Consumers Power Company

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Director, Nuclear Reactor Regulation
Att Mr Dennis M Crutchfield, Chief
Operating Reactors Branch No 5
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 -
PALISADES PLANT - RESPONSE TO
ADEQUACY OF STATION POWER

Consumers Power Company was requested by NRC letter dated June 19, 1980, to provide additional information on adequacy of station electric distribution system voltages for our Palisades Plant. Our responses are as follows:

Question 1

"Does the 86.25% of 2400 V setpoint of your second level of voltage protection (attachment 2^a) adequately protect 480 V and 120 V class 1E equipment? Response to item 1^d indicates this setpoint is 0.913 PU. Resolve the discrepancy."

Response to Question 1

Relay modifications have been completed and the final version of the logic diagram has been incorporated on Drawing E-17, Sh 1 & 2 of the Palisades' P&IDs. The actual relay setting values are reflected in the Relay Setting Data Sheets submitted in our May 7, 1980 letter to the NRC.

Our October 2, 1978 letter states in the response to Position 1a, "The proposed undervoltage relays will be set to protect the 460 V motors from long-term voltages below 86.25% of 480 V (not 2400 V), and this setting reflected to the 2400 V bus will more than adequately protect the 2300 V motors." Our subsequent voltage drop calculations have shown that a value of 91.3% on the 2400 V bus is needed to ensure a value of 86.25% on the 480 V bus.

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Question 2

"Per NRC guidelines 3 and 9[b], compare the effect of starting and running the largest non-class 1E load on all class 1E equipment with the required voltage range for normal operation of these loads (starters, contactors, motors, etc.). What is the duration of identified transient undervoltage conditions?"

Response to Question 2

Item 4 in the NRC letter to CP Co dated June 6, 1979 asked basically the same question. CP Co responded to that question in a submittal letter dated February 27, 1980. The following is an elaboration on the analysis that was performed and referenced in the February 27, 1980 letter. Referring to the one-line diagrams for the Palisades Plant, it can be seen that the typical large nonclass 1E loads (condensate, primary coolant, cooling tower) are rated at 4160 V. These loads are connected directly to the main transmission system (345 kV) and the analysis shows that the starting and running of these loads has no effect on the voltage at the 2400 V buses. The 2400 V and 4160 V buses are directly connected to the 345 kV system and are not interconnected to each other. Therefore, loads from the 4160 V bus do not affect the loads of the 2400 V bus.

The largest nonclass 1E load on the 2400 V buses is an 800 hp heater drain pump which is only operated when the unit is on line. An analysis was performed assuming the lowest typical generator voltage and found that the 2400 V bus voltage drops to 91% while starting the motor. This voltage level is sustained for approximately 0.7 seconds. The total motor acceleration time was calculated to be approximately 1.6 seconds which is well below the six-second time delay which initiates further undervoltage protection as outlined in Drawing E-17, Sh 1 & 2, of the Palisades Plant P&IDs.

Question 3

"As required by NRC guideline 9, CP should provide analysis and comparison of terminal voltages on all class 1E loads (2300 V, 480 V, and lower voltage loads) for the worst case starting voltage and steady state running voltages. The CP submittals[a,c,d] do not include all of these values."

Response to Question 3

The analysis and comparison of terminal voltages on Class 1E loads for the worst case starting voltage was previously submitted in the Response to Item 9 of the March 7, 1980 letter to the NRC.

The analysis of terminal voltages on Class 1E loads for steady-state running conditions shows a per unit (PU) voltage of 1.015 (Bus 1C), .974 (LC 11), .970 (MCC-1), 1.015 (Bus 1D), .995 (LC 12), .993 (MCC 2). In comparison, as stated in the Response to Question 1 above, the 480 V buses need a voltage of 86.25% to ensure proper operation.

Question 4

"Plant FSAR, Section 8.3.2.2 and single line diagram indicate three alternate sources of offsite power to class 1E buses. Reference 2 includes analysis only for one offsite source (startup transformer). Separate analysis for the other two offsite sources (service transformer and station power transformer) is required."

Response to Question 4

As stated in the Response to Item 1 of the March 7, 1980 letter to the NRC, the largest load demand situation occurs following an accident which trips the unit and initiates an SIS signal. Tripping the unit results in a fast transfer from station power to start-up power. Because of this feature, the Station Power Transformer is not subjected to the same loads as the start-up transformer. Therefore, we did not analyze this voltage condition. We did, however, analyze the effects of starting a large nonclass 1E load (800 hp heater drain pump) while connected to the Station Power Transformer and reported the results of this analysis in the Response to Item 1 in the letter to the NRC dated January 9, 1980. A discussion of this analysis is also included in the Response to Item 4 in the letter to the NRC dated February 27, 1980. Per unit voltages from this analysis have been included in the Response to Question 3 above. Based on the above, we feel that the Station Power Transformer has been sufficiently analyzed for its duties as a source of offsite power.

The Reserve Transformer, referred to by the NRC as a Service Transformer, is only used in the event that the Start-Up Transformer has to be taken out of service and the plant would have to be maintained in a shutdown mode using the on-site power sources (diesel generators). The transformer has a rated capacity equal to both of the diesel generators. If the Reserve Transformer is ever used in a shutdown mode, it will be manually loaded in the same manner as the diesel generators. Since this transformer has no normal operating conditions or automatic loading schemes, no further analysis is required.

Question 5

"As per reference e, the generic issue in reference b, is part of SEP topic VIII-1-A. CP should, therefore, review the station power system for possible violation of GDC-17 as requested in reference b."

Response to Question 5

GDC-17 criteria as it applies to the Palisades Plant will be reviewed under the appropriate SEP Topic evaluation.

David P. Hoffman

David P Hoffman
Nuclear Licensing Administrator

CC: Director, Region III, USNRC
NRC Resident Inspector-Palisades