PSE&G

Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038

Nuclear Department

APR 23 1993

NLR-N93039
LCR 93-05

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

Gentlemen:

LICENSE AMENDMENT APPLICATION
ULTIMATE HEAT SINK TEMPERATURE CHANGES
HOPE CREEK GENERATING STATION
FACILITY OPERATING LICENSE NPF-57
DOCKET NO. 50-354

This letter submits an application for amendment to Appendix A of Facility Operating License NPF-57 for the Hope Creek Generating Station, and is being filed in accordance with 10CFR50.90. This amendment request would revise the Technical Specification for the Ultimate Heat Sink and the Bases for the Service Water System.

A description of the requested amendment, supporting information and analyses for the change, and the basis for a no significant hazards consideration determination are provided in Attachment 1. The Technical Specification pages affected by the proposed change are marked-up in Attachment 2.

Pursuant to the requirements of 10CFR50.91(b)(1), a copy of this request for amendment has been sent to the State of New Jersey.

Upon NRC approval of this proposed change, PSE&G requests that the amendment be made effective on the date of issuance, but implemented within sixty days 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,

J. J. Hagan
Vice President -
Nuclear Operations

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The power is in your hands.

APR 23 1993

Affidavit
Attachments (2)

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REF: NLR-N93039
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STATE OF NEW JERSEY)
) SS.
COUNTY OF SALEM)

J. J. Hagan, being duly sworn according to law deposes and says:

I am Vice President - Nuclear Operations of Public Service Electric and Gas Company, and as such, I find the matters set forth in the above referenced letter, concerning the Hope Creek Generating Station, are true to the best of my knowledge, information and belief.

Subscribed and Sworn to before me
this 23RD day of April, 1993

Sherry L Cagle
Notary Public of New Jersey

SHERRY L. CAGLE
NOTARY PUBLIC OF NEW JERSEY
My Commission Expires March 5, 1997

My Commission expires on _____

ATTACHMENT 1
PROPOSED CHANGES TO TECHNICAL SPECIFICATIONS

LICENSE AMENDMENT APPLICATION
ULTIMATE HEAT SINK TEMPERATURE CHANGES
FACILITY OPERATING LICENSE NPF-57 NLR-N93039
HOPE CREEK GENERATING STATION LER 93-05
DOCKET NO. 50-354

I. DESCRIPTION OF THE PROPOSED CHANGES

As indicated on the marked-up pages in Attachment 2, PSE&G requests that:

1) Technical Specification 3.7.1.3, Ultimate Heat Sink (UHS), be revised such that the maximum allowable value of average river temperature is changed from 90.5°F to 88.6°F.

2) The action statement for the Limiting Condition for Operation (LCO) 3.7.1.3 be revised to permit continued normal operation of the plant for a period of six hours.

3) Surveillance Requirement 4.7.1.3.b.2, be revised to increase the frequency of the surveillance of river water temperature from once per 6 hours to once per 2 hours.

4) Bases 3/4 7-1, Service Water System, be revised to state the justification for the action statement in LCO 3.7.1.3, and that operator actions are taken when river water temperature is greater than 85°F and a LOP occurs concurrent with a loss of a SSWS/SACS loop.

II. REASON FOR THE CHANGES

On August 17, 1990, PSE&G identified that the Technical Specification limit for the ultimate heat sink (Delaware River) had been established nonconservatively high (90.5°F) due to a design calculation error. PSE&G notified the NRC of this situation in Licensee Event Report (LER) 90-014-00 dated September 12, 1990. At that time, an administrative limit of 85°F for maximum allowable ultimate heat sink (UHS) temperature, based upon the design temperature of the Station Service Water System (SSWS), was placed into effect and evaluations were initiated to establish the correct maximum allowable temperature.

On July 12, 1991, LER 90-014-01 was submitted to indicate that an

increased administrative limit of 87.5°F had been established based upon refined engineering analyses and a 10 CFR 50.59 evaluation. Subsequent to the submittal of the revised LER, the administrative limit was further increased to 88.1°F, based upon continued engineering analyses of the Safety Auxiliary Cooling System (SACS) heat exchangers. This limit has been in effect since July 26, 1991, (reference NRC inspection report No. 50-354/91-14 dated August 16, 1991). PSE&G's existing commitment, reiterated via a letter dated August 4, 1992, to establish a new design temperature limit and to subsequently incorporate it into all applicable configuration documents forms the basis of this request for amendment.

The new UHS design limit of 88.6°F was derived from iterative analyses at the component level of the SSWS and the SACS, and replaces the current Technical Specification limit of 90.5°F and the currently utilized administrative limit of 88.1°F. The incorporation of a six hour sustained temperature requirement into the LCO action statement, prevents unnecessary initiation of shutdown procedures by accommodating temporary river temperature excursions which occur only at maximum incoming tidal surges under the worst case summer conditions (as described in the following section). In addition, surveillance requirements have been revised to increase the frequency of monitoring in order to more accurately determine the condition of the UHS.

Finally, Bases 3/4 7-1, Service Water Systems, has been revised to state that operator actions are taken in the event that river water temperature is above 85°F and a LOP and loss of one loop of SSWS/SACS occur concurrently. In this situation, or in a LOCA/LOP scenario, the UHS will remain operable up to 88.8°F, which makes single SSWS loop normal operation the limiting case for the determination of the UHS maximum allowable temperature.

III. JUSTIFICATION FOR THE CHANGE

The incorporation of the new maximum allowable UHS temperature limit of 88.6°F in TS 3.7.1.3 replaces an existing nonconservatively high value of 90.5°F. The iterative analyses that determined this new temperature limit conservatively utilized a worst case SSWS pump degradation value of 15% and assumed that 50 tubes in each SACS heat exchanger are blocked for all postulated conditions. In addition, the calculation for the 88.6°F UHS temperature limit includes worst case river water elevation (76.0' accident boundary condition) and single SSWS loop normal operation (the limiting case).

The six hour sustained temperature requirement has been incorporated into the LCO action statement to prevent unnecessary initiation of shutdown procedures. As discussed in paragraph A below, it is only during the hottest days of July and August with coincident maximum incoming tidal surges transporting Salem's discharge upstream when river water temperatures that exceed 85°F have been recorded. Past records show this to be an infrequent occurrence that has never been sustained over a long period of time due to the shift in tides. Likewise, if the river water temperature was to exceed 88.6°F, it would also be expected to last for only a short duration.

However, this situation currently requires the operator to take actions to shutdown the plant even though river water temperatures were expected to decrease, restoring the UHS to an operable status in a short period of time with the shift in tide. To prevent this from occurring, the six hour sustained temperature requirement will be incorporated into the LCO action statement for the UHS.

Probabilistic analysis has shown that having: 1) river water temperature exceed 88.6°F; 2) a river water elevation at its design low limit of 76.0' (caused by a postulated large radius stationary probable maximum hurricane); and 3) a loss of one SSWS/SACS loop during normal operation (the limiting case), results in a 1.0E-8 chance of occurrence. It is because of this remote possibility coupled with the very conservative nature of the UHS temperature limit calculations and aforementioned transient characteristics of the river water temperature excursions, that the establishment of a six hour sustained temperature requirement in the UHS LCO action statement can be justified.

The increased frequency of river water temperature monitoring will provide a more accurate determination of the actual condition of the UHS. This increased monitoring for river water temperature greater than 85°F enables the operator to determine if the six hour sustained temperature requirement in the LCO action statement for the UHS has been exceeded.

Since the original documented design limit of 85°F for the SSWS will be exceeded by the new maximum allowable UHS temperature limit of 88.6°F, the following analyses of river water temperature variance, design bases, maximum river temperature, associated operator actions and thermal stress calculation considerations were conducted to ensure the continued safe operation of the SSWS within the TS 3.7.1.3 parameters. The majority of these analyses were previously transmitted by PSE&G via a letter dated August 4, 1992, and form the technical basis of the administrative limits currently in effect.

A. River Temperature Variance

Each day, river temperature, which is monitored at the intakes of the SSWS pumps, varies directly with cyclic tidal surges. During the hottest days of late July and August, the incoming tide causes warm surface water from estuarine marshes and the discharge from the Salem Generating Station to be transported upstream to the Hope Creek SSWS intake structure. Historically this has been the time when indicated river temperature has exceeded 85°F. However, since the high temperature conditions only exist at the maximum incoming tidal surges, they have not been sustained over long periods of time. The total average of time that the river temperature has exceeded 85°F over the course of any one year is 14 hours/year (as measured over a three year period).

B. Design Basis

The Hope Creek SSWS was designed in compliance with 10CFR50, Appendix A-Criterion 44, which in part, requires a system to transfer heat from structures, systems and components important to safety to an ultimate heat sink to be provided. The system safety function shall be to transfer the total heat load of these components under both normal operating and emergency conditions.

Further, suitable redundancy in components and features that shall be provided to assure the system safety function can be accomplished, assuming single failure.

To meet this objective, the SSWS and SACS are composed of two redundant loops, or subsystems, designated A and B. UFSAR Sections 9.2.1 and 9.2.2 state that only one SSWS and SACS loop is required for normal operation, shutdown, and emergency shutdown. The system design therefore, provides protection against complete loss of the cooling function, assuming the occurrence of a single active or passive failure.

In summary, the SSWS and SACS must be capable of providing sufficient cooling to safety related loads with only a single SSWS/SACS loop available. All SSWS and SACS operating modes are bounded by this requirement.

C. Maximum River Temperature Design Limit

During the design phase of the SSWS, the Architectural Engineer (AE) for Hope Creek originally identified the following four bounding modes of operation: 1) power generation, 2) normal

shutdown, 3) loss of offsite power (LOP), and 4) operation greater than ten minutes after a loss of coolant accident. For each operational mode, the AE calculated the resulting SACS heat exchanger loads for both single and two loop SSWS configuration and subsequently determined that, in each mode, single loop operation resulted in the highest heat exchanger heat duty.

Based on the calculated SSWS performance under each of the four modes of operation that were evaluated, PSE&G has concluded that the ultimate heat sink will remain operable with river temperatures exceeding the current documented design limit of 85°F up to and including the new maximum UHS temperature limit of 88.6°F. The basis of this temperature limit assumes:

1. Operator actions are taken (post LOP only as indicated in the Service Water Systems Bases section markup in Attachment 2) to increase the heat removal capabilities of the SACS heat exchangers and minimize the total heat duties of the system,

2. All four SSWS pumps are degraded a maximum of 15%, and

3. 50 tubes in each SACS heat exchanger are blocked.

D. Required Operator Actions - Description

In the event of a LOP with only one SSWS train and SACS loop available and river water temperature is between 85°F and 88.6°F, the following actions must be taken:

1. SSWS flow is isolated to one RACS Heat Exchanger.

2. SSWS flow is throttled to the remaining RACS Heat Exchanger to obtain 2,200 gpm.

In the event of a LOCA or LOCA/LOP with only one SSWS train and SACS loop available and river water temperature is between 85°F and the maximum allowable UHS temperature limit, the SSWS to RACS will automatically isolate with no additional operator actions required.

For both normal operating and shutdown conditions, existing procedures require the operator to maintain the SACS below its design temperature limit of 95°F.

E. Required Operator Actions - Procedure

The preceding actions will be incorporated into a revision of the existing station operating procedure HC.OP-AB.ZZ-0122(Q), "Service Water System Malfunction", and subsequently be included in the operator training programs. In order to key operators into entering this procedure, "Service Water Temperature > 85°F" is included on the list of "Symptoms" which is located in Section 1.0 of the procedure.

F. Required Operator Actions - Area Accessibility

Since several of the required actions must be performed locally in the Reactor Building, consideration was given to accessibility of the subject areas. Reactor Building radiation levels after a LOP would be equivalent to normal post shutdown levels; therefore, area accessibility after a LOP would be assured.

For the LOCA and LOCA/LOP scenario, no operator access to the Reactor Building is required.

G. Stress Calculation Considerations

Since the Line Index for Hope Creek piping systems indicates that the maximum operating temperature for the SSWS supply piping to the SACS and RACS heat exchangers is 85°F, a review of the applicable stress calculations was performed. SSWS supply piping from the river to the SACS and RACS heat exchangers has been analyzed to operate between 31°F and 85°F thermal range. A review of the stress calculations for piping in the SSWS Intake Structure and Reactor Building shows significant design margin for a small increase in the thermal stresses due to a 5°F elevated river temperature.

A minimum of 20% margin has been found to exist against allowances for thermal expansion per ASME Section III, Paragraph NC/ND 3652.3 Equation (10), whereas a maximum of about a 10% increase in expansion stresses can be expected from a thermal range between 31°F and 90°F. Higher allowances for combined effects of pressure, weight other sustained loads, and thermal expansion under equation (11) provide further assurance for code compliance for this low pressure and temperature piping system. This review also shows that the loading combination for equipment nozzles and pipe support design is governed by higher loads due to the operating mode at 31°F during the winter, rather that loads at 85°F or even 90°F during the summer. Hence the piping system is capable of meeting its intended design functions under those additional loads.

The piping system on the SSWS outlet of the heat exchangers is analyzed for 110°F. It is assumed in the vendor data sheets for the SACS and RACS heat exchangers that with a supply temperature of 90°F to these components the discharge temperature will rise to a maximum of 115°F. Additional stresses and loads due to this change are considered to be within the design of this piping.

IV. Significant Hazards Consideration Evaluation

PSE&G has, pursuant to 10 CFR 50.92, reviewed the proposed amendment to determine whether our request involves a significant hazards consideration. We have determined that operation of the Hope Creek Generating Station in accordance with the proposed changes:

1. Will not involve a significant increase in the probability or consequences of an accident previously evaluated.

   A review of the accident scenarios described in the UFSAR Chapter 15 indicated that the proposed change will neither significantly increase the likelihood of those accidents from occurring nor significantly affect the performance of any system involved in the occurrence or mitigation of the subject accidents. Additionally, the UFSAR Chapter 15 review demonstrated that the radiological consequences of the analyzed accidents will not be affected as a result of the proposed change.

   The new Ultimate Heat Sink (UHS) temperature proposed for incorporation into the Hope Creek Technical Specifications is based upon conservative calculations which ensure that the UHS and its associated systems remain capable of performing their intended safety functions. Although the proposed change would permit the temperature to rise above the new UHS limit for short durations, this allowance is justified based upon the probabilistic risk assessment (PRA) results and the conservative nature of the temperature limit calculation.

   Although the proposed change will result in higher than original design SSWS flow rates and temperatures through the SACS heat exchangers, these heat exchangers were modified and analyzed for higher SSWS flows and temperatures prior to initial fuel load. At that time the heat exchangers were analyzed for operation with SSWS temperatures > 90°F and flow up to 17,000 gpm. Engineering calculations show that maximum flows and temperatures will be below these limits. Piping stress calculations were also reviewed for SSWS

operating temperatures up to 90°F for all heat exchangers' inlet piping and 115°F for all heat exchangers' outlet piping. It was concluded that significant design exists for the small increase in thermal stresses due to a 5°F increase in river temperature (85°F to 90°F).

The increased SSWS flow accounts for the increase in allowable river temperatures while maintaining the same heat removal capability for essential components. As such, there will be no adverse effects to equipment important to safety.

Failures of equipment important to safety affected by this proposal would not result in increased radiological consequences. As there are no modifications to equipment or logic, all equipment will fail in the same manner as before.

2. Will not create the possibility of a new or different kind of accident from any accident previously evaluated.

Since this proposal does not result in any hardware or logic changes, or intent of how systems are operated, no new possibilities or types of accidents are introduced.

3. Will not involve a significant reduction in a margin of safety.

Detailed engineering evaluations have demonstrated that the revisions to the SSWS and SACS identified by Technical Specification 3.7.1.3 will not significantly reduce the ability of these systems to continue to provide sufficient cooling capacity for safety-related equipment during normal and accident conditions with the designed redundancy.

V. Conclusion

Based on the preceding discussion, PSE&G has concluded that the proposed change to the Technical Specifications does not involve a significant hazards consideration insofar as the change: (i) does not involve a significant increase in the probability or consequences of an accident previously evaluated, (ii) does not create the possibility of a new or different kind of accident from any accident previously evaluated, and (iii) does not involve a significant reduction in the margin of safety.