Entergy Operations

Entergy Operations, Inc.
P.O. Box 756
Port Gibson, MS 39150
Tel 601-437-6408

W. T. Cottle
Vice President
Operations
Grand Gulf Nuclear Station

March 13, 1991

U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D.C. 20555

Attention: Document Control Desk

SUBJECT: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Removal of Battery Load Profile Requirements
Request for Additional Information on PCOL-90/11

GNRO-91/00041

Gentlemen:

By letter dated January 28, 1991 (GNRI-91/00017) the staff requested additional information in order to complete its review of our proposed change to the Grand Gulf Nuclear Station (GGNS) Operating License dated January 11, 1990 (GNRO-91/00004).

The proposed change requested deletion of the Division I, II and III 125 VDC battery load profiles from GGNS Technical Specification 4.8.2.1.d.2. The change had been discussed with the staff at a meeting on November 6, 1990 and modeled after a similar change recently granted to Alabama Power Co. (Joseph M. Farley Nuclear Plant) on October 1, 1990.

Previous to the amendment request, GGNS had reported, pursuant to 10CFR50.73 (LER 90-012-00 dated August 23, 1990; AECM-90/0151) a condition in which the Division III 125 VDC battery load profile currently described in the TS is non conservative when compared with the actual emergency load profile during the 1-60 minute time interval. As corrective action, GGNS immediately corrected the load profile, verified the batteries' capacity to deliver the energy and successfully performed TS surveillance 4.8.2.1.d.2.c using the corrected profile to demonstrate operability. A bounding profile was provided to the staff in LER 90-012-00 and incorporated into Revision 5 to the Updated Final Safety Analysis Report (UFSAR) which was submitted to the staff via AECM-90/0208, dated December 1, 1990. The changes to the Division III load profile associated with this condition were evaluated under the provision of 10CFR 50.59. In response to the staff request, the attachment to this letter provides our response to those questions pertaining to the Division III load calculations.

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The staff also requested that GGNS provide an analysis about the issue of no significant hazards consideration (NSHC) for the change in the Division III battery load profile. The changes proposed in the January 11, 1990 application involved the deletion of the Division I, II, and III DC battery load profiles because they are also contained in the UFSAR. An evaluation of the NSHC associated with the relocation of the battery profiles was provided with that application. GGNS, therefore, is proposing no change to the original application or the NSHC contained in the original application.

If you require additional information, please advise.

Yours truly,

W T Cottle

WTC/JOF/ams
attachment:
cc: Mr. D. C. Hintz (w/a)
Mr. J. Mathis (w/a)
Mr. R. B. McGehee (w/a)
Mr. N. S. Reynolds (w/a)
Mr. H. L. Thomas (w/o)

Mr. Stewart D. Ebneter (w/a)
Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
101 Marietta St., N.W., Suite 2900
Atlanta, Georgia 30323

Mr. L. L. Kintner, Project Manager (w/a)
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop 11D21
Washington, D.C. 20555

GGNS RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION:

The response to questions 1, 2 and 3 below are based on Calculations EC-Q1L21-90020 and EC-Q1L21-90023. These calculations were reviewed in detail by the NRC Region II team during the Electrical Distribution System Functional Inspection (EDSFI) conducted at GGNS during three visits spanning November 14 to December 14, 1990. The team concluded that the ratings of the batteries and chargers were compatible with the present loading, for all analyzed conditions.

Question 1:

Provide a detailed description of the "design duty cycle" for this battery including a tabulation of all the continuous and momentary loads, their duration, and when they occur during the design duty cycle.

Response:

Nuclear Plant Engineering Calculation EC-Q1L21-90020 Revision 1 identifies the loads fed from the division III 125 VDC battery that will be required to operate under concurrent Loss of Off-site Power (LOP) and Loss of Coolant Accident (LOCA) conditions. These loads are summarized and presented below in a tabulated form.

Note that during the first minute, the loads listed below occur sequentially in such a manner that the maximum demand on the battery is equal to 61.271 Amperes or less. Load Description values shown below do not necessarily reflect total connected loads for each category, but do represent the load requirement for each category during the maximum demand period (approximately the first second of the 0 - 60 second period).

Period: 0 - 60 Seconds

Load Description	Load[1] (Amps)
Breaker loads (HPCS, DG & ESF 12)	6.000
- Trip Coils	
- Close Coils	
- Spring Charging Motors	
- Miscellaneous	

[1] Load for each category during maximum demand period.

Diesel Generator Loads	46.364
- Field Flashing	
- DG Relays	
- DG Solenoids	
- Fuel Pumps (Inrush & Steady State)	
Miscellaneous Loads	8.907
- Monitoring	
- Annunciation & Indication	
- Control	
- Alarming (Audible)	
- Miscellaneous	
Total Load (Amperes)	**61.271**

Period: **60 Seconds - 60 Minutes**

Load Description	Load (Amps)
Miscellaneous Steady State Loads	8.365
- Monitoring (Relays, etc.)	
- Annunciation & Indication (Bulbs, etc.)	
- Control (Relays, etc.)	
- Alarming (Horns, etc.)	
- Miscellaneous	
Diesel Generator Steady State Loads	9.08
- Fuel Pumps	
- Relays	
- Miscellaneous	
Total Load (Amperes)	**17.445**

Period: **60 Minutes - 120 Minutes**

Load Description	Load (Amps)
Miscellaneous Steady State Loads	8.36
- Monitoring (Relays, etc.)	
- Annunciation & Indication (Bulbs, etc.)	
- Control (Relays, etc.)	
- Alarming (Horns, etc.)	
- Miscellaneous	

Diesel Generator Steady State Loads	9.08
- Fuel Pumps	
- Relays	
- Miscellaneous	
Total Load (Amperes)	**17.445**

Question 2:

Provide detailed battery capacity versus load calculations used to determine terminal voltage versus time encompassing the current load profile contained in the plant's Technical specifications and the new load profile contained in the plant's UFSAR. Calculations should include assumptions utilized such as: aging factor, margin, minimum allowable terminal voltage. (See IEEE Std 485-1983 for guidance.)

Response:

The loads identified in question 1 are used by calculation EC-Q1L21-90020 Revision 1 to verify the adequate sizing of the Division III battery. As discussed earlier, the load profile developed in calculation EC-Q1L21-90020 Revision 1 reflects continuous and momentary loads that the battery will be subjected to under concurrent LOP and LOCA conditions for the period of the duty cycle (time T=0 to T=120 minutes). This is the basis for the revised load profile in the UFSAR.

The battery sizing calculation is performed using the guidance of IEEE 485-1978, "Recommended Practice For Sizing Large Lead Cell Batteries for Generating Stations and Substations". Conservative assumptions including the appropriate temperature correction factor, aging factor, growth margin as well as the minimum cell voltage are utilized to calculate the required cell size. This calculation verifies that the existing battery (C&D 3DCU-9) is adequately sized to meet the postulated emergency power requirements.

The revised load profile in the UFSAR envelops the actual load profile for the division III battery as developed in calculation EC-Q1L21-90020 Revision 1. Therefore, performing surveillance tests to the revised load profile will adequately test the Division III battery.

Question 3:

Provide a detailed discussion of the basis for the minimum battery terminal voltage determination. Were all components/cable lengths and sizes considered in that determination? What was the limiting component/cable?

Response:

Calculation EC-Q1L21-90023 Revision 3 performs a voltage drop study of the Division III 125 VDC battery. The purpose of this calculation is to verify that Division III 125 VDC devices required to operate under concurrent LOP and LOCA conditions have at least the minimum operating voltage available at their terminals to enable them to perform their safety function.

For operating components (as identified in calculation EC-Q1L21-90020 Revision 1), load information (load current, minimum voltage rating, etc.) as well as path information (cable size, length, resistance, ambient temperature, etc.) are utilized to identify the available voltage at the device terminals. These values are then compared to the respective device manufacturers' minimum operating voltages to verify the availability of adequate voltage. Actual load and cable characteristics have been utilized to model the system.

The calculation shows that under the postulated emergency conditions, the required components have the minimum voltage necessary available at their terminals to perform their design safety function, including consideration for end of life battery capacity, temperature, etc. as delineated in IEEE 485-1978, for the battery size utilized for the GGNS Division III system.

The NRC Region II EDSFI Team reviewed the calculation and verified that adequate battery terminal voltage will exist at the onset of a DBA.

Question 4:

The proposed load profile is based on a LOCA with a loss of battery charger for 2 hours. How does this scenario loading relate to the battery's loading during a station blackout scenario?

Response:

In accordance with the definition of a station blackout (SBO) as given in 10CFR50.2, the HPCS EDG may be assumed to be available during an SBO and in fact can be designated as an alternate power source, if desired. Given that the HPCS EDG is available, power is thus provided to Division III ESF Bus without relying on the Division III batteries.

In the GGNS response to the SBO Rule (AECM-90/0060 dated March 3, 1990), no credit is taken for HPCS operation in conjunction with the SBO coping analysis. Therefore, it was not necessary to evaluate any battery load profile changes to the values given in UFSAR Table 8.3-8 for a postulated SBO scenario.