Florida Power
CORPORATION

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

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Degraded Grid Voltage

Dear Mr. Stolz:

Based upon your review of our December 20, 1980 submittal, your letter of July 17, 1981, requested additional information pertaining to the issue of degraded grid voltage. Florida Power Corporation has reviewed your request and hereby offers the following responses:

Item 1: Verify that the selection of the voltage and time setpoints are determined from your analysis of voltage requirements of the Class 1E loads at all distribution system voltage levels.

Response:

The proposed setpoint of 90% for the second level undervoltage relays was selected based upon a review of all of the steady state condition calculations presented in our December 22, 1980 submittal. The worst case condition is shown in Table 6 as a 2% difference (per unit) between the 4160V and 480V voltage levels. Therefore, a 92% setpoint on the 4160V level would only allow a 90% operating voltage on the 480V level. The 92% setting would be 0.92 x 4000V = 3680 volts. Further, 3680V/4160V = 88.5% actual. So by setting the relays at the 90% TAP, a 1-1/2% margin is used when all distribution system voltage levels are considered on a nominal rating basis.

Item 2: Verify that the voltage protection includes coincidence logic to prevent spurious trips of offsite power.

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Response:

We are enclosing elementary diagram B-208-040: MT-131 to verify the design has coincidence logic to prevent spurious trips of the off-site power. Note that we have proposed the use of a 3 out of 3 logic scheme; i.e., all 3 relays (one per phase) must sense under-voltage. Relays are fail-close designed.

Item 3: Verify that the time delay on the second-level undervoltage relay logic:

a) does not exceed the maximum time delay that is assumed in the FSAR accident analysis (including diesel starting time).

b) minimizes the effect of short-duration disturbances reducing the availability of the offsite power sources.

c) does not result in failure of safety systems or components.

Responses:

3A. The proposed time delay of 23 seconds does not exceed the maximum time that is assumed in the FSAR (See Section 8 page 8-10) of 25 seconds.

3B. Twenty seconds of the 23 seconds time delay is "prior to commit to trip" time. That is, if up to 20 seconds after the relay detects undervoltage, the system voltage returns to tolerable levels, then the undervoltage system will reset itself. After 20 seconds, a transfer to the diesel generator is eminent.

3C. The proposed design is not a "ZONE" protective relay but protects one point or one set of circumstances (i.e., the design limit point of the motors of approximately 90%). In order to achieve protection from spurious trips, a time delay must be used. A time delay of 23 seconds is acceptable at 90 to 92% of the system's rated voltage. However, if the grid voltage were to degrade to say 70%, then the 23 second time would be intolerable and therein lies the paradox; because to reduce the time delay would cause spurious trips.

Based on conversations with your consultant (EG&G), we believe you would desire that we move the inverse time - "ZONE" type - first level undervoltage relay setting to just under the second level settings, thus providing a full zone of protection. A relay coordination study and analysis would be required to address this new issue. If the first level system were moved up to the 90% range, additional time delay relays and/or

replacement of potential transformers may be required. If further analysis will be required to fully address your concern, please advise us so a schedule can be provided.

Item 4: Verify that the voltage monitors automatically initiate the disconnection of offsite power sources whenever the voltage setpoint and time-delay limits have been exceeded.

Response:

The design of this second level system is a complete design and will be a "hard wired" system that will disconnect the offsite system and cause transfer to the diesel generators (i.e., not an alarm feature).

Item 5: Verify that the voltage monitor design satisfies the requirements of IEEE std 279-1971.

Response:

The consultant contracted to perform the design has verified that this design is in accordance with IEEE - 279-1971.

Item 6: Supply preliminary proposed technical specifications in accordance with the model technical specifications (NRC letter dated June 6, 1977). These should include limiting conditions of operation, trip setpoints, with upper and lower limits and allowable time delays.

Response:

We will not be able to propose technical specifications for the second level of undervoltage protection until finalization of our design (reference our response to Item 30 above) and until we have your complete concurrence with our proposed design. At that time, we will evaluate technical specifications on this proposed modification and advise you accordingly.

Item 7: These same technical specifications should include the testing requirements to demonstrate the full operability and independence of the onsite power sources per position 3 (NRC letter dated June 6, 1977).

Response:

See our response to Item 6 above.

Based on the nature and content of further discussion regarding the degraded grid voltage issue, Florida Power Corporation will be able to provide our schedule for installation of the hardware necessary to provide the second level of undervoltage protection at Crystal River Unit 3 once we finalize the design and receive your concurrence. Speculation on that schedule at this time is not meaningful.

Very truly yours,

William A. Cross

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