June 9, 2000

Mr. Harold W. Keiser
Chief Nuclear Officer & President -
Nuclear Business Unit
Public Service Electric & Gas
Company
Post Office Box 236
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK GENERATING STATION, ISSUANCE OF AMENDMENT RE: CLASS 1E BATTERY ELECTROLYTE TEMPERATURE (TAC NO. MA8218)

Dear Mr. Keiser:

The Commission has issued the enclosed Amendment No. 127 to Facility Operating License No. NPF-57 for the Hope Creek Generating Station. This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated February 9, 2000.

This amendment revises TS Limiting Condition for Operation 3.8.2.1 to add two new Action Statements for operating conditions where a Class 1E battery's electrolyte temperature is below the minimum limit specified in TS Surveillance Requirement 4.8.2.1.b.3.

A copy of our safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

/RA/

Richard B. Ennis, Project Manager, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-354

Enclosures: 1. Amendment No. 127 to
License No. NPF-57
2. Safety Evaluation

cc w/encls: See next page

Hope Creek Generating Station

cc:

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PUBLIC SERVICE ELECTRIC & GAS COMPANY

ATLANTIC CITY ELECTRIC COMPANY

DOCKET NO. 50-354

HOPE CREEK GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 127
License No. NPF-57

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment filed by the Public Service Electric & Gas Company (PSE&G) dated February 9, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-57 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 127 , and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into the license. PSE&G shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance, and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: June 9, 2000

ATTACHMENT TO LICENSE AMENDMENT NO. 127

FACILITY OPERATING LICENSE NO. NPF-57

DOCKET NO. 50-354

Insert the following page in the Appendix "A" Technical Specifications. The page is identified by Amendment number and contains marginal lines indicating the areas of change.

Remove	Insert
---	3/4 8-12a

LIMITING CONDITION FOR OPERATION (Continued)

c. With the average electrolyte temperature of each sixth cell of connected cells in any 125v battery at or below 72°F, but at or above 65°F, the battery may be considered OPERABLE for an additional 31 days, provided that:

1. Within 2 hours from identification of degraded temperature, the battery pilot cells are determined to meet Category A limits; and

2. Within 24 hours from identification of degraded temperature, and once per seven days thereafter, all connected cells are determined to meet Category B limits.

Otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. With the average electrolyte temperature of each sixth cell of connected cells in any 250v battery at or below 72°F, but at or above 65°F, the battery may be considered OPERABLE for an additional 31 days, provided that:

1. Within 2 hours from identification of degraded temperature, the battery pilot cells are determined to meet Category A limits; and

2. Within 24 hours from identification of degraded temperature, and once per seven days thereafter, all connected cells are determined to meet Category B limits.

Otherwise, declare the associated HPCI or RCIC system inoperable and take the appropriate ACTION required by the applicable Specification.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 127 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 February 9, 2000, the Public Service Electric & Gas Company (the licensee) submitted a request to change the Hope Creek Generating Station (HCGS) Technical Specifications (TSs). The requested change would revise TS Limiting Condition for Operation (LCO) 3.8.2.1. This change would add two new Action Statements for operating conditions where a Class 1E battery's electrolyte temperature is below the minimum limit specified in TS Surveillance Requirement 4.8.2.1.b.3.

2.0 BACKGROUND

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 Criteria (GDC) 17 of Appendix A to Title 10 of the Code of Federal Regulations (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 72 °F. The current TSs require that the battery be declared inoperable if the electrolyte temperature falls below the 72 °F limit. Action Statement a. of LCO 3.8.2 requires that with any 125 V dc battery inoperable, the inoperable channel must be restored to operable status within 2 hours or the unit must be in at least hot shutdown within the next 12 hours and in cold shutdown within the following 24 hours. Action Statement b. of LCO 3.8.2 requires that

with any 250 V dc battery inoperable, the associated high pressure coolant injection (HPCI) system or reactor core isolation cooling (RCIC) system be declared inoperable and the appropriate action required by the applicable TS be taken.

The licensee's submittal states that low electrolyte temperatures are postulated to occur when a safety-related battery room duct heater fails and ambient conditions cannot maintain the required electrolyte temperature. The submittal further states that although these conditions would reduce battery capacity, the battery, with its design margins, will still be capable of performing its design basis safety functions as long as the electrolyte temperature is at least 65°F. Therefore, to avoid unnecessary plant shutdown transients, the licensee is proposing that TS Action Statements c. and d. be added to LCO 3.8.2 to provide a 31-day period of time to repair duct heaters or otherwise restore battery electrolyte temperatures. The proposed Action Statements would read as follows:

c. With the average electrolyte temperature of each sixth cell of connected cells in any 125v battery at or below 72°F, but at or above 65°F, the battery may be considered OPERABLE for an additional 31 days, provided that:

    1. Within 2 hours from identification of degraded temperature, the battery pilot cells are determined to meet Category A limits; and

    2. Within 24 hours from identification of degraded temperature, and once per seven days thereafter, all connected cells are determined to meet Category B limits.

    Otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

d. With the average electrolyte temperature of each sixth cell of connected cells in any 250v battery at or below 72°F, but at or above 65°F, the battery may be considered OPERABLE for an additional 31 days, provided that:

    1. Within 2 hours from identification of degraded temperature, the battery pilot cells are determined to meet Category A limits; and

    2. Within 24 hours from identification of degraded temperature, and once per seven days thereafter, all connected cells are determined to meet Category B limits.

    Otherwise, declare the associated HPCI or RCIC system inoperable and take the appropriate ACTION required by the applicable Specification.

3.0 EVALUATION

The Bases for HCGS TS 3/4.8, “Electrical Power Systems,” state, 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 compensate for battery aging. In addition, a “design margin” should be provided to account for load growth and for less than optimum operating conditions of the battery due to improper maintenance, recent discharge, or ambient temperatures lower than anticipated.

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).

In a Safety Evaluation (SE) for HCGS TS Amendment No. 118, dated March 25, 1999, the Nuclear Regulatory Commission (NRC) approved a change to Surveillance Requirement 4.8.2.1.b.3 to increase the minimum battery electrolyte limit from 60 °F to 72 °F. This change resolved a discrepancy in the electrolyte temperature assumed in the Class 1E battery sizing calculations versus the limit specified in the TSs. As discussed in the SE for Amendment No. 118, the battery sizing calculations were completed using an electrolyte temperature of 77 °F ± 5 °F (i.e., minimum temperature of 72 °F) and did not include a temperature correction factor. Therefore, the old TS 4.8.2.1.b.3 electrolyte temperature limit of 60 °F (before issuance of Amendment No. 118) required an 11% allocation of battery capacity margin to account for the temperature correction factor. This resulted in insufficient available battery capacity margin for less than optimum operating conditions. The change to TS 4.8.2.1.b.3 in Amendment No. 118 (i.e., increase battery electrolyte temperature limit from 60 °F to 72 °F) allowed the temperature correction factor related battery capacity margin allocation to be reduced from 11% to approximately 3%. This change enabled 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) and allowed the minimum design margin to be reestablished at a value of 5%, as currently shown in UFSAR Section 8.3.2.1.2.2. The 5% design margin is in addition to the 25% battery capacity margin (i.e., margin provided to account for battery aging) which is also discussed in UFSAR Section 8.3.2.1.2.2.

The licensee’s submittal proposes to add TS Action Statements c. and d. to LCO 3.8.2, which would allow the batteries to be considered operable for up to 31 days, as long as the average electrolyte temperature was at or above 65 °F, and TS Table 4.8.2.1-1 Category A and Category B limits were met, as appropriate. As shown in Table 1 of IEEE Standard 485-1978,

an electrolyte temperature of 65 °F has a temperature correction factor of 1.08 (i.e., 8%). As discussed above, the 72 °F electrolyte temperature limit in TS 4.8.2.1.b.3 has a temperature correction factor of approximately 3%. Therefore, the battery capacity would be approximately 5% less at 65 °F versus 72 °F (i.e., 8% - 3%). This would result in the design margin being reduced from 5% to a minimum of 0% during these degraded battery electrolyte temperature conditions. Therefore, the design margin would be temporarily utilized to compensate for less than optimum operating conditions. This is consistent with the HCGS licensing basis as discussed in UFSAR Section 8.3.2.1.2.2.

As discussed in the Bases for TS 3/4.8, the surveillance requirements for demonstrating the operability of the HCGS batteries are in accordance with the recommendations of Regulatory Guide 1.129, “Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants,” and IEEE Standard 450-1980, “IEEE Recommended Practice for Maintenance, Testing and Replacement of Large Lead Storage Batteries for Generating Stations and Substations.” The parameters monitored under the battery surveillance requirements specified in TS Table 4.8.2.1-1 are electrolyte level, float voltage, and specific gravity. For each of these parameters, Table 4.8.2.1-1 includes limits or allowable values that are designated as either Category A, B, or C. Category A defines the normal parameter limits for each designated pilot cell in each battery. Category B defines the normal parameter limits for each connected cell. Category C defines the parameter allowable values for each connected cell.

The proposed new TS Action Statements would require that the operators ensure that the battery pilot cells meet the Category A limits specified in TS Table 4.8.2.1-1 within 2 hours of identifying the degraded battery electrolyte temperature conditions (i.e, $\leq$ 72 °F and $\geq$ 65 °F). In addition, within 24 hours from identification of the degraded battery electrolyte temperature conditions, and once per 7 days thereafter, the operators would need to ensure that the connected cells meet the Category B limits specified in TS Table 4.8.2.1-1.

The Table 4.8.2.1-1 Category A and B limit for electrolyte level ($\geq$minimum level indication mark and <1/4" above maximum level indication mark) is consistent with the guidance in IEEE Standard 450-1980, with an extra 1/4" allowance to account for temperature and charge effects. These limits ensure that the battery cell plates suffer no physical damage and that adequate electron transfer capability is maintained.

The Table 4.8.2.1-1 Category A and B limit for float voltage ($\geq$2.13 volts) is based on the recommendations in IEEE Standard 450-1980, which states that prolonged operation of cells below 2.13 volts can reduce the life expectancy of cells.

The Table 4.8.2.1-1 Category A limit for specific gravity for each pilot cell is $\geq$1.200, which is 0.015 below the manufacturer’s fully charged nominal specific gravity. The Category A limit is characteristic of a charged cell with adequate capacity. The Category B limit for specific gravity for each connected cell is $\geq$1.195, which is 0.020 below the manufacturer’s fully charged nominal specific gravity. Category B limits also require that the average specific gravity of all connected cells be >1.205. This allows some cells to be slightly lower than the nominal requirement as long as others are sufficiently higher so as to maintain the average

above the Category A limit. The TSs require that all specific gravity readings be corrected for electrolyte temperature and level.

The Table 4.8.2.1-1 Category C allowable values for electrolyte level, float voltage, and specific gravity are considered outside of the normal limits (i.e., battery is in a degraded condition), however, the values are specified such that they provide assurance that sufficient battery capacity exists to perform the intended functions while maintaining a margin of safety.

Table 4.8.2.1-1 requires that with the parameters within one or more cells in one or more batteries not within normal limits (i.e., Category A, Category B, or Category A and B limits not met), the battery may be considered operable provided that:

1. Within 1 hour, pilot cell electrolyte levels and float voltages are verified to meet Category C Allowable Values, and

2. Within 24 hours, and once per 7 days thereafter, all battery cell parameters meet Category C Allowable Values, and

3. Within 31 days, all battery cell parameters are restored to within Category A and Category B limits.

Based on the current TSs, a battery would be considered in a normal operating condition if its parameters were within Category A and B limits and the electrolyte temperature was above 72 °F. The battery would be considered degraded (but operable for up to 31 days) if its parameters were within the Category C allowable values and the electrolyte temperature was above 72 °F.

As described in the Background section above, the licensee's submittal proposes to add TS Action Statements c. and d. to LCO 3.8.2, which would allow the batteries to be considered operable for up to 31 days, as long as the average electrolyte temperature was at or above 65 °F, and the TS Table 4.8.2.1-1 Category A and Category B limits were met as appropriate. Under these conditions, the design margin would temporarily be utilized to compensate for the electrolyte temperature being below the 72 °F limit specified in Surveillance Requirement 4.8.2.1.b.3. Since the battery parameters specified in TS Table 4.8.2.1-1 (i.e., electrolyte temperature, float voltage, and specific gravity) will be required to be within the normal limits (i.e., Category A and B), the affected batteries would have sufficient capacity and capability to perform their intended safety-related functions. The provisions of Table 4.8.2.1-1 which allow batteries meeting the Category C allowable values to be considered operable for up to 31 days would not apply to batteries with electrolyte temperatures below the 72 °F limit.

The proposed new Action Statements include the following time limits:

(1) 2-hour limit (from identification of degraded temperature) to verify that the battery pilot cells meet the TS Table 4.8.2.1-1 Category A limits;

(2) 24-hour limit (from identification of degraded temperature) and once per 7 days thereafter to verify that the all battery connected cells meet the TS Table 4.8.2.1-1 Category B limits; and

(3) 31-day limit to restore battery electrolyte temperature above 72 °F limit specified in Surveillance Requirement 4.8.2.1.b.3.

The 2-hour limit is consistent with the existing allowed time to restore an inoperable battery when electrolyte temperature falls below the 72 °F limit, as specified in Action Statement a. for LCO 3.8.2. The other time limits (i.e., 24 hours, 7 days, and 31 days) are consistent with the existing time limits for similar actions required by TS Table 4.8.2.1-1.

Based on the above evaluation, the staff finds that:

(1) Consistent with the HCGS licensing basis, the proposed change would allow all 5% of the battery design margin to be temporarily utilized to compensate for less than optimum operating conditions (i.e., design margin would be 0% at the minimum acceptable battery electrolyte temperature of 65 °F);

(2) Since the proposed change requires that the battery parameters meet the TS Table 4.8.2.1-1 Category A and B limits, the affected batteries would have sufficient capacity and capability to perform their intended safety-related functions (i.e., the proposed change is consistent with the requirements of GDC 17); and

(3) The proposed change contains time requirements that are consistent with the existing TSs.

Therefore, the proposed change to add new TS Action Statements c. and d. to LCO 3.8.2 is acceptable.

4.0 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.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. 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 (65 FR 12294). 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.

6.0 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.

Principal Contributor: R. Ennis

Date: June 9, 2000