generating Station Unit 2. The proposed amendment would reduce the maximum allowable reactor power level with two inoperable Main Steam Safety Valves (MSSVs). The proposed change is consistent with safety analyses performed to support the Salem Unit 2 Steam Generator Replacement Project.

PSEG has evaluated the proposed changes in accordance with 10CFR50.91(a)(1), using the criteria in 10CFR50.92(c), and has determined this request involves no significant hazards considerations. An evaluation of the requested changes is provided in Attachment 1. The marked up TS affected by the proposed change is provided in Attachment 2. Changes to the TS Bases are provided in Attachment 3. In accordance with 10CFR50.91(b)(1), a copy of this submittal is being sent to the State of New Jersey.

PSEG requests approval of this amendment request by March 31, 2007, with amendment implementation prior to restart from the steam generator replacement outage planned for the Spring, 2008 refueling outage.

Should you have any questions regarding this request, please contact Mr. Steve Mannon at 856-339-1129.

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

Sincerely,

Executed on 4/6/06

Thomas P. Joyce
Site Vice President
Salem Station Units 1 and 2

Attachments (3)

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SALEM GENERATING STATION – UNIT 2
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CHANGES TO TECHNICAL SPECIFICATIONS

1.0 DESCRIPTION

This proposed amendment to Salem Unit 2 Operating License DPR-75 would revise Salem Unit 2 Technical Specification (TS) Table 3.7-1, "Maximum Allowable Power with Inoperable Steam Line Safety Valves," to reduce the allowable reactor power level from 59% to 58% of Rated Thermal Power (RTP) when a maximum of two Main Steam Safety Valves (MSSVs) are inoperable in any steam generator. This request supports the replacement of the Westinghouse Series 51 original steam generators (OSGs) with the AREVA-Framatome 61/19T replacement steam generators (RSGs). Analyses of postulated loss of load/turbine trip (LOL/TT) events with the RSGs show that current licensing basis acceptance criteria, including maximum secondary side pressure of 110% of design pressure, are met if plant operation is consistent with the proposed change. Steam generator replacement is planned for the Salem Unit 2 sixteenth refueling outage (2R16) in Spring of 2008.

2.0 PROPOSED CHANGE

The proposed change to Salem Unit 2 Technical Specification (TS) Table 3.7-1 would reduce the maximum allowable power level with two inoperable Main Steam Safety Valves in any steam generator, from 59% of RATED THERMAL POWER (RTP) to 58% RTP. The marked up Technical Specification page is provided in Attachment 2.

Attachment 3 contains changes to Bases 3/4.7.1 for specific steam flow values (discussed in 4.3 below) and an editorial correction to a table reference (from "Table 3.7-2" to "Table 3.7-1").

3.0 BACKGROUND

Salem Unit 2 is a four-loop Westinghouse pressurized water reactor (PWR) with five main steam safety valves (MSSVs) per steam generator. MSSV lift settings and setpoint tolerances are defined in TS Table 3.7-4, included in Attachment 2 for information. Operability of the MSSVs in accordance with TS 3/4.7.1 ensures that the secondary system pressure will be limited to within 110% of its design pressure of 1100 psia during the most severe anticipated system operational transient. The MSSVs also provide protection against overpressurization of the reactor coolant pressure boundary by providing a heat sink for the removal of energy from the reactor coolant system if the preferred heat sink is not available. A loss of external electrical load and/or turbine trip (LOL/TT) is the limiting anticipated operational occurrence with respect to MSSV capability.

Salem Unit 2 TS 3.7.1.1 requires all main steam line code safety valves (MSSVs) associated with each steam generator (i.e., five per SG) to be operable in plant Modes 1, 2 and 3.

TS Action Statements 3.7.1.1.a and 3.7.1.1.b state:

a. "With one or two main steam line code safety valves inoperable in one or more steam generators, operation in Modes 1, 2 and 3 may proceed provided, that within 4 hours, either the inoperable valve is restored to OPERABLE status or reduce power to less than or equal to the applicable percent of RATED THERMAL POWER per Table 3.7-1; otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With three main steam line code safety valves inoperable in one or more steam generators, operation in Modes 1, 2 and 3 may proceed provided, that within 4 hours, either the inoperable valves are restored to OPERABLE status or reduce power to less than or equal to the applicable percent of RATED THERMAL POWER per Table 3.7-1 and within 36 hours, reduce the Power Range Neutron Flux High trip setpoint to less than or equal to the RATED THERMAL POWER per Table 3.7-1; otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours."

Salem Unit 2 Technical Specification (TS) Table 3.7-1 establishes the following allowable reactor power limits when MSSVs are inoperable:

Maximum Number of Inoperable Safety Valves on Any Operating Steam Generator	Maximum Allowable Power* (Percent of RATED THERMAL POWER)
1	87
2	59
3	39

* The values do not provide any allowance for calorimetric error.

PSEG plans to replace the four Salem Unit 2 original Westinghouse Series 51 steam generators with AREVA/Framatome Model 61/19T steam generators during the sixteenth refueling outage (2R16) in the Spring of 2008. In support of the planned steam generator replacement, Westinghouse reanalyzed the LOL/TT and Rod Withdrawal at Power (RWAP) events using methods consistent with the analyses supporting the current TS as approved in Salem Unit 2 License Amendment No. 225 (Ref 7.1). The results of these analyses show that the acceptance criteria are met assuming operation consistent with the current Technical Specification limits, with the exception of the LOL/TT with two inoperable MSSVs, for which an additional reduction of 1% RTP (from 59% to 58%) is required to maintain peak secondary system pressure below the design limit of 1208.5 psia (110% of design pressure of 1100 psia).

4.0 TECHNICAL ANALYSIS

4.1 Loss of Load/Turbine Trip (UFSAR Section 15.2.7)

Loss of Load/Turbine Trip (LOL/TT) is the loss of steam load during power operation, without a direct reactor trip. It may be initiated by a turbine trip or by loss of external electrical load. The LOL/TT is analyzed to verify that (1) pressure in the reactor coolant system (RCS) and main steam system would remain below 110% of design pressure; (2) minimum departure from nucleate boiling ratio (DNBR) remains above the analysis limit, thereby assuring fuel cladding integrity is maintained; and (3) the pressurizer does not fill (i.e., the LOL/TT event does not result in a more serious plant condition).

For the cases analyzed to demonstrate the adequacy of the pressure relieving devices, the LOL/TT is analyzed using the Standard Thermal Design Procedure. For these cases, initial core power, reactor coolant temperature, and reactor coolant pressure are assumed at their maximum values consistent with steady-state full power operation including allowances for calibration and instrument errors. This results in the maximum power difference for the load loss.

The proposed reduction in allowable reactor power level is necessary to meet the secondary system pressure limit of 110% of design pressure during a Loss of Load/Turbine Trip (LOL/TT) event with a maximum of two Main Steam Safety Valves (MSSVs) inoperable on any steam generator, following replacement of the Westinghouse Series 51 original steam generators (OSGs) with Framatome-ANP Model 61/19T replacement steam generators (RSGs). The need for the proposed 1% reduction in allowable power level is attributed to differences in steam generator geometry and operating conditions. Primary side volume per SG is 1201 ft^3 for the RSGs and 1100 ft^3 for the OSGs. Secondary heat transfer rate (UA) is approximately 92.73 E6 Btu/hr-°F per RSG and 72.62 E6 Btu/hr-°F per OSG. Main Steam pressures for Unit 2 with RSGs are approximately 30 psi higher than Unit 1 Main Steam pressures.[1]

Westinghouse performed LOFTRAN analyses of the LOL/TT, modeling the RSGs and using assumptions consistent with the current licensing basis for operation with inoperable MSSVs as approved in Reference 7.1. Analysis assumptions to maximize calculated secondary system pressure include 0% steam generator tube plugging, availability of Reactor Coolant System (RCS) power operated relief valves (PORVs) and pressurizer sprays, and pressurizer level program consistent with no steam generator fouling. These assumptions tend to maximize primary to

[1] Unit 1 has Westinghouse Model F steam generators and the same Technical Specification Table 3.7-1 limits as Unit 2 with OSGs. Unit 1 steam pressure is approximately 869 psia at the upper Tavg limit (577.9°F), 100% reactor power (3459 MWt) and 0% steam generator tube plugging. Steam pressure for Unit 2 with RSGs is approximately 899 psia under the same NSSS conditions.

secondary heat transfer during the LOL/TT transient and therefore result in a conservative calculation of maximum secondary pressure. The LOL/TT analyses show that with a maximum of two inoperable MSSVs in any steam generator, operation at 58% RTP would result in a maximum secondary pressure of 1205.7 psia, below the acceptance criterion of 1208.5 psia.

4.2 Rod Withdrawal at Power

Rod Withdrawal at Power (RWAP) cases with inoperable MSSV's are also analyzed to verify that sufficient MSSV capacity is available to mitigate the reactivity transient during operation consistent with TS Table 3.7-1. Analysis cases were performed at each of the TS Table 3.7-1 power levels using a range of reactivity insertion rates from 1 pcm/sec to 110 pcm/sec. The upper limit reactivity insertion rate is verified each cycle as part of the core reload evaluation.

The RWAP analyses show the acceptance criteria are met with the current TS limits. The peak calculated secondary pressure for the 59% power case results is 1207.53, below the acceptance criterion of 1208.5 psia. Operation in accordance with the proposed change (58% vs. 59%) is conservative with respect to the analysis.

4.3 Main Steam Safety Valve (MSSV) Capacity

Technical Specification Bases Section 3/4.7.1 provides a comparison of maximum calculated steam flows to MSSV capacity. The total relieving capacity of 16.66 E6 lbm/hr is 110.4% of the calculated maximum flow of 15.08 E6 lbm/hr (current TS Bases value). Calculated steam flow for the RSGs at the upper Tavg limit (577.9°F), 100% reactor power (3459 MWt) and 0% steam generator tube plugging, is 15.12 E6 lbm/hr. Steam flow capacity remains at approximately 110% of the maximum value and is not adversely impacted by the proposed change. Attachment 3 includes the appropriate changes to TS Bases 3/4.7.1.

5.0 REGULATORY SAFETY ANALYSIS

5.1 No Significant Hazards Consideration

PSEG has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below.

The change that is being evaluated below is the reduction in Salem Unit 2 maximum allowable power level with two inoperable Main Steam Safety Valves (MSSVs) on any steam generator, from 59% of Rated Thermal Power (RTP) to 58% RTP, to support steam generator replacement.

1. Do the proposed changes involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed change reduces the power level at which Salem Unit 2 may be operated with a maximum of two inoperable MSSVs in any steam generator. This change is consistent with analyses of the limiting transients for secondary system pressure (loss of load/turbine trip and rod withdrawal at power), performed to demonstrate the acceptance criterion of 110% of design pressure will continue to be met following steam generator replacement. The proposed change does not involve any changes to the MSSV actuation setpoints; they remain well above the Main Steam System operating pressures. The proposed change does not challenge the relief capacity of the MSSVs. Therefore, the probability of an event associated with mis-operation of the MSSVs (e.g., inadvertent depressurization of the Main Steam System) is not impacted by the proposed change. The proposed reduction in allowable power level establishes initial conditions consistent with the safety analyses, and does not affect the probability of any previously evaluated accident.

The proposed change is necessitated by analyses of limiting secondary system pressure transients, whose acceptance criteria continue to be met provided that plant operation is restricted to 58% RTP with a maximum of two inoperable MSSVs in any steam generator. There is no impact on any radiological consequences of an accident associated with the proposed reduction in maximum power level.

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

2. Do the proposed changes create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

Reducing the allowable power level per the proposed change does not introduce any new accident scenarios or malfunctions. The proposed change establishes an operating restriction consistent with current safety analysis methodology. It represents a change to an input assumption used in analyses of limiting secondary pressurization transients to ensure plant operation does not challenge any design limits.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No

Acceptable margins of safety are inherent in the safety analysis acceptance criteria, including the limit on secondary system pressure to 110% of design pressure during a loss of load/turbine trip (LOL/TT) or rod withdrawal at power (RWAP) transient. The purpose of the proposed change is to limit operation with a maximum of two inoperable MSSVs for any steam generator, such that the acceptance criterion for secondary pressure continues to be met. The proposed change does not modify any acceptance criteria, nor would it cause any design limit to be exceeded.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, PSEG concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c) and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

10CFR50.36(c)(2)(ii)(B) requires Technical Specification (TS) Limiting Conditions for Operation (LCO's) be established for "A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier."

Salem Unit 2 Technical Specification 3/4.7.1 includes restrictions on plant operation if Main Steam Safety Valves (MSSVs) are inoperable, to provide assurance that the secondary pressure limit of 110% of design presssure is met, in accordance with the requirements of the American Society of Mechanical Engineers (ASME) Code.

Consistent with the above requirements, the proposed change to reduce the maximum power level from 59% of Rated Thermal Power (RTP) to 58% RTP with a maximum of two inoperable MSSVs in any steam generator, establishes an operating restriction used as an initial condition of transient analyses performed in support of Salem Unit 2 steam generator replacement.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. PSEG has determined that the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22 (b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

7.1 NRC letter to PSEG dated September 19, 2001, "Salem Nuclear Generating Station, Unit Nos. 1 and 2, Issuance of Amendment Re: Reactor Coolant System Safety Valves and Plant Systems, Main Steam Safety Valves (TAC NOS. MB0087 and MB0088)."

TECHNICAL SPECIFICATION PAGES WITH PROPOSED CHANGES

The following Technical Specification for Facility Operating License DPR-75 is affected by this change request:

Salem Unit 2

Technical Specification	Page
Table 3.7-1	3/4.7-2

NO CHANGES TO THIS PAGE - INFO ONLY

3/4.7 PLANT SYSTEMS

3/4.7.1 TURBINE CYCLE

SAFETY VALVES

LIMITING CONDITION FOR OPERATION

3.7.1.1 All main steam line code safety valves (MSSVs) associated with each steam generator shall be OPERABLE with lift settings as specified in Table 3.7-4.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

a. With one or two main steam line code safety valves inoperable in one or more steam generators, operation in Modes 1, 2 and 3 may proceed provided, that within 4 hours, either the inoperable valve is restored to OPERABLE status or reduce power to less than or equal to the applicable percent of RATED THERMAL POWER per Table 3.7-1; otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With three main steam line code safety valves inoperable in one or more steam generators, operation in Modes 1, 2 and 3 may proceed provided, that within 4 hours, either the inoperable valves are restored to OPERABLE status or reduce power to less than or equal to the applicable percent of RATED THERMAL POWER per Table 3.7-1 and within 36 hours, reduce the Power Range Neutron Flux High trip setpoint to less than or equal to the RATED THERMAL POWER per Table 3.7-1; otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.1.1 Verify each required MSSV lift setpoint per Table 3.7-4. No additional Surveillance Requirements other than those required by Specification 4.0.5.

TABLE 3.7-1

MAXIMUM ALLOWABLE POWER WITH INOPERABLE
STEAM LINE SAFETY VALVES

Maximum Number of Inoperable Safety Valves on Any Operating Steam Generator	Maximum Allowable Power* (Percent of RATED THERMAL POWER)
1	87
2	~~59~~58
3	39

* The values do not provide any allowance for calorimetric error.

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TABLE 3.7-4

STEAM LINE SAFETY VALVES PER LOOP

VALVE NUMBER					LIFT SETTING (± 3%)*	ORIFICE SIZE (sq. inches)
	Loop A	Loop B	Loop C	Loop D		
a.	21MS11	22MS11	23MS11	24MS11	1125 psig	16.0
b.	21MS12	22MS12	23MS12	24MS12	1120 psig	16.0
c.	21MS13	22MS13	23MS13	24MS13	1110 psig	16.0
d.	21MS14	22MS14	23MS14	24MS14	1100 psig	16.0
e.	21MS15	22MS15	23MS15	24MS15	1070 psig	16.0

* Following testing the lift setting shall be reset to within ± 1%.

3/4.7.1 TURBINE CYCLE

3/4.7.1.1 SAFETY VALVES

The OPERABILITY of the main steam line code safety valves ensures that the secondary system pressure will be limited to within 110% of its design pressure of 1085 psig during the most severe anticipated system operational transient. The MSSVs also provide protection against overpressurization of the Reactor Coolant Pressure Boundary by providing a heat sink for the removal of energy from the Reactor Coolant System if the preferred heat sink is not available. The maximum relieving capacity is associated with a turbine trip from 100% RATED THERMAL POWER coincident with an assumed loss of condenser heat sink (i.e., no steam bypass to the condenser).

The specified valve lift settings and relieving capacities are in accordance with the requirements of Section III of the ASME Boiler and Pressure Code, 1971 Edition. The total relieving capacity for all valves on all of the steam lines is 16.66 x 10^6 lbs/hr which is approximately 110.4% of the maximum calculated steam flow of ~~15.08~~15.12 x 10^6 lbs/hr at 100% RATED THERMAL POWER. A minimum of 2 OPERABLE safety valves per OPERABLE steam generator ensures that sufficient relieving capacity is available for the allowable THERMAL POWER restriction in Table ~~3.7-2~~3.7-1.

STARTUP and/or POWER OPERATION is allowable with inoperable safety valves within the limitations of the ACTION requirements on the basis of the reduction in secondary steam flow associated with the required reduction of RATED THERMAL POWER. The acceptable power level (in percent RATED THERMAL POWER) for operation with inoperable safety valves was determined by performing explicit transient analysis.

The events that challenge the relief capacity of the safety valves are those resulting in decreased heat removal capability. In this category of events, a loss of external electrical load and/or turbine trip is the limiting anticipated operational occurrence. A series of cases was analyzed for this transient covering up to two inoperable safety valves on each steam generator. The results of these cases were used to determine a maximum thermal power level from which the event could be initiated without exceeding the primary and secondary side design pressure limits. Thus, the maximum allowed power level as a function of the number of inoperable MSSVs on any steam generator is presented in Table 3.7-1. Note that the power level values presented on this table are the direct inputs into the transient analysis cases and do not include any allowance for calorimetric error. Actual power level reductions must include calorimetric uncertainty and other allowances for operating margin as deemed necessary.

Specific accident analyses for RCCA Bank Withdrawal at Power scenarios demonstrate that adequate safety valve relief capacity exist with up to two inoperable safety relief valves on each steam generator. These cases demonstrate that the reactor trip on OTDT along with the relief from the available main steam safety valves is sufficient to meet secondary side pressurization limits.

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For three inoperable main steam safety valves in one or more steam generators, thermal reactor power must be reduced in conjunction with a reduction in the Power Range Neutron Flux High trip setpoint to prevent overpressurization of the main steam system.

The transient analysis assumes that the MSSVs will start to open at the lift setpoint with 3% allowance for setpoint tolerance. In addition, the analysis accounts for accumulation by including a 5 psi ramp for the valve to reach its fully open position. Inoperable MSSVs are assumed to be those with the lowest lift setting. Surveillance testing as covered in Table 3.7-4 allows a ± 3% lift setpoint tolerance. However, to allow for drift during subsequent operation, the valves must be reset to within ± 1% of the lift setpoint following testing.

3/4.7.1.2 AUXILIARY FEEDWATER SYSTEM

The OPERABILITY of the auxiliary feedwater system ensures that the Reactor Coolant System can be cooled down to less than 350 F from normal operating conditions in the event of a total loss of offsite power.

Verifying that each Auxiliary Feedwater (AFW) pump's developed head at the flow test point is greater than or equal to the required minimum developed head ensures that the AFW pump performance has not degraded during the cycle, and that the assumption made in the accident analysis remain valid. Flow and differential head are normal tests of centrifugal pump performance required by Section XI of the ASME Code. Because it is undesirable to introduce cold AFW into the steam generators while operating, the test is performed on recirculation flow. This test confirms one point on the pump design curve (head vs flow curve), and is indicative of pump performance. Inservice testing confirms pump operability, trends performance and detects incipient failures by indication of pump performance.

The flow path to each steam generator is ensured by maintaining all manual maintenance valves locked open. A spool piece consisting of a length of pipe may be used as an equivalent to a locked open manual valve. The manual valves in the flow path are: 2AF1, 21AF3, 22AF3, 23AF3, 21AF10, 22AF10, 23AF10, 24AF10, 21AF20, 22AF20, 23AF20, 24AF20, 21AF22, 22AF22, 23AF22, 24AF22, 21AF86, 22AF86, 23AF86, and 24AF86.

3/4.7.1.3 AUXILIARY FEED STORAGE TANK

The OPERABILITY of the auxiliary feed storage tank with the minimum water volume ensures that sufficient water is available to maintain the RCS at HOT STANDBY conditions for 8 hours with steam discharge to the atmosphere concurrent with total loss of offsite power. The contained water volume limit includes an allowance for water not usable because of tank discharge line location or other physical characteristics.