PHILADELPHIA ELECTRIC COMPANY

2301 MARKET STREET

P.O. BOX 8699

PHILADELPHIA, PA. 19101

(215) 841-5001

SHIELDS L. DALTROFF
VICE PRESIDENT
ELECTRIC PRODUCTION

March 30, 1983

Docket Nos. 50-277
50-278

Mr. John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

SUBJECT: Peach Bottom Reactor Protection System (RPS)
Power Supply Modification

References: 1. Application for Amendment of Operating License requesting change to Peach Bottom Technical Specifications relating to the Reactor Protection System, Filed December 23, 1981.

2. Letter to J. F. Stolz from S. L. Daltroff dated October 30, 1981.

Dear Mr. Stolz:

Your letter to E. G. Bauer, Jr., dated February 10, 1983, requested additional information on Philadelphia Electric Company's Peach Bottom Reactor Protection System Power Supply modification. The information requested and our responses are listed below.

(1) Submit draft proposed Technical Specifications with limiting conditions of operation, surveillance requirements, and the

A001

setpoints with time delays for the design modification. See model Standard Technical Specifications (Ref. 2).

Response:

Philadelphia Electric Company previously submitted a proposed Technical Specification on December 23, 1981. (See Reference 1, above). However, after review of the Model Standard Technical Specification, dated July 19, 1982, referenced in your request above, we propose a change to the Application for Amendment of Facility Operating Licenses DPR-44 and DPR-56. The change to the Application pertains to the limiting condition for operation. The Model Technical Specification states: "With one RPS electric power monitoring channel for an inservice RPS MG set or alternative power supply inoperable, restore the inoperable channel to OPERABLE status within 72 hours or remove the associated RPS MG set or alternate power supply from service." The original Application for Amendment, dated December 23, 1981, was written as follows:

Limiting Conditions for Operation

D. Reactor Protection System Power Supply

1.** Reactor Protection System Power Supply:

One trip train* per RPS MG set may be in the bypassed or inoperative condition for a period of one month, provided the other trip train is functionally tested at least once per day. If this condition cannot be satisfied, or if both trip trains are inoperative, the RPS bus shall be transferred to the alternate source or de-energized.

2.** One trip train* of the RPS alternate power supply may be in the bypassed or inoperative condition for a period of one month, provided the other trip train is functionally tested at least once per day. If this condition cannot be satisfied, or if both trip trains are inoperative, the RPS bus shall be transferred to the RPS MG set or de-energized.

* A trip train consists of one breaker, one undervoltage relay, one overvoltage relay , one underfrequency relay, one time delay relay (MG set only), and the associated logic.

** Effective upon installation of the protective trip devices.

To reflect the 72 hour provision in the Model Technical Specification, Philadelphia Electric Company hereby requests that the pending Application for Amendment (Reference 1, above) be amended to include the following:

Limiting Condition for Operation:

D. Reactor Protection System Power Supply

1.** Reactor Protection System Power Supply:

One trip train* per RPS MG set may be in the bypassed or inoperative condition for a period of one month, provided that after 72 hours the other trip train is functionally tested at least once per day. If this condition cannot be satisfied, or if both trip trains are inoperative, the RPS bus shall be transferred to the alternate source or de-energized.

2.** One trip train* of the RPS alternate power supply may be in the bypassed or inoperative condition for a period of one month, provided that after 72 hours the other trip train is functionally tested at least once per day. If this condition cannot be satisfied, or if both trip trains are inoperative, the RPS bus shall be transferred to the RPS MG set or de-energized.

(2) What is the nominal voltage and frequency at the monitoring packages from which the setpoints are selected. Verify this voltage to ensure GE required RPS component terminal voltage of 115 $\pm$ 2V.

Response:

The nominal voltage at the RPS protection panels is 120V and the nominal frequency is 60 Hz. Measurements at Peach Bottom indicate that there is a 2 to 3 volt drop in voltage between the MG sets and the scram solenoid fuse panels at the hydraulic control units. The MG set voltage will be adjusted to maintain a voltage of 115 + 2V at the hydraulic control units after installation of this modification. We will use the procedure detailed in the response to item 5.

(3) Submit verification that the design and installation of the monitoring package (including relay control power, independence, etc.) meet all the requirements of IEEE 279-1971 and IEEE 384-1974.

Response:

The details and electrical drawings of Peach Bottom's RPS package were provided to you by letter (Reference 2, above). The protection for each RPS will consist of two independent Class IE divisions of protection in a single cabinet. A steel barrier will provide physical separation and electrical isolation between divisions. The DC supply for each division will be from a different 125 VDC battery (A and C batteries for RPS A, and B and D batteries for RPS B).

The protection cabinets will be installed in the 4KV emergency switchgear rooms and will be environmentally and seismically qualified for this area. Provisions have been made to allow testing and annunciation of this testing in the Control Room while the units are at power. DC supply availability and operation of relays will be annunciated in the Control Room. The protection package design and installation will meet all the requirements of IEEE 279-1971 and IEEE 384-1974.

(4) The test result indicates a temperature increase of only 0.8 degrees F (0.5%) for a 33% current rise in a solenoid valve when frequency drops to 53 Hz from 60 Hz and an average coil temperature of 182 degrees F. These values show a negligible

I squared R loss in terms of heat (33% current rise causing only 0.5% temperature rise). Also 182 degrees F was based on room ambient temperature during test. What average coil temperature and temperature rise will result when the coil is picked up during plant operation and its designed environment. Confirm the coil capability for these temperatures.

Response:

Bench tests were conducted on a scram solenoid valve to determine the effects of lowered frequency on the coil. The tests were similar to the previous tests performed, except the solenoid valve was subjected to an ambient temperature of 110 degrees F. A temperature of 105 degrees F is the maximum ambient temperature that is expected in the areas of the hydraulic control units during normal operating conditions. The tests simulated the MG set output by maintaining voltage and reducing frequency gradually to 53 Hz during 11 second and 15 second intervals. As the frequency was lowered, the accompanying increases in coil current were measured and changes in coil temperature were monitored with a thermocouple. The components were tested twenty times with this procedure.

It was found that the temperature of the scram solenoid valve increased an average of less than 0.2 degrees F., (less than 0.1%) for each test. These smaller increases in temperature, when compared to our previous tests, can be attributed to the higher ambient and coil operating temperatures. The solenoid valve dropped out when the voltage was removed and picked up when the voltage was reapplied. This was verified during each step of the test.

The test conditions used were more severe than those expected in the plant. Since the tested solenoid valve operated correctly under repeated bench tests, it can be concluded that it will operate correctly with a six second time delay setting for initiation of underfrequency tripping. In addition, the heat rise of the coil during underfrequency conditions was insufficient to affect performance of the solenoid valve during a single event or promote degradation of the coils after repeated events. These additional tests have demonstrated that a six second time delay before initiation of underfrequency tripping will not adversely affect the performance of the scram solenoid valves.

The following results were obtained:

Scram Solenoid Valve @ 110 Degrees F Ambient:

Current at 60 Hz	- 0.23A.	
Current at 53 Hz	- 0.29A.	
Ave. Temp. of Coil	- 217.1 Degrees F	Tests 1-10
Ave. Change in Temp.	- 0.11 Degrees F	Tests 1-10
Ave. Temp. of Coil	- 217.3 Degrees F	Tests 11-20
Ave. Change in Temp.	- 0.16 Degrees F	Tests 11-20

(5) Provide the procedures for testing the design modifications after the installation to insure that acceptable voltages and frequency are present at the terminals of the RPS components such as the scram discharge solenoid valve.

Response

The formal procedure for testing the design modification has not yet been prepared. The intent of the attached draft procedure will be incorporated into the pre-operational test to be performed for this modification.

If you have any questions or require additional information, please do not hesitate to call.

Very truly yours,

Attachment

cc: A. R. Blough
Site Inspector
Peach Bottom

March 30, 1983

ATTACHMENT

Draft Procedure For Verifying Proper RPS Terminal Voltages After Modification Completion

After the modification to install RPS Protection Panels is complete, voltage measurement shall be made at the following locations:

1. At each RPS MG set output breaker

2. At the coil terminals of 2 HFA relays on panel (20)30C15 for the "A" logic, or on panel (20)30C17 for the "B" logic

3. On one scram solenoid in each of the four scram solenoid valve groups for the particular logic under test. (This measurement shall be taken at the local fuse boxes on the hydraulic control units.)

The voltage at the MG set shall initially be set for 120V. If the measurements at (3) above exceed 115 $\pm$ 2V, adjust the MG set output voltage and repeat the above measurements. The voltage at the HFA relays in (2) above should be less than 120V but greater than the solenoid valve voltages.

Frequency measurements shall be made at each RPS MG set output breaker. The MG sets are specified to operate at 60 $\pm$ 1.2 Hz. Normal operating frequency has been found to be approximately 59.8 Hz.