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PSEG Nuclear LLC

LR-N01-0087
LCR S00-06, Sup. 2

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

Gentlemen:

**SUPPLEMENTAL ENVIRONMENTAL INFORMATION
IN REGARDS TO REQUEST FOR LICENSE AMENDMENT
INCREASED LICENSED POWER LEVEL
SALEM GENERATING STATION, UNIT NOS. 1 AND 2
FACILITY OPERATING LICENSE DPR-70 AND DPR-75
DOCKET NOS. 50-272 AND 50-311**

This letter transmits additional environmental information to support the staff's review of the request for license amendment submitted by PSEG Nuclear LLC on November 10, 2000 requesting an increase in licensed power levels for Salem Generating Station Unit Nos. 1 and 2.

Should you have any questions regarding this request, please contact Mr. Brian Thomas at (856)339-2022.

Sincerely,

M. B. Bezilla
Vice President - Technical Support

Affidavit
Enclosure

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Microfilm Copy
File Nos. 1.2.1 (Salem)
2.3 (LCR S00-06)

REF: LRN-01-0087
LCR S00-06, Sup. 2

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

M. B. Bezilla, being duly sworn according to law deposes and says:

I am Vice President - Technical Support of PSEG Nuclear LLC, and as such, I find the matters set forth in the above referenced letter, concerning Salem Generating Station, Units 1 and 2, are true to the best of my knowledge, information and belief.

Subscribed and Sworn to before me
this 2nd day of April, 2001

Notary Public of New Jersey

My Commission expires on June 16, 2003

ENCLOSURE

PSEG NUCLEAR, LLC
SALEM GENERATING STATION (SGS)
UNIT NOS. 1 & 2
FACILITY OPERATING LICENSE DPR-70 AND DPR-75
DOCKET NOS. 50-272 AND 50-311

REQUEST FOR LICENSE AMENDMENT INCREASED POWER LEVEL (DATED NOVEMBER 10, 2001)

SUPPLEMENTAL ENVIRONMENTAL INFORMATION

The Salem Nuclear Generating Station Units 1 & 2 Final Environmental Statement (FES-OL), issued on April 1973, evaluated the environmental impact of operating Salem Generating Station (Salem or Station) Units 1 & 2. The conclusions of the Final Environmental Statement are based on review of the information contained in Salem Generating Station Environmental Report submitted on June 30, 1970 and supplemented on November 5, 1971. The following evaluation provides additional environmental information related to the 1.4% power uprate of Salem Units 1 and 2.

Section 3.1 (Plant Design and Operation) of the Salem Generating Stations Environmental Protection Plan (EPP), Appendix B to the Unit 1 Facility Operating License DPR-70 and Appendix B to the Unit 2 Facility Operating License DPR-75 state that "the licensee may make changes in station design or operation or perform tests or experiments affecting the environment provided such activities do not involve an unreviewed environmental question and do not involve a change in the EPP." Section 3.1 requires that an environmental evaluation be prepared and recorded prior to engaging in any activity which may significantly affect the environment. Section 3.1 further states that, "A proposed change, test or experiment shall be deemed to involve an unreviewed environmental question if it concerns: (1) a matter which may result in a significant increase in any adverse environmental impact previously evaluated in the FES-OL, environmental impact appraisals, or in any decisions of the Atomic Safety and Licensing Board; or (2) as significant change in effluents or power level; or (3) a matter, not previously reviewed and evaluated in the documents specified in (1) of this Subsection, which may have a significant adverse environmental impact."

In accordance with the requirements discussed above, this evaluation assessed the proposed core power level increase from 3411 MWt to 3459 MWt and determined that there is no significant adverse environmental impact. The environmental evaluation considers thermal effects, entrainment effects, radiological effluents and radwaste.

Salem is located at River Mile 50 on the Delaware Estuary (River or Estuary). The Station is located on a projection of land known as Artificial Island on the eastern shore of the Delaware Estuary. The Estuary in the area of the Station is approximately 2.5 miles wide. The tidal flow of the River past the Station is approximately 400,000 cubic feet per second (cfs) or 259,000 million gallons per day (MGD). The Station's Circulating Water System (CWS) is the once-through, non-contact cooling water system and is designed to withdraw approximately 3200 MGD from the Estuary.

The CWS supplies cooling water to the main condensers of both units to condense turbine exhaust steam and transfer the heat to the Estuary. As the heat sink for the main turbine, the CWS is designed to maximize steam power cycle efficiency.

The Circulating Water Intake Structure (CWIS) consists of 12 separate intake bays (six for each unit). Each of the 12 bays contains a Circulating Water Pump (CWP). Each pump draws water by suction from its own intake bay. The CWPs are the principal means of circulating water from the Estuary, through the main condenser, and back into the Estuary. Each pump's design rating is 185,000 gpm at 27 feet total developed head (TDH), for a total design flow of 1,110,000 gpm through each unit. The present New Jersey Pollutant Discharge Elimination System (NJPDES) Permit imposes limits on the CWS of a thirty-day average of 3024 MGD (i.e., 175,000 gpm for a total of 1,050,000 gpm per unit).

The main condenser is designed to remove waste heat from the steam power cycle and dissipate that heat to the environment for maximum efficiency of the station. Exhaust steam from the turbines passes into each unit's three-shelled condenser. Exhaust steam from the turbines is cooled and condensed for reuse in a single-pass, divided-circulation, triple-shell condenser. Each condenser contains over 68,000, 22-gauge, one-inch diameter tubes constructed of AL-6X or AL-6XN material. In the condensers, cooling to condense the turbine exhaust steam is dependent upon the volume of circulating water flow and the initial temperature of the circulating water, which varies with ambient river water temperature. The need to maintain the turbine backpressure within the operational range of the turbines is critical to Station operation. An increase in turbine backpressure results in a decrease in the efficiency of the turbine and in electrical output from the generators.

Each condenser discharges to a 7-foot diameter pipe. The six 7-ft diameter discharge pipes for each unit are combined into three 10-ft diameter discharge pipes for each unit, which transport the cooling water to the Estuary. When Salem is producing full power, the cooling water is returned to the Estuary at a temperature approximately 15°F warmer than when it entered the condenser system. The discharge pipes extend approximately 500-ft offshore from the property line. The pipes were designed to achieve a discharge velocity of 10.5 feet per second (fps) at a submerged elevation of approximately 28 ft below the surface at mean low tide. This design arrangement was selected to minimize the recirculation of the heated discharge back to the CWIS and to maximize mixing of the heated discharge with the cooler ambient river water.

The NJPDES Permit imposes limits on the temperature of discharged cooling water, on the temperature increase of the cooling water (ΔT), the amount of heat discharged and the rate of flow of water withdrawal from the River by the Station. During the period from 1 June to 30 September each year, the maximum permissible discharge temperature is 115°F. During the rest of the year, the maximum permissible discharge temperature is 110°F. The maximum permissible temperature differential, year-round, is 27.5°F. The permit limits the amount of water that can be taken in to the Salem CWS to a thirty-day average of 3,024 MGD. This correlates to a monthly average of 1,050,000 gpm passing through each unit's main condensers. No current Permit discharge limits will be exceeded as a result of the 1.4 % Uprating.

At full-power operation, the condenser for each unit is designed to reject 7.7×10^9 Btu/hr. Each reactor operates at the licensed core thermal power of 3,411 MWt or a Nuclear Steam Supply System power level of 3,423 MWt. The turbine generators are rated at a gross electrical output of 1,162 MWe, resulting in a designed energy transfer to the CWS of 2,249 MW or 7.7×10^9 Btu/hr per unit. This value may vary by approximately 10 % due to fluctuations in operating efficiency resulting from variations in river temperature, condenser backpressure, CWS flow rate degradation, etc. At the designed circulating water inlet temperature of 60°F and a CWS flow of 1,050,000 gpm, this heat load results in a temperature increase of 15°F. Other heat loads discharging through the circulating water discharge pipes, such as the SWS, are minor in comparison to the heat load from the condenser and have only a negligible impact on the discharge temperature.

River water is also used to remove heat via the Service Water System (SWS). Service Water is withdrawn from the River through a separate intake located approximately 400 feet north of the CWS intake and is pumped to various heat exchangers and equipment where it picks up heat and is returned back to the Estuary via the CWS discharge pipes.

Not all the systems and components cooled by the SWS will realize an increase in heat load. The Component Cooling Water System (CCS) is an intermediate closed loop system exchanging heat between various radioactive systems and components to the SWS. Spent Fuel Pool (SFP) heat exchangers (initial cooling by CCS), Turbine Auxiliary Cooling (TAC) heat exchangers and Steam Generator Feed Pump (SGFP) lube oil coolers will see increased heat loads.

The highest heat load to the SWS is from the SFP heat exchangers when the unit is off-line and the core is off-loaded. The incremental increased heat load when the core is off-loaded is insignificant compared to the heat load to the condenser from full load power operation. TAC heat exchanger increased heat load is expected to increase the SWS temperature leaving the TAC heat exchangers approximately 0.1°F with a flow of approximately 11,000 gpm; again an insignificant increase. The SGFP lube oil cooler SWS flow is only 85 gpm to each of the two coolers, which is less than 1% of the SWS flow. The increased heat load as result of the increased feed pump speed will be insignificant.

On March 4, 1999, PSEG submitted new §316(a) and 316(b) Demonstrations as part of the NJPDES Permit (NJ0005622) renewal application to the State of New Jersey Department of Environmental Protection (NJDEP). The Demonstrations address the effect of Salem Units 1 and 2 operation on the Estuary. These demonstrations were developed under the direction and supervision of renowned experts in each of the pertinent disciplines including biological sciences, engineering, hydrodynamics and economics. The demonstrations utilized state-of-the-art analytical methods and mathematical modeling tools. Subsequent to the March 4, 1999, filing PSEG performed evaluations of the effects of a 1.5 % power uprating utilizing the same technical experts and consultants. The evaluations were performed at a 1.5 % Uprating value, which bounds the increase of 1.4 % requested in the November 10, 2000 Request for License Amendment.

The Uprating will result in a very small increase in temperature (approximately 0.3°F), ΔT and heat discharged. These slight increases would not significantly alter the characteristics of the thermal plume used for the biothermal assessment and are within the computational accuracy of the results presented in the 1999, §316(a) Demonstration. Additionally the small changes in the thermal exposure of aquatic organisms that would result from the Uprating would not cause any appreciable change in the effects on the biota and are within the precision of the predictive methodology used in the 1999 NJPDES Permit renewal. The Uprating does not significantly alter the bases for concluding that Salem's thermal discharge is protective of the balanced indigenous community in the Delaware Estuary.

As with the §316(a) evaluation, the evaluation of the effects of the proposed Uprating demonstrate that increasing the ΔT up to 1.5 % would not cause substantial changes to any of the findings of the §316(b) Demonstration and would not change any of the conclusions reached therein. The proposed Rerating would result in small changes in the predicted entrainment losses, losses expressed as pounds lost to the fishery and stock jeopardy analysis. Therefore, the proposed Rerating does not alter the conclusion presented in the 1999 Application that Salem's CWIS would not cause an adverse environmental impact on the Delaware Estuary. Furthermore, the updated cost-benefit analyses assessing the effects of the proposed Rerating supports the position that none of the fish protection alternatives considered for the Salem CWIS has benefits that exceed their costs. Thus, the results presented above for the proposed Rerating do not materially alter any of the findings presented in the Section 316(b) Demonstration and do not change any of the conclusions presented in the 1999 Application.

The evaluations concluded that the proposed Uprating would not require any modification to the effluent limitations to the existing NJPDES Permit, will not cause an adverse environmental impact and bound the requested 1.4 % increase in power.

To summarize, the 1.4 % power increase and resultant thermal discharge does not change the conclusions of the 316(a) Demonstration that Salem's discharge is not a threat to the protection and propagation of a balanced indigenous community in the Delaware Estuary, or the 316(b) Demonstration conclusions that the Salem's CWIS remains the best

technology available (BTA). The slight increases in heat load, temperature and ΔT are within the computational accuracy of the models, remain within current permit limits and do not require changes to any of the current effluent limitations administered by the NJDEP.

Baseline calculations were evaluated to determine potential impacts on radiological effluents as a result of the power uprating. It has been determined that the 1.4% power uprating is bounded by the existing analyses for Steam Generator Tube Rupture (SGTR), Loss of Coolant Accident (LOCA) and Main Steam Line Break (MSLB). This was documented in the Request for License Amendment LCR No. S00-06 dated November 10, 2000.

There are no anticipated changes in the radiological dose to the environment or dose received by the general public as a result of the 1.4% power increase. Current regulations and operating requirement assure that dose to the general public are keep as low as reasonably achievable (ALARA). Implementation of the programs and processes that assure an ALARA concept will not be affected by the power increase. Neither liquid nor gaseous radiation effluent monitoring setpoints will be changed as a result of the power increase. Radioactive effluent releases are closely monitored and controlled by approved programs and procedures.

The release volumes from the gaseous and liquid radiological waste processing systems are not expected to change as a result of the proposed power level change. An infinitesimal increase might occur in concentrations of liquid or gaseous radiological effluent as a result of the power increase. It is also possible that there could be an extremely small increase in the radioactivity levels of demineralizer resins in liquid processing systems. Radioactive demineralizers are processed and shipped as solid radioactive radwaste. All solid radioactive wastes are evaluated and shipped in appropriate shipping container (including shield casks as required, based on radiation level). Thus there is no expected increase in dose to the general population from solid radioactive waste processing, shipping or disposal due the power level increase.

The requirement imposed in federal regulations specified in 10 CFR 20 and 10 CFR 50, Appendix I (as well as the NRC operating license specifications) assure that there would be virtually no radiological impact as a result of station operation, either at the current level or the increased level. A continuous dose assessment program that is required by 10 CFR 50, Appendix I, restricts the operation of a nuclear facility to a small fraction of the annual dose that any member of the general public would normally receive from environmental and other manmade sources. The radiological effect of Salem were evaluated in the Final Safety Evaluation Report, the Salem Environmental Report, the 10 CFR 50, Appendix I application submittal made in 1976, as well as in the NRC's Environmental Impact Statement and Safety Analysis Report. The conservative design basis assumptions in these analyses bound the expected radioactive effluent release activity from station operation even above the proposed 1.4% increase.

To assure that there is no radiological dose impact from station operation, a comprehensive environmental radiological monitoring program is in place. The program requires that annual reports be sent to the NRC and made available to the general public that evaluate environmental radiological level. These reports must include documentation of any dose increase to the environment or general public and thus assure no impact to the environment from operation of the Salem Generating Stations.

Likewise, design basis accidents evaluated in the Salem Environmental Report are bounded by the power level assumed in that present accident analysis.

In conclusion, the environmental effects of thermal discharges, radiological effluents, radiation dose to the public and radwaste from the 1.4% power increase were evaluated and it is concluded that no significant environmental impact would occur as a result of the power increase. The slight increase in heat load, temperature and ΔT to the Delaware Estuary are within the computational accuracy models utilized in the most recent §316(a) and (b) Demonstrations submitted to the NJDEP and no change to existing NJPDES permit limits are required. For radiological effluents, radiation dose to the public and radwaste, original parameters remain unchanged or the original evaluations bound the uprated values.