Thomas J. Martin
Vice President
Engineering and Construction

Public Service Electric and Gas Company 80 Park Place Newark, N.J. 07101 201/430-8316

May 2, 1979

Mr. Boyce H. Grier, Director
U. S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region 1
631 Park Avenue
King of Prussia, Pennsylvania 19406

Dear Mr. Grier:

4 KV VITAL BUS DIFFERENTIAL PROTECTION
10CFR50.55(e) "SIGNIFICANT DEFICIENCY"
NO. 2 UNIT
SALEM GENERATING STATION

On April 11, 1979 a verbal report was made to Region 1, Office of Inspection and Enforcement representative Mr. S. Folsom, advising that a potential deficiency existed relative to General Electric 12PVD11C relays which could be susceptible to misoperation under conditions of a design basis earthquake. This report was provided in accordance with the provisions of 10CFR50.55(e). The following supplemental information is hereby submitted pursuant to our initial report and in accordance with the requirements of 10CFR50.55(e):

1. Background Information

Protection of the 4 KV Vital Buses against faults and transients is provided by a number of protective relays performing various functions. The philosophy of bus protection utilizes an in-depth approach of overlapping and backup protective relay functions.

All safety-related protective relays are required to withstand a seismic disturbance without misoperation causing a degradation of plant safety. Appropriate seismic qualification documentation for the 4 KV Vital Bus Switchgear (GE 5 KV Model Switchgear) and protective relays was provided.

The NRC Seismic Qualification Review Team reviewed this documentation as part of their audit of Salem and requested that the report be augmented with additional data of the type recommended by IEEE Standard 501-1978, "Seismic Testing of Relays." PSE&G requested General Electric to perform an analysis and/or testing as required to generate this additional information for the relays in question and all safety-related protective relays mounted in the switchgear.

2. Description of Deficiency

In preparing additional seismic qualification data for PSE&G, General Electric used actual seismic test data (obtained subsequent to the original report prepared for Salem) to develop required response spectra (RRS) for protective relays used in their 5 KV Switchgear at Salem. The GE-developed RRS is more conservative than the Salem RRS. However, a review of the available test data based on the GE RRS indicated that the GE 12PVD11C style relay is susceptible to misoperation. All other protective relay data is acceptable.

This particular relay is utilized for monitoring differential current on the 4 KV Vital Buses. A signal from the bus differential relay initiates a multitrip which isolates the bus from offsite power and the diesel generators. Misoperation of this relay during a seismic disturbance would result in isolation of the bus from its preferred power source and its emergency power source. Each vital bus incorporates three 12PVD11C relays for differential protection. The failure mode would be common to all three vital buses. This condition is a degradation of the safety systems in that the power sources for the engineered safeguards would not operate in accordance with design criteria.

3. Cause of Deficiency

This particular relay design incorporates a plunger-type mechanism which is susceptible to seismic vibration causing spurious operation of the relay.

4. Effects on Safety

At least two of the three vital buses are required to maintain minimum engineered safeguards and safe plant conditions. The spurious operation of the 12PVD11C relays could cause the total loss of all 4 KV Vital Buses, thereby compromising plant safety. The restoration of power to the vital buses can be accomplished subsequent to the reset of the multitrips and closure of the

infeed breakers or the diesel generator breaker following the seismic event. However, the loss of power during an earthquake could place the plant in a compromised condition until power could be restored.

The present differential relays may cause spurious trips at Salem. The Salem RRS is less than the RRS under which the misoperation of the 12PVD11C was determined. PSE&G has elected to replace this particular relay with a new style relay in the interests of a conservatively safe design.

5. Corrective Action

The immediate corrective action will delete the 4 KV Vital Bus Differential Relays from the tripping circuits to prevent spurious trips and subsequent loss of power during an earthquake. Vital bus protection against bus faults is provided by the overcurrent protective relays. The overcurrent relays meet applicable seismic requirements. In order to reinstate bus differential protection, new protective relays will be installed. The new relays will be GE 12PVD21 style relays which are equivalent relays and which meet all applicable seismic requirements.

6. Schedule for Implementation

A design change (EC-523) has been initiated to accomplish the above-noted corrective action. The installation of the new relays will be accomplished prior to core load of Unit 2.

Very truly yours,