PSEG Nuclear LLC
P.O. Box 236, Hancocks Bridge, New Jersey 08038-0236

DEC 2 1 2001

PSEG
Nuclear LLC

LRN-01-0430
LCR S01-08

United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Gentlemen:

SUPPLEMENT TO REQUEST FOR CHANGE TO TECHNICAL SPECIFICATION 3/4.7.4
SERVICE WATER SYSTEM
SALEM GENERATING STATION UNIT NO. 1
FACILITY OPERATING LICENSE DPR-70
DOCKET NO. 50-272

On December 10, 2001, PSEG Nuclear LLC (PSEG) submitted a request for a revision to the Technical Specifications for Salem Generating Station Unit No. 1 to provide a one-time extension of the time allowed for operation with one nuclear service water header out of service from 72 hours to 10 days. This letter provides PSEG's response to requests from the Nuclear Regulatory Commission staff during telephone conferences on December 12, December 17 and December 20, 2001. Pursuant to the requirements of 10CFR50.91(b)(1), a copy of this submittal has been sent to the State of New Jersey.

The information provided in this letter does not alter the conclusions reached in the 10CFR50.92 No Significant Hazards analysis previously submitted.

Should you have any questions regarding this submittal, please contact Paul Duke at (856) 339-1466.

Sincerely,

D. F. Garchow
D. F. Garchow
Vice President - Operations

Attachment

A001

Rec'd 01/23/02

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

Executed on DEC 2 1 2001

D. F. Garchow
Vice President - Operations

C Mr. H. Miller, Administrator - Region I
U. S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

U. S. Nuclear Regulatory Commission
ATTN: Mr. R. Fretz, Licensing Project Manager - Salem
Mail Stop 8B2
Washington, DC 20555-001

USNRC Resident Inspector Office (X24)

Mr. K. Tosch, Manager IV
Bureau of Nuclear Engineering
P. O. Box 415
Trenton, NJ 08625

SALEM GENERATING STATION
UNIT NO 1
DOCKET NOS. 50-272
CHANGE TO TECHNICAL SPECIFICATIONS

The following questions were discussed during the December 12, December 17 and December 20, 2001 telephone conferences:

1. **What is the system configuration during the extended allowed outage time?**

   A simplified diagram of the service water system is provided in Figure 1. It is identical to the figure provided in PSEG's December 10, 2001 submittal.

   A double-valved (11SW17 and 12SW17), normally open, interconnection between the two pump headers is provided to permit the continued operation of the system with any combination of pumps in the event of a supply line outage. In addition, cross-connect valves in the Auxiliary Building (11SW23 and 12SW23) are sized to allow for acceptable flow to meet the design requirements for all the coolers in use with only one main service water header available.

   To isolate the leaking section of the buried portion of the 12 nuclear header, the number 3 service water intake bay will be isolated temporarily to permit installation of a blind flange before repairs are made.

   During the extended AOT, when both Unit 1 intake bays are available, the Service Water system will remain capable of performing its design function in the event of a loss-of coolant accident coincident with a loss of offsite power and a subsequent 4 kV vital bus failure. The buried portion of the 12 service water nuclear header will be isolated such that all six service water pumps will be available and capable of supplying cooling water to the safety related equipment via the OPERABLE 11 Service Water header. The cross-connect valves in the service water intake structure (11SW17 and 12SW17) and in the Auxiliary Building (11SW23 and 12SW23) will be open.

2. **Discuss the engineering evaluation of the 11 service water header pipe integrity.**

   The credible extent of condition, including potential degradation of the 11 service water header, is bounded by the current OPERABILITY evaluation of the 12 service water header discussed below.

   OPERABILITY of the 12 Service Water Nuclear Supply Header

   In the limiting system configuration (one bay isolated) and with service water at its maximum design temperature (90 °F), the service water system would provide adequate flow even with an assumed leakage rate of 200 gallons per minute. The

SALEM GENERATING STATION
UNIT NO 1
DOCKET NOS. 50-272
CHANGE TO TECHNICAL SPECIFICATIONS

currently observed leakage rate from the 12 Service Water nuclear supply header is significantly less than the 200 gpm assumed in the hydraulic analysis.

PSEG evaluated the load bearing capacity of the backfill underneath the number12 service water nuclear header. Even with a reduction in the effective bearing capacity due to static hydraulic pressure, a large margin would remain to provide assurance of the backfill's bearing capacity.

The effect of potential voids beneath the pipe was also evaluated and found to be acceptable. While no significant voiding was detected during surveys with ground penetrating radar, an 8-foot void beneath the pipe was assumed. This would bound any potential voids since the pipe is 24 inches in diameter and the bottom of the pipe is about 8 feet below the surface. The expected load acting on the 24 inch diameter pipe spanning an 8-foot void as a beam is less than 9,000 pounds per square inch (psi), well within the recommended design stresses of 15,000 psi provided in AWWA M9, Concrete Pressure Pipe, Chapter 8, Pile-Supported Installations.

Thus, while repairs will be required, the 12 Service Water nuclear supply header is currently OPERABLE.

Extent of Condition

Based on the information currently available, the leak is believed to be at an underground mechanical joint or mechanical connection associated with the buried portion of the 12 service water nuclear supply header located near the service water intake structure. The underground leakage is confined to the 12 Service Water nuclear supply header. This determination was based on the use of a rhodamine dye test conducted on all four service water bays. No other service water bays had any indication of leakage. Surveys with ground penetrating radar were also performed and did not reveal leakage from any other header. The specific source of the leak for the 12 Service Water nuclear supply header has not been identified yet. The leak could be from a deteriorated flange joint, bell and spigot joint, vent/drain cap, or a pipe defect.

However, for structural integrity, the bounding credible condition would be the degradation of the tendons in the Prestressed Concrete Pipe (PCCP). This is due to the grade of tendon wires and the corrosive environment near the intake structure. These are the major elements that cause degradation of the prestress pipe/wires and therefore loss of leak tightness of the pipe.

Corrosion could originate from the exterior of the pipe due to a breakdown in the protective properties of the outer cement mortar coating. This loss of protection

allows corrosion to initiate on the prestressed tendon wires. Wire deterioration can then be caused by galvanic corrosion, stray-current corrosion or hydrogen embrittlement (a form of stress corrosion cracking).

For the Salem Service Water PCCP, wire deterioration will not cause immediate catastrophic failure due to the 10 gauge steel liner. This liner is thick enough to retain the service water line pressure. Corrosion of the liner, to the extent that a through wall condition would eventually result, would also cause pipe leakage. This type of failure mechanism however, would concurrently result in a growing leakage increase, as the extent of corrosion also expanded and would not result in immediate catastrophic rupture.

The structural integrity of the 11 nuclear supply header was confirmed by inspection during the most recent Unit 1 refueling outage in April 2001. The 11 header is less susceptible to corrosion since it is located further below surface grade than the 12 header. The larger overburden ground cover reduces the potential for higher oxygen levels which tend to accelerate corrosion. Additionally, the piping configuration near the Intake Structure of the 12 header is more prone to corrosion due to numerous flanges, joints and metal combinations in proximity of the Intake Structure.

The joints involved are designed to flex (e.g., bell and spigot) and the seismic capability of the piping system is derived from the engineered soils, which provide passive resistance to the piping. There is no evidence that the leakage from the 12 service water header has challenged the surrounding soil bearing capability and therefore the seismic capability is not in question.

The principal buried supply line piping runs are separated by about 13 feet. This separation, in conjunction with the depth at which they have been buried, makes these lines essentially invulnerable to damage from a single postulated event. There is no evidence of subsidence of a magnitude sufficient to affect both supply headers.

As noted above in the discussion of 12 service water header OPERABILITY, in the limiting system configuration (one bay isolated) and with service water at its maximum design temperature (90 °F), the service water system would provide adequate flow even with an assumed leakage rate of 200 gallons per minute. Consequently, if the 12 service water header is removed from service and a leak was to develop in the 11 service water header, the existing hydraulic analysis already bounds this condition.

If the bounding and credible extent of condition is postulated for the 11 service water header, the expected result would be detectable leakage, but with no immediate

consequence to structural integrity, seismic qualification, or a loss of service water inventory greater than what has already been analytically bounded. The 11 service water header would continue to be capable of performing its specified function.

3. **Discuss actions to be taken if the 11 service water header (1) began to leak or (2) had to be isolated during the proposed allowed outage time (AOT). Discuss compensatory measures which address the risk aspects associated with these considerations.**

While the 12 service water nuclear supply header is removed from service for repairs, a service water header outage contingency plan will be in effect. The plan will include the following elements:

- Provisions to cross-tie Unit 2 to Unit 1 service water, if required.
- Contingency plan and pre-staged equipment for restoration of the 12 service water nuclear supply header.
- Augmented management, maintenance and engineering staffing during the repairs to 12 service water header.

In the highly unlikely event of a total loss of service water while the reactor is critical, existing plant procedures direct a rapid shutdown to Mode 3. The plant would be maintained with decay heat removal provided by the auxiliary feedwater system and the steam generator atmospheric relief valves. Water inventory would be sufficient to provide for decay heat removal until restoration of a service water nuclear header. Procedures are in place to address the resulting loss of ventilation and spent fuel pool cooling by cross connecting the affected systems to Unit 2 and by establishing alternate ventilation paths. With the current spent fuel decay heat load, fuel pool temperature would not reach the design temperature limit for greater than 200 hours. Plant procedures provide for cross connecting to the Unit 2 spent fuel pool cooling system before design limits would be exceeded.

PSEG conducted simulator exercises involving a total loss of service water scenario. The exercises included briefing the crew on plant conditions for the 12 service water header outage, discussion of potential coping strategies, and review of existing plant procedures. The simulator exercise highlighted the benefits of coping strategies such as securing letdown flow, minimizing charging flow and isolating the reactor coolant pump and thermal barriers to minimize component cooling system heat up in accordance with plant procedures. The exercise confirmed that existing plant procedures are adequate to safely shutdown and maintain the plant. As a result of insights gained from these scenarios, PSEG will prestage equipment to provide alternate cooling to the charging pumps using existing plant procedures. Lessons

learned from the simulator exercise will be communicated to Operations personnel before the 12 service water nuclear supply header is removed from service for repairs.

Insights gained from the simulator exercise are consistent with a qualitative assessment of the current probabilistic safety assessment model which identifies the ability to maintain cooling for the reactor coolant pump seals as one of the most important items in reducing risk. Continued cooling prevents seal degradation that could result in a small LOCA.

4. **Will the pressurizer power operated relief valve block valves be planned to be operable during the proposed AOT?**

   There are no planned outages for the power operated relief valve block valves during the proposed AOT. If, during the proposed AOT, the power operated relief valve block valves are required to be removed from service, risk associated with required maintenance activities will be evaluated in accordance with 10 CFR 50.65(a)(4) and plant configuration will be maintained in accordance with the requirements of the Salem Unit 1 Technical Specifications.

5. **Will all the auxiliary feedwater trains be planned to be operable for long-term steam generator cooling during the proposed AOT?**

   There are no planned outages for the auxiliary feedwater trains during the proposed AOT. If, during the proposed AOT, the auxiliary feedwater trains are required to be removed from service, risk associated with required maintenance activities will be evaluated in accordance with 10 CFR 50.65(a)(4) and plant configuration will be maintained in accordance with the requirements of the Salem Unit 1 Technical Specifications.

6. **Please provide the baseline core damage frequency and large early release frequency according to your updated probabilistic safety assessment model.**

   The Salem baseline core damage frequency is 4.995E-05 per year. The baseline large early release frequency is 9.87E-06 per year. The incremental conditional core damage probability (ICCDP) for the extended AOT is estimated to be less than 2.89E-08. The incremental conditional large early release probability (ICLERP) is estimated to be less than 3.92E-09.

SALEM GENERATING STATION
UNIT NO 1
DOCKET NOS. 50-272
CHANGE TO TECHNICAL SPECIFICATIONS

FIGURE 1
SALEM UNIT 1 SERVICE WATER SYSTEM