Public Service Electric and Gas Company

Thomas J. Martin Vice President Engineering and Construction 80 Park Plaza, Newark, NJ 07101 201-430-8316 Mailing Address: P.O. Box 570, Newark, NJ 07101

# April 30, 1985

Dr. Thomas E. Murley, Administrator U. S. Nuclear Regulatory Commission Office of Inspection and Enforcement Region I 631 Park Avenue King of Prussia, Pennsylvania 19406

Dear Dr. Murley:

SIGNIFICANT CONSTRUCTION DEFICIENCY MISAPPLIED SEQUENCER RELAYS HOPE CREEK GENERATING STATION

On January 18, 1985, a verbal report was made to Region I, Office of Inspection and Enforcement representative, Mr. J. Strosnider, advising of a potentially significant construction deficiency concerning series 07 sequencer relays that may have been misapplied for their intended function. On February 19, 1985, an interim report was submitted to your office. The following final report is provided in accordance with 10CFR50.55(e).

### Description of the Deficiency

8505230095

Our Architect/Engineer and Constructor, Bechtel, has advised us that twenty-six (26) of the emergency load sequencer output relays supplied by Consolidated Controls Corporation to input the Bailey controls system and associated switchgear have been misapplied. The manufacturer, Airpax-North American Philips, has indicated that the contact gap in the fully open position may be insufficient to quench the arc drawn when breaking 125VDC. Consequently, the contacts may weld together resulting in a subsequent misoperation of the circuit. A total of 144 of the series 07 relays are installed in panels 1A428, 1B428, 1C428 and 1D428.

Our investigation identified two (2) scenarios involving twentysix (26) relays where the noted condition presents a problem.

10 ,6 27

#### Dr. T. E. Murley

- 1. Process Start Inhibit Signal (PSIS) outputs to the same switchgear, energize two relays in parallel, one of which has a contact in the start circuit. The PSIS is present continuously while the sequencer is in operation and can only be reset by the operator at the completion of the sequence. When the sequencer is reset, the back electromagnetic force (EMF) generated by the collapsing field of the relay coils will cause an arc to be drawn across the PSIS relay contact and the magnitude of this could potentially cause the contact to weld shut. Eight (8) relays are affected.
- 2. Outputs to the Bailey logic modules consist of the Bus Power Failure Fanout (LOP Fanout), LOCA Fanout, LOCA and LOP Fanout and Sequencer Fanout (sequencing start signals and PSIS). The Bailey input circuit has a steady state current value of 0.0045 amperes per input circuit. The worst case was identified as Bus Power Failure Fanout inputs to 56 circuits resulting in 0.25 amperes steady state current. Consequently, the contact of the Bus Power Failure Fanout relays could potentially weld together resulting in a subsequent misoperation of this circuit.

Eighteen (18) relays were identified as Bus Power Failure Fanout (LOP Fanout), LOCA Fanout, LOCA and LOP Fanout to Bailey cabinets and switchgears for valves closing and breakers tripping in the events of LOCA and LOP. In the case of Bus Power Failure Fanout, the relays provide LOP signals to AC 1E MOV OVERLOAD/POWER FAILURE monitors.

In summary, the design of the AIRPAX sequencer relays has limited 125VDC application, indicating that the relays should not be used in high loading applications.

# Safety Analysis

Bechtel Project Engineering bas performed an analysis of safety implications based upon the two scenarios described above. They are as follows:

 In the first scenario with PSIS contacts welded shut, the PSIS would not clear to Diesel Generator Room Recirculation Fans. This would cause the sequence start signals to remain sealed-in, therefore the Diesel Generator Recirculation Fans could no longer sequence start. Under a Design Basis Event (DBE), both room recirculation fans would start simultaneously the instant that diesel generator comes on line. This could cause improper loading of the diesel.

### Dr. T. E. Murley

2. In the second situation, with LOCA and LOP Fanout relay contacts welded shut, many components that trip on LOCA and LOP events would not be operating. Bus Power Failure signals to all the AC 1E MOV OVLD/PF monitors would be activated. Although this condition would not affect safe shutdown, it would prohibit the plant from operating at power.

As described in paragraph 1 above, the noted deficiency could cause improper loading and subsequent tripping of the Emergency Diesel Generator. Had the problem gone undetected and uncorrected, safe shutdown of the plant could have been adversely affected. We therefore consider the subject deficiency to be reportable in accordance with 10CFR50.55(e).

### Corrective Action

The twenty-six (26) affected relays will be replaced by Struthers-Dunn relays which are qualified for high loading application at 125VDC. The rework will be tracked and controlled by Nonconformance Report No. 6415.

Very truly yours,

T g Martin RRB

C Office of Inspection and Enforcement Division of Reactor Construction Inspection Washington, D. C. 20555

NRC Resident Inspector - Hope Creek P. O. Box 241 Hancocks Bridge, NJ 08038

Records Center Institute of Nuclear Power Operations 1100 Circle 75 Parkway, Suite 1500 Atlanta, GA 30339