UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 118 TO FACILITY OPERATING LICENSE NO. NPF-57

PUBLIC SERVICE ELECTRIC & GAS COMPANY

ATLANTIC CITY ELECTRIC COMPANY

HOPE CREEK GENERATING STATION

DOCKET NO. 50-354

1.0 INTRODUCTION

By letter dated October 22, 1998, the Public Service Electric & Gas Company (the licensee) submitted a request to change the Hope Creek Generating Station (HCGS), Technical Specification (TSs). The requested change would revise TS 4.8.2.1.b.3 to increase the minimum battery electrolyte temperature limit from 60°F to 72°F. This change resolves a discrepancy in the electrolyte temperature assumed in the Class 1E battery sizing calculations versus the limit specified in the TSs.

2.0 EVALUATION

As described in the HCGS Updated Final Safety Analysis Report (UFSAR), Section 8.3.2.2, the Class 1E dc system is designed to comply with General Design Criterion (GDC) 17 of Appendix A to 10 CFR Part 50, and has sufficient capacity, capability, independence, redundancy, and testability to ensure the performance of its safety functions assuming a single failure.

The Class 1E dc system distributes power at 125 V dc and 250 V dc. The 125 V dc system includes six batteries and the 250 V dc system includes two batteries. As stated in UFSAR Section 8.3.2.1.2.2, each battery has sufficient capacity to independently supply the required loads for 4 hours without support from battery chargers.

Technical Specification 4.8.2.1 provides the surveillance requirements to demonstrate that the HCGS batteries and battery chargers are operable. Surveillance requirement 4.8.2.1.b.3 requires that the average electrolyte temperature of each sixth cell of connected battery cells be above 60°F. The Bases for TS 3/4.8, "Electrical Power Systems," states in part that verifying average electrolyte temperature above the minimum for which the battery was sized compares the battery capacity at that time with the rated capacity.

Factors that should be considered when determining battery capacity are discussed in Section 6.2 of the Institute of Electrical and Electronics Engineers (IEEE) Standard 485-1978, "IEEE Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations." This standard states that battery capacity margin should be provided when

sizing batteries to account for aging degradation. In addition, a "design margin" should be provided to account for load growth and for less than optimum operating conditions of the battery. The original licensing basis for HCGS as discussed in Section 8.3.2.2 of the Hope Creek Safety Evaluation Report (NUREG-1048) states that the batteries were sized to account for aging as well as a design margin to account for less than optimum operating conditions. This section of the Safety Evaluation Report references IEEE Standard 485-1978.

As discussed in Section E2.3 of NRC Inspection Report (IR) 50-354/98-80, dated June 10, 1998, the licensee had revised the battery sizing calculations to address the NRC observation (as discussed in IR 50-354/96-80) that a discrepancy existed between the TS minimum battery temperature (60°F) and the minimum temperature assumed in the battery specification and original sizing calculations (72°F). The NRC review of the revised calculations determined that adequate battery capacity margin was provided to account for aging degradation. However, in the 10 CFR 50.59 safety evaluation to support an associated UFSAR change, the licensee justified changing the design margin range from 5-10% to 0-10% (i.e., minimum design margin was changed from 5% to 0%). This change assumed that the battery capacity design margin was a consumable margin and that design controls were in place to restrict load growth. The licensee's justification failed to recognize that margin was also needed for those periods when the batteries operate at less than optimum conditions. For example, the specific gravity of the electrolyte in a battery drops during battery discharge as the sulphuric acid reacts with the lead plates. The reduction in specific gravity results in a loss of battery capacity.

As discussed in Section 6.2.1 of IEEE Standard 485-1978, the available capacity of a battery cell is affected by its operating temperature. The standard temperature for stating cell capacity is 77°F. If the lowest expected electrolyte temperature is below 77°F, a temperature correction factor is used to determine the capacity. As shown in Table 1 of the IEEE standard, an electrolyte temperature of 77°F has a temperature correction factor of 1.00 while a temperature of 60°F has a temperature correction factor of 1.11 (i.e., battery capacity is 11% less at 60°F than at 77°F).

As stated in the licensee's submittal dated October 22, 1998, the battery sizing calculations were completed using an electrolyte temperature of 77°F ± 5°F and did not include a temperature correction factor. Therefore, the current TS 4.8.2.1.b.3 electrolyte temperature limit of 60°F requires an 11% allocation of battery capacity margin to account for the temperature correction factor. This results in insufficient available battery capacity margin for less than optimum operating conditions. The requested change would revise TS 4.8.2.1.b.3 to increase the minimum battery electrolyte temperature limit from 60°F to 72°F. This change would reduce the temperature correction factor related battery capacity margin allocation from 11% to approximately 3%. The proposed change will enable the remainder of the battery margin to be allocated to the design margin (i.e., for future load growth and less than optimum operating conditions). The licensee has stated that this change will allow the minimum design margin to be reestablished to a value of 5%.

As stated in the licensee's submittal and in UFSAR Section 9.4.1.1.4, the temperature in the battery rooms is maintained at 77°F ±3°F (i.e., minimum temperature of 74°F) by the Control Equipment Room Supply (CERS) system. The CERS is safety-related and is designed to

meet the specified temperature requirements during normal, shutdown, and accident conditions without loss of function. Sufficient redundancy is provided in the CERS design to meet the single failure criteria as required by GDC 17.

Based on the above evaluation, the staff finds that:

(1) The proposed change resolves the discrepancy in the electrolyte temperature assumed in the Class 1E battery sizing calculations versus the limit specified in the TS;

(2) The proposed change enables the battery capacity minimum design margin to be reestablished at a value of 5% which will provide for future load growth and for less than optimum operating conditions of the battery, consistent with the HCGS licensing basis;

(3) The proposed minimum electrolyte temperature of 72°F is justified given that the CERS is designed to maintain the temperature in the battery rooms to a minimum value of 74°F; and

(4) The proposed change is consistent with the requirements of GDC 17 such that the Class 1E dc system will continue to have sufficient capacity, capability, independence, redundancy, and testability to ensure performance of its safety functions assuming a single failure.

Therefore, the proposed change to TS 4.8.2.1.b.3 to increase the minimum battery electrolyte temperature limit from 60°F to 72°F is acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Jersey State Official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes the surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (63 FR 66602). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (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.

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