

January 24, 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: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2, ISSUANCE OF  
AMENDMENT RE: SINGLE CELL CHARGING OF BATTERIES  
(TAC NOS. MA6343 AND MA6344)

Dear Mr. Keiser:

The Commission has issued the enclosed Amendment Nos. 226 and 207 to Facility Operating License Nos. DPR-70 and DPR-75 for the Salem Nuclear Generating Station, Unit Nos. 1 and 2. These amendments consist of changes to the Technical Specifications in response to your application dated August 25, 1999.

These amendments authorize the licensee to perform single-cell charging of operable safety-related batteries by using non-Class 1E single-cell battery chargers, with proper electrical isolation. The single-cell chargers would be used to restore individual cell float voltage to the normal TS limit.

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/*

William C. Gleaves, Project Manager, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-272 and 50-311

Enclosures: 1. Amendment No. 226 to  
License No. DPR-70  
2. Amendment No. 207 to  
License No. DPR-75  
3. Safety Evaluation

cc w/encls: See next page

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PUBLIC SERVICE ELECTRIC & GAS COMPANY

PHILADELPHIA ELECTRIC COMPANY

DELMARVA POWER AND LIGHT COMPANY

ATLANTIC CITY ELECTRIC COMPANY

DOCKET NO. 50-272

SALEM NUCLEAR GENERATING STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 226  
License No. DPR-70

1. The Nuclear Regulatory Commission (the Commission or the NRC) has found that:
  - A. The application for amendment filed by the Public Service Electric & Gas Company, Philadelphia Electric Company, Delmarva Power and Light Company and Atlantic City Electric Company (the licensees) dated August 25, 1999, 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 hereby amended to authorize the licensee to perform single-cell charging of connected cells in OPERABLE Class 1E batteries, provided the licensee has isolated the batteries from faults in the non-Class 1E charger and ensured that the charger will not be a load on the battery, as described in the licensee's submittal dated August 25, 1999, and evaluated in the staff's Safety Evaluation, dated January 24, 2000.
3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA Bartholomew C. Buckley Acting For/*

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

Date of Issuance: January 24, 2000

PUBLIC SERVICE ELECTRIC & GAS COMPANY

PHILADELPHIA ELECTRIC COMPANY

DELMARVA POWER AND LIGHT COMPANY

ATLANTIC CITY ELECTRIC COMPANY

DOCKET NO. 50-311

SALEM NUCLEAR GENERATING STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 207  
License No. DPR-75

1. The Nuclear Regulatory Commission (the Commission or the NRC) has found that:
  - A. The application for amendment filed by the Public Service Electric & Gas Company, Philadelphia Electric Company, Delmarva Power and Light Company and Atlantic City Electric Company (the licensees) dated August 25, 1999, 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.

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

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA Bartholomew C. Buckley Acting For/***

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

Date of Issuance:

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NOS. 226 AND 207 TO FACILITY OPERATING  
LICENSE NOS. DPR-70 AND DPR-75  
PUBLIC SERVICE ELECTRIC & GAS COMPANY  
PHILADELPHIA ELECTRIC COMPANY  
DELMARVA POWER AND LIGHT COMPANY  
ATLANTIC CITY ELECTRIC COMPANY  
SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2  
DOCKET NOS. 50-272 AND 50-311

## 1.0 INTRODUCTION

By letter dated August 25, 1999, the Public Service Electric & Gas Company (the licensee) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for authorization to perform single-cell charging of operable safety-related batteries by using non-Class 1E single-cell battery chargers, with proper electrical isolation, at the Salem Nuclear Generating Station, Unit Nos. 1 and 2. The single-cell chargers would be used to restore individual cell parameters to the normal TS limit.

## 2.0 BACKGROUND

As described in Section 8.3.2, "DC Power," of the Salem Updated Final Safety Analysis Report (UFSAR), the direct current (DC) electrical power system consists of separate 250-volt DC (VDC), 125-VDC, and 28-VDC sources. The 125- and 28-VDC subsystems form the safety-related (Class 1E) portion of the DC power system. The 125-VDC subsystem generally provides power to operate switchgear, vital instrument bus, emergency lighting, station essential computer inverters, emergency diesel generator distribution panels, alternate shutdown system control power, and engineered safety features control power. The 28-VDC safety-related source supplies power to the low voltage control room system and recorder panel in the main control room. The safety-related portion of the DC system has sufficient capacity, capability, independence, redundancy, and testability to ensure the performance of its safety functions assuming a single failure. A separate non-safety related 125-VDC subsystem serves the 4160-volt circulating water switchgear, 13-kilovolt south bus section breakers, the supervisory control and data acquisition systems, and portions of the switchgear relaying systems.

The Class 1E 125-VDC system is divided into three independent systems while the Class 1E 28-VDC system is divided into two independent systems. The 125-VDC system includes six batteries each consisting of 60 lead calcium cells. The 28-VDC system includes two batteries each consisting of 13 lead calcium cells. Each of the 125-VDC and 28-VDC systems include two 100-percent capacity battery chargers. Only one charger supplies each bus at one time. Under normal operating conditions, the installed Class 1E battery chargers supply the operating DC loads and a float charge to their respective batteries. The float voltage is the voltage applied to a battery to maintain it in a fully charged condition during normal operation. The chargers can also supply the largest combined demand of the various continuous steady-state loads plus charging capacity to restore the associated battery.

When an individual battery cell or a small number of cells exhibit low voltage or low specific gravity, the normal corrective action is to apply an equalizing charge to the entire battery. The equalizing charge (which is at a voltage higher than the float voltage) helps to correct inequalities that may develop in service among battery cells. When the batteries are being equalize-charged, the 125-VDC system voltage can be as high as 139.5 VDC and the 28-VDC system voltage as high as 29.5 VDC. These values are considered the maximum design operating voltages for the 125- and 28-VDC systems, respectively.

TS surveillance requirement (SR) 4.8.2.3.2 requires, in part, at least once per 7 days for each designated pilot cell and at least once per 92 days for each connected cell of the 125-VDC batteries that the electrolyte level, float voltage, and specific gravity meet specified limits. The limits are specified in TS Table 4.8.2.3-1, "Battery Cell Parameters Requirements," and are designated as Category A (limits for each designated pilot cell) and Category B (limits for each connected cell). TS Table 4.8.2.3-1 also specifies, as Category C, the allowable values for electrolyte level, float voltage, and specific gravity for each connected cell. With the parameters of one or more cells in one or more batteries not within normal limits (i.e., Category A, Category B), the battery is considered degraded but is still OPERABLE provided that the Category C values are met. The battery cell parameters must be restored to the Category A and B limits within 31 days. The 31-day action time was derived taking into consideration that, while battery capacity is degraded, sufficient capacity exists to perform the intended function while providing a time period adequate to permit full restoration of the battery cell parameters to normal limits.

For the 28-VDC batteries, TS SR 4.8.2.5.2 requires, in part, that each battery be demonstrated operable by verifying that the electrolyte level, cell voltage, and specific gravity meet the limits specified in the SR; at least once per 7 days for the designated pilot cell and at least once per 92 days for each connected cell. With the one 28-VDC battery inoperable, the battery must be restored to operable status within 2 hours or a plant shutdown must be initiated.

As stated above, when an individual battery cell or a small number of cells exhibit low voltage or low specific gravity, the normal corrective action is to apply an equalizing charge to the entire battery bank (i.e., via the use of the permanently installed Class 1E battery charger). However, the effectiveness of an equalizing charge decreases when only a single cell or a small number of cells require equalizing. In Section 4.4.2, "Equalizing Charge," of the Institute of Electrical and Electronics Engineers (IEEE) Standard 450-1995, "IEEE Recommended Practice for



Maintenance, Testing, and Replacement of Vented Lead Storage Batteries for Stationary Applications,” single-cell charging is an acceptable method of correcting low voltage or low specific gravity cell conditions.

In its August 25, 1999, letter, the licensee proposed the use of non-Class 1E single-cell battery chargers, with proper electrical isolation, to charge connected cells in OPERABLE Class 1E batteries. The single-cell chargers would be used to restore individual cell parameters to the limits specified in the applicable TS section.

### 3.0 EVALUATION

The NRC staff reviewed and evaluated the proposed performance of single-cell charging and the use of non-Class 1E battery chargers as described below.

#### 3.1 Performance of Single-Cell Charging

In its August 25, 1999, letter the licensee stated an equalizing charge applied to the entire battery bank is the normal corrective action to restore the battery from a condition involving low cell voltage or low specific gravity. The licensee also stated that the effectiveness of an equalizing charge decreases when only a single cell or a small number of cells require equalizing. Thus, the licensee concluded that performing a single-cell battery charge is a more effective method of restoring the battery in that case.

Single-cell charging is an accepted industry practice to restore low cell voltage or low specific gravity, which is approved in IEEE Std. 450-1995. Therefore, the staff finds the performance of single-cell charging of single cells or a small number of cells in OPERABLE Class 1E batteries to be acceptable in order to restore individual cell parameters to the limits specified in TS Table 4.8.2.3-1 for the 125-VDC batteries or SR 4.8.2.5.2 for the 28-VDC batteries.

#### 3.2 Use of Non-Class 1E Battery Chargers

The licensee requested that non-Class 1E battery chargers be used for performance of single-cell charging of Class 1E batteries. In its submittal, the licensee committed to the following equipment provisions and procedures with respect to the use of these battery chargers.

##### a. Equipment

1. At least two Class 1E properly rated fuses in series will be used on both the positive and negative leads between the battery charger and the cell(s) to protect the battery if a fault should develop in the charger. The fuses will be bolted to the frame of the battery charger. One set of the fuses will be used to connect the positive lead of the charger to the positive terminal of the battery cell and one set of fuses will be used to connect the negative lead of the charger to the negative terminal of the battery cell.

2. The charger cables will be non-Class 1E, but will utilize cable insulation material with an appropriate rating to minimize the possibility of shorting leads or clips at the cell.
3. The charger design is such that it will not be a load on the connected cell(s) in the event of loss of the charger input voltage or a short circuit in the 120 volt alternating current (AC) source. The charger internal design includes diodes and a power transformer which will not allow current to flow from the DC side to the AC side.

b. Procedures

1. Single-cell charging will be limited to one OPERABLE Class 1E battery bank at a time for either the 125-VDC or 28-VDC system. Also, single-cell charging for an OPERABLE Class 1E battery will not be permitted if less than the minimum number of Class 1E batteries are OPERABLE as required by the TSs.
2. During single-cell charging procedural controls will ensure the proper functioning of the charger. Monitoring will be performed at least once every 4 hours.
3. Cells that have been charged using the single-cell charging method will be checked weekly for 4 weeks after single-cell charging. The increase of surveillance will ensure that the use of single-cell charging will not cause long-term cell degradation to go undetected.

The staff has reviewed the equipment provisions and procedures for the use of non-Class 1E battery chargers to perform single-cell charging of Class 1E batteries. Through the use of the design features described above, the licensee has isolated the batteries from faults in the non-Class 1E charger and ensured that the charger will not be a load on the battery. Accordingly, the licensee has provided sufficient protection of the Class 1E battery from the non-Class 1E charger. In addition, the licensee has included adequate procedures to implement the use of the non-Class 1E charger. Therefore, the staff finds the use of non-Class 1E battery chargers given the equipment provisions and procedures described above to be 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 amendments. The State official had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change 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 amendments involve 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 amendments involve no significant hazards consideration, and there has been no public comment on such finding (64 FR 51349). Accordingly, the amendments meet 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 amendments.

## 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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: S. Saba

Date: January 24, 2000

Salem Nuclear Generating Station,  
Units 1 and 2

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