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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Edwin I. Hatch Nuclear Plant
Degraded Grid Protection

Gentlemen:

Following the electrical distribution system functional inspection which was completed on July 12, 1991, Georgia Power Company (GPC) representatives and the Nuclear Reactor Regulation (NRR) staff have held meetings and telephone conference calls to discuss the performance and protection of safety-related equipment at Edwin I. Hatch Nuclear Plant during postulated degraded grid voltage conditions. By letter dated November 22, 1993, GPC submitted a description of an evaluation which concluded that the existing degraded grid protection system provides an adequate level of safety and is in compliance with applicable regulations.

The degraded grid protection system was originally established in response to the Nuclear Regulatory Commission's letter dated June 2, 1977. This letter requested GPC to compare the design of the emergency power systems with the staff positions stated in the letter's enclosure to assess the susceptibility of the safety-related electrical equipment with regard to a sustained degraded voltage condition at the offsite power sources and interaction between the offsite and onsite emergency power systems. These staff positions, which were the precursors to Branch Technical Position PSB-1, are provided on page E-2 of GPC's November 22, 1993 submittal.

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An electrical distribution system functional inspection (EDSFI) was performed at Plant Hatch from June 10 through July 12, 1991. The NRC team determined that during a postulated design basis loss of coolant accident concurrent with the 4160 volt bus voltage in a narrow 3% band between approximately 91 percent (3786 volts) and 88.34 percent (3675 volts), certain class 1E loads at voltage levels of 600 volts and below may not receive sufficient voltage. The NRC EDSFI team did not agree with GPC's methodology which established a minimum expected value for offsite power to ensure adequate voltage and concluded that the automatic degraded grid protection was not adequate.

GPC's analysis of expected voltages for the safety-related loads uses the minimum expected voltage from the offsite power supply rather than the setpoint for the degraded grid undervoltage relay. As a result, a "deadband" exists between the minimum required voltage on the 4160 volt safety-related busses and the setpoint of 88.34 percent of 4160 volts for initiating an automatic disconnect of the offsite power supply. Consequently, a deviation from the staff position stated in the June 2, 1977 letter exists relative to the initiation of an automatic disconnect from the offsite power source. The deviation is approximately 12 percent when comparing the minimum required voltage to the voltage and time delay stated in the Technical Specifications, which is 78.8 percent of 4160 volts at 21.5 seconds. These setpoints are specified in Table 3.2-12, and Table 3.3.8-1 of the Unit 1 and Unit 2 Technical Specifications, respectively.

GPC's analysis of the degraded grid protection system determined that the evaluation requires consideration of several inputs. As described in GPC's November 22, 1993 submittal, the inputs are the electrical requirements of safety related equipment, the high reliability of the offsite power supply, the potential adverse effects to the plant caused by an unnecessary disconnect from the offsite power source, and the extremely low probability of a sustained degraded grid concurrent with a loss of coolant accident (LOCA). Because of the offsite system monitoring capabilities and design, a sustained degraded grid does not represent the most probable event. Rather, a dynamic voltage excursion lasting less than 10 minutes is more likely. Consequently, the degraded grid voltage protection at Plant Hatch provides adequate assurance of plant safety. As a result, the existing degraded grid protection system uses manual actions instead of an automatic disconnect in the range of the deadband. Accordingly, GPC has implemented an abnormal operating procedure to provide specific actions to address a degraded offsite power supply. If the 4160 volt bus voltages were to degrade below approximately 92 percent, operators will initiate a "one hour to restore" action statement. If voltages are not restored within one hour, a plant shutdown is then initiated.

During recent discussions, the NRR staff requested GPC to incorporate the degraded grid alarms into the Technical Specifications for both units. In response, GPC has agreed to include the alarms, along with the degraded grid undervoltage relays, in the improved Technical Specifications. Accordingly, the limiting condition of operation (LCO) will require the degraded grid alarms to be operable in modes 1, 2, and 3. The specification will include two actions. One will require monitoring the associated 4160 volt bus voltage on an hourly basis if one or more degraded grid alarms are inoperable. Each 4160 volt bus has two alarm relays. The second action will be to restore the inoperable alarm during the next refueling outage. The specification will also include a surveillance to perform an instrument calibration at least once per operating cycle.

Additionally, the NRR staff has verbally requested GPC to consider raising the degraded grid alarm setpoints from their current value of approximately 92 percent of 4160 volts to approximately 97 percent of 4160 volts. The current degraded grid alarm setpoints are specific to the individual 4160 volt busses and range from approximately 92 to 93 percent of 4160 volts. The NRR staff expressed a concern that an alarm setpoint of 92 percent would not provide sufficient notification that the voltage required for (LOCA) conditions had been degraded. GPC has evaluated this request to raise the alarm setpoints to 97 percent of 4160 volts and determined that it is not feasible nor required. The basis for this conclusion is as follows:

The NRR staff's request, basically, corresponds to applying the "hypothetical" alarm and trip ranges. That is, the range between the minimum expected operating voltage and the minimum required for LOCA conditions is sufficiently wide to accommodate an alarm and a trip prior to reaching the minimum required. As described on page E-9 of GPC's November 22, 1993 letter, the existing narrow range between the voltage expected with the offsite power at 101.3 percent of 230 Kv and the minimum required for LOCA loads would not accommodate an alarm setpoint of 97 percent due to the voltage changes associated with normal and startup/shutdown bus alignments to the startup transformers. As a result, an alarm setpoint of 97 percent would be expected to generate frequent nuisance alarms when the non-safety 4160 volt busses are powered from the startup transformers with the offsite power at 101.3 percent of 230 Kv.

The current alarm setpoints of approximately 92 to 93 percent of 4160 volts are approximately midway between the calculated minimum expected voltage with the offsite power at 101.3 percent and the calculated minimum required voltage for normal operating conditions. The current alarm setpoint values signify that adequate voltage is available for normal operations. Consequently, the annunciator response procedures direct the operators to confirm the low voltage condition, contact the GPC control center, and to enter procedure 34AB-S11-001-0S, "Operation With Degraded System Voltage" if the voltage cannot be restored. Procedure 34AB-S11-001-0S directs operators to initiate a "one hour to restore" action statement for restoring the bus voltages to acceptable levels for normal operation. An alarm at 97 percent would not necessarily signify that a degraded voltage condition existed depending on the bus alignments to the startup transformers. From a human factors perspective, the significance of the alarm would be reduced as operators would expect to receive the alarm in certain conditions. Additionally, the current "one hour to restore" action statement significance would be inappropriate for the higher alarm setpoint. Consequently, the setpoints for the degraded grid alarms consider voltage requirements for normal operation as opposed to voltage requirements for LCOCA conditions as the probability of a sustained degraded grid event concurrent with a LCOCA is extremely low and is not a credible event.

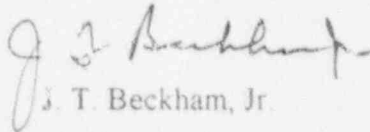
Since GPC's alternate methodology of using manual actions instead of an automatic disconnect differs from the staff position stated in the June 2, 1977 letter, GPC requests formal NRR staff review and approval of this deviation. As described in the November 22, 1993 submittal, GPC has evaluated the deviation from the staff position and concluded that the existing degraded grid protection system is adequate, and is in conformance with applicable regulations. GPC has determined that the deviation is acceptable based on the offsite power system monitoring, the reliability of the offsite power supply, the extremely low probability of a sustained degraded grid event concurrent with a LCOCA, the potential adverse effects to the plant caused by an unnecessary disconnect from the offsite power source, the impact to the offsite power system caused by separating up to 1600 MW during a degraded grid event, and the enhancements provided by operating orders and degraded grid alarms.

U.S. Nuclear Regulatory Commission
July 1, 1994

Page Five

Should you have any questions in this regard, please contact this office.

Sincerely,


J. T. Beckham, Jr.

JKB/cr

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