Public Service
Electric and Gas
Company

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LCR 87-01

50-272

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

REQUEST FOR AMENDMENT
FACILITY OPERATING LICENSE DPR-70 AND DPR-75
SALEM GENERATING STATION - UNIT NOS. 1 AND 2

In accordance with the Atomic Energy Act of 1954, as amended and the regulations thereunder, we hereby transmit copies of our request for amendment and our analyses of the changes to Facility Operating License DPR-70 and DPR-75 for Salem Generating Station, Unit Nos. 1 and 2 respectively.

The amendment consists of increasing the boron concentration limits in the Refueling Water Storage Tanks and Accumulators. These changes are being requested to accommodate the use of high energy, low leakage cores for future Unit 1 and 2 reloads. Also included are several changes to various related specifications which are being made to provide uniformity between Salem Unit 1 and Unit 2 Technical Specifications. Because of the number of plant procedural changes and difficulty involved in adjusting the boron concentration in large volumes of water, it is requested that upon approval, implementation of the requested changes be delayed until the next refueling outage for each unit. Since this change is necessary for startup from the next refueling outage (currently scheduled to begin September 11, 1987), it is also requested that your review be completed by this time.

Enclosed is a check in the amount of $150.00 as required by 10 CFR 170.21.

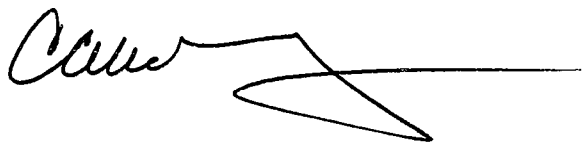
Pursuant to the requirements of 10CFR50.91, a copy of this request for amendment has been sent to the State of New Jersey as indicated below.

This submittal includes three (3) signed originals and forty (40) copies.

A001
1/40
w/check # 10385
$150.00

Should there be any questions regarding this matter, please feel free to contact us.

Sincerely,



Attachment

C Mr. D. C. Fischer
Licensing Project Manager

Mr. T. J. Kenny
Senior Resident Inspector

Ref: LCR 87-01

STATE OF NEW JERSEY)
) SS.
COUNTY OF SALEM)

Corbin A. McNeill, Jr., being duly sworn according to law deposes and says:

I am Vice President of Public Service Electric and Gas Company, and as such, I find the matters set forth in our letter dated Mar. 10, 1987 concerning Facility Operating License DPR-70 and DPR-75 Generating Station, is true to the best of my knowledge, information and belief.

Subscribed and Sworn to before me
this 10th day of March, 1987

Deloris D. Hadden
Notary Public of New Jersey

DELORIS D. HADDEN
A Notary Public of New Jersey
My Commission Expires March 14, 1990

My Commission expires on _____

PROPOSED LICENSE CHANGE
SALEM GENERATING STATION

The following changes are being requested:

- Increase of the required RWST boron concentration range from 2000-2200 ppm to 2300-2500 ppm - Units 1 and 2
- Increase of the required Accumulator boron concentration range from 1900-2200 ppm to 2200-2500 ppm - Units 1 and 2
- Increase Units 1 and 2 RWST MODE 5 and 6 required volume from 9,690 gallons to 12,500 gallons
- Increase Units 1 and 2 maximum expected boration capability requirement from 75,000 gallons to 85,000 gallons (Basis only)
- Change Unit 1 MODE 1 thru 3 accumulator volume range from 6380-6657 to 6223-6500
- Change Unit 1 Boric Acid Tank (BAT) boron concentration range from 20,100-21,800 to 20,000-22,500 ppm Boron
- Change Unit 1 Boron Injection Tank (BIT) Boron concentration range from 20,100-21,800 to 20,000-22,500 ppm Boron
- Change Unit RWST MODE 1 thru 4 required volume range from 364,000-400,000 to 364,500-400,000 gallons
- Changes on LCOs related to heat tracing requirements to make units consistent internally and with the Westinghouse Standard Technical Specifications.

These changes affect Sections 3.1, 3.5 and 3.10 of the Technical Specifications along with associated surveillance requirements and basis and will be discussed further below.

Description of Change

Preliminary Salem Unit 2 Cycle 4 core design calculations indicated core subcriticality could not be ensured based on borated water sources only, following a hypothesized large break LOCA. The key contributing factors that produced this condition was high energy, low leakage core reload design of Salem Unit 2 Cycle 4 and the assumption of no rod insertion on a large break LOCA. Further, since the BIT is anticipated to be deleted during Unit 2's fourth refueling outage and Unit 1's seventh refueling outage and as these core reload designs are expected to be norm, it was decided to increase the Refueling Water Storage Tank (RWST) and Accumulator boron concentration ranges as a long term solution to preclude such a condition in the future.

Consequently, PSE&G directed Westinghouse to perform the necessary safety evaluation to investigate the increase in the RWST and Accumulator boron concentrations. The Westinghouse safety evaluation report (Reference 1) has been reviewed by PSE&G. This report demonstrates that the boron concentration range for the RWST can be increased from the current range of (2000-2200) ppm to a new range of (2300-2500) ppm. Similary, the Accumulator boron concentration range can be increased from the current value of (1900-2200) ppm to a new range of (2200-2500) ppm.

It is also proposed that the RWST minimum contained volume requirements during modes 5 and 6 be changed from 9690 gallons to 12,500 gallons to accommodate a new design basis boration swing of 0-1300 ppm as the unit is taken from end of life, hot full power to cold shutdown condition (Reference 2). This design basis reflects a new Westinghouse design policy that incorporates longer fuel cycle lengths. For the same reason the maximum boration capability requirement from the RWST during modes 1-4, which appears in the bases section of the technical specification is changed from 75,000 gallons to 85,000 gallons.

Additionally, Westinghouse calculation process revealed that for Salem Unit No. 1 the accumulator water volume in the technical specification was not consistent with the LOCA analysis in the FSAR. This discrepancy was evaluated and it was determined that the current Unit 1 Accumulator technical specification values do not alter the conclusions in the FSAR for large break LOCAs.

Therefore to eliminate this inconsistency, it is proposed that Salem Unit No. 1 accumulator water volume can be changed from the current range of (6380-6657) gallons of borated water to the correct range of (6223-6500) gallons.

Similarly, the review process uncovered several minor differences in the technical specification between the two units for the boric acid storage system. It is proposed that the minimum contained volume for the Salem Unit 2 BAT in modes 1-4 be changed from 5136 gallons to 5106 gallons, to account for a typographical error in the Unit 2 technical specification. Westinghouse, in Reference 2, has verified that the correct value is 5106 gallons as already appears in the Unit 1 technical specifications. Secondly, it is proposed that the allowable concentration for the Salem Unit 1 BAT be changed from (20,100-21,800) ppm to (20,000-22,500) ppm of boron (Reference 2). The proposed values for Unit 1 are the existing values for Unit 2. The increased range is for the convenience of plant operations personnel. All Unit 1 are the existing values for Unit 2. The increased range is for the convenience of plant operations personnel. All Unit 1 technical specifications which directly or indirectly are impacted by the proposed increase in the BAT boron concentration range are also being proposed for amendment. This includes the concentration in the BIT since the content of this tank is recirculated to the BAT. The analyses to document the acceptability of this change are common to both units and use the increased range; i.e., 20,000 to 22,500 ppm. Changes were made

to LCOs related to heat tracing requirements to make the two units consistent with the Westinghouse Standard Technical Specifications. The change requires at least one heat trace system to be operable. Additionally, the Unit 1 Bases were revised to be consistent with the Unit 2 Bases.

Note that removal of the BIT has been proposed by PSE&G via LCR 85-07 and is currently under review by the NRC. Upon approval and implementation of LCR 85-07, Technical Specification 3.5.4.1 for the BIT will be eliminated. The proposed change is necessary to accomodate BAT changes in the interim.

The last difference is a minor difference in the required RWST volume during modes 1, 2, 3, and 4. It is proposed to increase the minimum RWST volume required for Modes 1 thru 4 in the Unit 1 Technical Specifications from 364,000 gallons to 364,500 gallons. The proposed value exists in Unit 2 (Reference 5) and is being changed to obtain consistency between units.

As stated above, PSE&G previously submitted LCR 85-07 to remove the BIT from the Technical Specification. Since approval of LCR 85-07 is still pending, this LCR has been prepared to allow submittal, review and implementation independently of LCR 85-07. Specifically, in the various analyses performed for LCR 87-01, the present boron concentration in the BIT was considered or neglected appropriately to yield the most conservative results. For example, the current BIT boron concentration was considered in calculating the new hot leg switchover time and minimum sump pH, thus ensuring conservative limits. For the Main Steam Line Break (MSLB) evaluations performed for LCR 87-01, the boron concentration in the BIT was not considered so as to yield overall conservative results.

Similarly, LCR 85-07 was reviewed to verify that the proposed changes in this LCR would not have any adverse impact on the analyses performed to support LCR 85-07. The results of this review indicate that LCR 87-01 proposed changes do not have any negative effect on the analyses conducted from the BIT elimination. The increase RWST and accumulator boron concentrations are of benefit when the BIT is deleted since the higher boron concentration will provide greater negative reactivity to counteract the positive reactivity addition resulting from the design basis accidents analyzed for LCR 85-07. This approach allows submittal, review and implementation of LCR 87-01 independently of LCR 85-07.

Justification for Change:

The justification for changing the Salem Units 1 and 2 RWST boron concentration range to (2300-2500) ppm and the Accumulators boron concentration to (2200-2500) ppm and other minor technical specifications identified above are based upon the safety evaluation performed by Westinghouse (References 1, 2, and 5). This study has been reviewed and approved by PSE&G (References 3

and 4). The study evaluated and/or analyzed all incidents that could be potentially impacted by these technical specification changes. These included:

1. Non-LOCA FSAR transients
2. Small and Large Break LOCA
3. Hot Leg Switchover Time Calculation
4. Sump and Spray pH, Hydrogen Production, Stress Corrosion, Radiological Consequences, and Boron Crystallization

Based on the above safety evaluation, it is concluded that the maximum RWST and Accumulator concentration ranges can be safely increased to 2500 ppm.

Significant Hazards Consideration Evaluation:

It has been determined that this LCR 87-01 involves no significant hazards consideration under the provisions of 10CFR50.92. A safety analysis was performed by Westinghouse and reviewed by PSE&G to assess the impact of increasing the boron concentration ranges for the RWST and Accumulators. Those incidents which were found to be sensitive to the above changes were evaluated and/or analyzed. These incidents include the following:

1. Non-LOCA FSAR transients
2. Small and Large Break LOCA
3. Hot Leg Switchover Time Calculation
4. Sump and Spray pH, Hydrogen Production, Stress Corrosion, and Radiological Consequences

Non-LOCA FSAR Transients:

The following non-LOCA transients which could be potentially impacted by this change were evaluated:

1. Uncontrolled Boron Dilution
2. Rupture of Main Steamline
3. Major Rupture of a Main Feedwater Line
4. Inadvertent operation of the ECCS
5. Accidental Depressurization of the Main Steam System

For each of these postulated FSAR accidents listed above it was determined that the increase in boron concentration ranges is bounded by the present FSAR analysis. In fact, for certain transients the increase in boron concentration is a benefit and makes the consequences of such transients less limiting than before. Note that the steam line break accident evaluation was done with and without the BIT in place to account for the time prior to BIT elimination. BIT tank removal was previously evaluated in LCR 85-07.

Small and Large Break LOCA:

Safety evaluation was performed for both the postulated small and large break LOCA accidents. The proposed technical specification changes have no impact whatsoever on small break LOCA because the reactor core is brought to a sub-critical condition by the trip reactivity of the control rods and not by borated water sources. Similarly, for large break LOCA the proposed changes do not alter the conclusions for the FSAR because the reactor core is maintained in the subcritical state, from the time of accident until peak cladding temperatures are reached by the voids present in the core. However, the increased boron concentration benefits the long term core cooling phase of the accident and ensures post LOCA subcriticality, based on the borated ECCS water sources only.

Hot Leg Switchover Time:

Westinghouse analysis concludes that the hot leg switchover time be revised from the current value of 22.5 hours to 14 hours following a LOCA. The results of this analysis are based upon maximum allowable boric acid concentration established by the NRC. The change in hot leg switchover time has no impact on the safety evaluation. The analysis conservatively assumes the BIT is in place at 22,500 ppm.

Spray and Sump pH, Hydrogen Production, Stress Corrosion, and Radiological Consequences:

The study determined that the minimum calculated spray and sump pH values were bounded by the current values in the FSAR. the hydrogen production rates based on the new calculated pH values were found to be either equal to or less than the rates assumed in the FSAR. The current Technical Specification minimum temperature (35°F) is sufficient to preclude freezing or crystallization of the RWST or accumulator contents. Finally it was concluded that as the pH values satisfy FSAR limits the impact on stress corrosion and radiological consequences are unchanged with the new boron concentration ranges. This evaluation conservatively assumed the BIT was in place.

The results of the Westinghouse Safety Analysis show that for every incident analyzed, the safety criteria continue to be fully met with ample margin to the applicable FSAR limits. PSE&G has reviewed this analysis and concurs with the Westinghouse conclusions. Thus, the current safety analysis design bases continue to be met, and operations of Salem Units 1 and 2 in accordance with the proposed increase of RWST and Accumulator Boron Concentration ranges amendment:

- would not involve a significant increase in the probability or consequences of an accident previously evaluated for Salem Units 1 and 2, since the proposed increase in boron concentration ranges showed that the current core safety limits were still met.

- in no way creates the possibility of a new or different kind of accident from any accident previously evaluated for Salem Units 1 and 2, since no plant modifications resulted from this change.

- does not involve a significant reduction in the margin of safety since the Technical Specification Boron Concentration limits are being increased to reflect the requirements of the extended life core analysis, thus at least maintaining current safety margins.

Additionally, the increase in the RWST minimum contained volume from 9690 gallons to 12,500 gallons in modes 1 through 4 and the increase in maximum boration capability requirement from 75000 gallons to 85000 gallons resulted due to a revision in Westinghouse design policy. This revision requires that the limiting boron addition to achieve cold shutdown be 1300 ppm in taking the unit from the End of Life, Hot Full Power condition to cold shutdown. The new limit offers more core design and operational flexibility. These changes continue to meet the design bases in the current safety analysis. It does not involve a significant increase in the probability or consequences of an accident previously evaluated for Salem Units 1 and 2 as the current core safety limits continue to be met; it does not create a possibility of a new or different kind of accident since no plant modifications are made and does not involve a significant reduction in the margin of safety since the margin of safety is being maintained by the increased boron requirements.

Based on the above evaluation, we have determined that the proposed amendment, revising the RWST and Accumulator boron concentration ranges and the boration capability requirement technical specifications and bases do not constitute a significant hazards consideration. These changes correspond to example VI as a change which in some way may result in some increase in the probability or consequences of a previously analyzed accident, but are within the acceptable criteria for the system.

The various other changes in heat tracing requirements, volumes and/or concentrations, and Bases discussed above were administrative in nature and either corrected typographical errors or corrected inconsistencies between Units 1 and 2 Technical Specifications in accordance with existing Westinghouse

analyses since the analyses are applicable to both units. These changes do not create a significant increase in the probability or consequence of a previously evaluated accident, create a new or different kind of accident, or involve a significant reduction in the margin of safety due to their administrative nature. These changes correspond to Example 1 of 48CFR14870 as a purely administrative change.

References:

(1) Westinghouse Safety Evaluation Report for Increase in Boron Concentration Ranges for the Refueling Water Storage Tanks and Accumulators for Salem Units 1 and 2, PSE-86-620, October 30, 1986.

(2) Westinghouse letter from D. Perone (W) to E. S. Rosenfeld (PSE&G), Response to Questions on RWST Boron Concentration Increase, 86PS*-G-0090, dated December 18, 1986, NFUI 86-563.

(3) Calculation File No. T01.6-076, Review of Westinghouse Safety Evaluation for the Increase in Boron Concentration Ranges for RWST and Accumulators for Salem Units 1 and 2, dated December 9, 1986.

(4) Internal Memorandum, from H. Trenka (Systems Engineering) to D. K. Hsu (Nuclear Fuel), dated December 18, 1986, NFUI 86-559.

(5) Westinghouse letter from D. Peronse (Westinghouse) to E. S. Rosenfeld (PSE&G), dated February 11, 1987. Subject: Salem Nuclear Generating Station, Unit 1, RWST Technical Specification Change, 87 PS*-G-0008.