

PHILADELPHIA ELECTRIC COMPANY

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Docket Nos. 50-277
50-278

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

Dear Mr. Stolz:

Your letter of December 7, 1981 requested additional information with regard to adequacy of station electric distribution system voltages for Peach Bottom 2 & 3.

These requests are restated below and are followed by our responses.

1. Verify that the voltage transient caused by starting of the RHR motors will not prevent proper operation of other Class 1E equipment connected to the distribution system, at all voltage levels of operation.

RESPONSE

A test was conducted at Peach Bottom to determine the effects of an RHR motor starting transient on other Class 1E equipment. This test was conducted by isolating a 4 kV bus from the startup sources and supplying it via a diesel generator. Instrumentation was provided to monitor contacts of several

different size 480V contactors and several different types of 120V relays. The RHR pump was started on the 4 kV bus and produced a starting voltage transient of 60% nominal at the different voltage levels. All the contactors and relays stayed in their picked-up condition without interruption during the starting transient. It is expected that the same results would be obtained from a starting transient of this magnitude when operating on the startup sources. The results of this test indicate that a voltage transient of this magnitude should not prevent proper operation of any 480V or 120V equipment connected to the distribution system at the time.

The use of a new transient analysis program has shown that the worst case for an RHR motor starting transient produces a voltage dip to 71.8% nominal on the 4 kV buses. A previous program, which used a more conservative approach, indicated a worst case motor starting voltage drop to 59.4% nominal. The worst case is for one unit at power, an accident in the other unit, the grid operating at 95%, and the loss of an off-site startup source just prior to the accident. The worst voltage transient occurs during the start of the second pair of RHR pumps.

Since the voltage transient test which produced a dip to 60% nominal indicated that there would be no mis-operation of relays or contactors, the new calculated dip of 71.8% nominal is considered acceptable.

2. Perform a voltage analysis to determine the transient effects, if any, on engineered safety features performance during startup of a large, non-Class 1E, motor.

RESPONSE

A transient analysis was performed to determine the transient effects on engineered safety features performance during the start of a 4500 (horsepower) condensate pump. The case analyzed was with an accident in one unit and the other unit at power. Only one startup source was available, the transformer had increased to its full boost tap position. When the station buses transferred to the startup source, the cooling tower load was automatically shed and it was assumed that two condensate pumps were lost in the transfer. Since two condensate pumps may be needed shortly after an accident, this case represents the

start of the second pump. The 230 kV grid was assumed to be operating at 95%. The results obtained are shown below.

220-08 Line	218.5 kV
2SU Bus	12.7 kV
4 kV Buses	3.9 kV
460V MCCs	439 V

These results are within the acceptable limits that were provided previously.

3. Submit results of voltage analysis verification tests in regard to questions 1 and 2.

RESPONSE

Two sets of tests were conducted at Peach Bottom to verify the results of the voltage analyses. The first set of tests was run to verify steady state conditions and the second set of tests was run to verify transient conditions.

The steady state tests were run with Unit 2 at Power and the 13.2/4 kV Emergency Auxiliary Transformer carrying approximately 54% Load. The calculated and measured voltages are shown below.

	<u>Calculated</u>	<u>Measured</u>
Line 220-08	238 kV	238 kV
2 SU Bus	13.79 kV	13.98 kV
4 kV Buses	4.28 kV	4.23 kV
460 V MCC	468 V	462 V

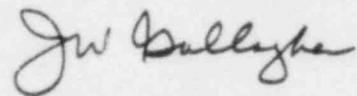
The transient tests were run by starting a 2000 hp RHR pump on the 4 kV bus. The calculated and measured voltages are shown below.

	<u>Calculated</u>	<u>Measured</u>
Line 220-08	238 kV	238 kV
4 kV Bus	3.94 kV	3.87 kV
460 V MCC	431 V	425 V

Since the calculated voltages were found to be within 2% of the measured voltages, it is considered that the results of the tests have verified the transient and steady state analyses.

If there are any questions or if we can provide any additional information, please do not hesitate to contact us.

Very truly yours,

A handwritten signature in cursive script, appearing to read "J.W. Gallagher". The signature is written in dark ink and is positioned below the typed closing "Very truly yours,".