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Georgia Power
the southern electric system

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LCV-0285-A

Docket Nos. 50-424
50-425

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

Ladies and Gentlemen:

VOGTLE ELECTRIC GENERATING PLANT
RESPONSE TO NRC STATION BLACKOUT INSPECTION
REPORT NOS. 50-424,425/93-28

Georgia Power Company (GPC) submits the enclosed information as requested by NRC Inspection Report Nos. 50-424,425/93-28, dated January 24, 1994. This inspection was conducted from December 6-10, 1993, and was the second within Region II of the pilot program verifying the adequacy of programs, procedures, training, equipment, systems, and supporting documentation for the implementation of the Station Blackout (SBO) Rule, 10 CFR Part 50.63. In the enclosure, each response is preceded by the NRC's item of concern as described in the inspection report.

Georgia Power Company has implemented its required programs, procedures, training, equipment, and systems modifications to be in compliance with the SBO Rule for Vogtle Electric Generating Plant (VEGP). Although there are minor items in the SBO supporting documentation requiring revision, these items will be completed by July 1, 1994. Georgia Power Company does not anticipate any changes to the coping strategy as a result of these revisions and considers this response to be the closure of Generic Issue A-44 "Station Blackout" for VEGP.

Should you have any questions, please contact this office.

Sincerely,

C. K. McCoy

JE01

CKM/AFS

Enclosure: Response to SBO Inspection Report

cc: Georgia Power Company
Mr. J. B. Beasley, Jr.
Mr. M. Sheibani
NORMS

U. S. Nuclear Regulatory Commission
Mr. S. D. Ebneter, Regional Administrator
Mr. D. S. Hood, Licensing Project Manager, NRR
Mr. B. R. Bonser, Senior Resident Inspector, Vogtle

ENCLOSURE

VOGTLE ELECTRIC GENERATING PLANT - UNITS 1 AND 2
RESPONSE TO SBO INSPECTION
NRC INSPECTION REPORT NOS. 50-424,425/93-28

1. **SBO Supporting Documentation - (Battery Systems)**

Item:

"The methodology for control cable sizing was to determine a maximum allowable circuit length for various types of devices then compare these lengths to the actual cable length. Calculation X3CK03-A "Maximum Control Cable Lengths" was very difficult to review because the text was marked out and notes added in numerous places causing the document to be very cluttered."

Response:

Calculation X3CK03-A, "Maximum Control Cable Lengths," will be revised by July 1, 1994, to remove deleted information and incorporate numerous previous revisions to assure the calculation is neat and legible.

Item:

"For all the inverters, loading was based on field measurement of AC current taken during various modes of operation. Safety factors of 1.02 % to 1.05 % were applied to the measured values. However, the team concluded that a safety factor of about 1.1 should have been considered in lieu of the ones used to conservatively account for ammeter accuracy and load fluctuations."

Response:

Calculation X3CF02, "Battery Sizing for Class 1E Battery Systems" will be revised by July 1, 1994, to assure the inverter diversity factor used has a minimum margin of 10 percent above the measured inverter loading at 100 percent power.

ENCLOSURE (CONTINUED)

VOGTLE ELECTRIC GENERATING PLANT - UNITS 1 AND 2
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Item:

"The efficiency assigned to certain inverters in the calculations was not related to the actual load. In general, the efficiency of inverters varies with load, and as load decreases, efficiency decreases. Inverters 1AD1I11, 1BD1I12, 2AD1I11 and 2BD1I12 were assumed to have an efficiency of 84 percent, but the factory test report indicated an efficiency of 82 percent at 100 percent of rated load. Since the load had been determined to be 60 percent of rated on these inverters, an efficiency substantially less than 84 percent should have been used in the calculations. The efficiency assigned to inverters 1DD1I4 and 2DD1I4 in the calculations was 67 percent but the loading was determined to be 64 percent of rated. If the correct efficiencies had been used, the battery loading could have been higher."

Response:

Calculation X3CF02, "Battery Sizing for Class 1E Battery Systems," will be revised by July 1, 1994, to incorporate the correct inverter efficiency for the corresponding load diversity and load limit.

Item:

"Of the two "smaller" loads for which the team requested verification of design input data, the actual loads were determined to be greater than that used in the calculation. The load on circuit 2AD11-08, which is the power supply to the miscellaneous systems equipment panel, should be 8.6 Amps rather than 3 Amps. The load on circuit 2AD11-14, which powers isolation relays for the 13.8 kV switchgear should be 0.23 Amps rather than 0.1 Amps."

Response:

Calculation X3CF02, "Battery Sizing for Class 1E Battery Systems" will be revised by July 1, 1994, to appropriately address the different load profiles for SBO and LOSP/LOCA. The dc panel loading data found on single line diagrams during the inspection and utilized in the Class 1E battery sizing calculation will be transferred to a new dc panel loading calculation that can better document the load fluctuations for normal and accident conditions.

ENCLOSURE (CONTINUED)

VOGTLE ELECTRIC GENERATING PLANT - UNITS 1 AND 2
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Item:

"The team's review of the battery performance curves indicated that end of duty cycle voltage was about 0.5 V less than calculated."

Response:

Calculation X3CF02, "Battery Sizing for Class 1E Battery Systems," will be revised by July 1, 1994, to document the volts per cell selection and the method of interpolation for cell voltages from battery performance curves.

Item:

"In addition, the efficiency assigned to certain inverters in X3CK08-A (Class 1E DC Power Cable Sizing) calculation was questionable because source design input documents were not available. Also, there was uncertainty as to whether resistances used in the battery voltage calculation were adjusted for the ambient temperatures that would exist during an SBO event."

Response:

Calculation X3CK08-A, "Class 1E DC Power Cable Sizing," will be revised by July 1, 1994, to clarify that temperatures utilized are either ambient or conductor temperatures, address the maximum ambient SBO and accident temperatures, assure that short circuit fault analysis is calculated at an ambient temperature of 25°C, and incorporate the same inverter efficiencies utilized in the revision of the Class 1E battery sizing calculation.

ENCLOSURE (CONTINUED)

VOGTLE ELECTRIC GENERATING PLANT - UNITS 1 AND 2
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Item:

"The team noted that the generator field flashing circuit voltage had not been calculated. However, it was calculated during the inspection. The team reviewed this calculation and supporting documentation and concluded that the circuit met the design basis. The licensee indicated that they would incorporate this supplementary calculation into Calculation X3CK08-A, Class 1E DC Power Cable Sizing."

Response:

The calculation for generator field flashing circuit voltage drop will be added to Calculation X3CK08-A, "Class 1E DC Power Cable Sizing" by July 1, 1994.

Item:

"The team identified a few instances where a memorandum of a telephone conversation with a vendor was used to document design basis information rather than the use of formal correspondence. The team considered this a weakness when this information is used as design input information in calculations."

Response:

For the specific instances noted during the SBO inspection where a memorandum of a telephone conversation with a vendor was used as design basis information, these documents will be replaced by July 1, 1994, with references to technical design bases information. Design engineering management will also issue a policy statement by May 1, 1994, clarifying the use of telephone conversation memoranda as design basis information.

2. Recovery Procedures - **(Transmission system grid restoration plan)**

Item:

"The recovery plan contained two alternatives for power restoration One alternative was to blackstart gas turbines at Plant Wilson which is approximately one mile from

the plant switchyard. There is a direct 230 kV connection between Plant Wilson and the switchyard. The weakness with this is that a diesel generator at Plant Wilson is used to power the gas turbine cranking motors, and the generator and motors are separated by a relatively large amount of electrical impedance. Due to this, the cranking motors do not have adequate starting voltage. During a test, the turbines started, but the cranking motors burned up. Therefore, Plant Wilson was not regarded as a reliable recovery source of power.

The second alternative described in the recovery plan was to start at least one unit at the Harlee Branch steam electric plant. Harlee Branch is about 100 miles from the site and power would flow over a 230 kV line which passes through two substations enroute. The unit cannot be started with only onsite power supplies. The team was told that the starting power would be the Wallace Dam hydroelectric power plant which is about 25 miles from Harlee Brach. Wallace Dam has six units for a total capacity of 321 MW. The station is continuously manned, and they have a blackstart procedure.

The weakness with this alternate was the time factor. It would take about 45 minutes to blackstart a hydro unit, and 4-hours minimum after outside power was available to put a Harlee Branch unit on line if the boilers had cooled down. Therefore this power restoration plan could be expected to take longer than the SBO coping duration time of 4-hours.

The team concluded that the Transmission System grid restoration plan did not meet the intent of RG 1.155. The licensee indicated that they would reconsider this approach to recovery of AC power."

Response:

Vogtle Electric Generating Plant is connected to a reliable transmission and generating system through five 230-kV and two 500-kV transmission lines connected to its switchyard. In the event of a system blackout or the loss of offsite power to the nuclear units, the highest possible priority to restoring power will be given to the nuclear units. If transmission lines are damaged, then high priority will be assigned to repair at least one line capable of supplying safety related equipment at the nuclear units. Repair crews engaging in power restoration activities for the nuclear units will be given high priority for manpower, equipment, and materials.

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Even considering the strength of the Southern Company grid and the numerous interconnections with other systems, Georgia Power Company has improved its contingency procedures. "Electric Operations Bulletin (EOB) # 29 - Blackstart Procedures", is in place for training and use by the system operators if an actual shortage of generation or a widespread system disturbance occurred. These procedures provide Georgia Power Company's steam driven electric generating facilities a logistical priority listing of offsite ac power sources capable of supplying emergency shutdown and/or generating startup station service power.

Georgia Power Company has further enhanced the procedure based on the comments received in the SBO inspection report. The procedure within EOB #29, "Restoration of Offsite AC Power for the Shutdown of Plant Vogtle" now clearly states that the most logistical order to be used for restoring offsite power to VEGP would be; 1) First available and capable source, (including a system interconnection if available), 2) Harlee Branch Plant, when generating capacity is sufficient, 3) Wallace Dam Hydroelectric Plant, and 4) Plant Wilson Combustion Turbines. However, it should be understood that this is only a suggested logistical order and the system operators may make different decisions based on circumstances that occur during an actual event.

In addition, Georgia Power Company is reviewing the blackstart capability of Plant Wilson Combustion Turbines and may upgrade this capability if it is deemed to be a cost effective improvement.

With regards to the station blackout rule and offsite power restoration, the guidance found in both RG 1.155, section 2, "Offsite Power," and NUMARC 87-00, Rev. 1, section 4.2.2, does not require independent verification or the demonstration of the timeliness of the offsite ac power restoration, only that procedures exist to assure the facilities have priority and consider several potential methods of transmitting power from blackstart capable units.

In conclusion, Georgia Power Company believes that with its reliable transmission and generating system, multiple system interconnections, training provided to system operators, and the enhanced procedure for "Restoration of Offsite AC Power For the Shutdown Of Plant Vogtle", that transmission system grid restoration plans fully meet the intent of R.G. 1.155.