Entergy

Entergy Operations, Inc.
P. O. Box 756
Port Gibson, MS 39150
Tel 601 437 6409
Fax 601 437 2795

William A. Eaton
Vice President,
Operations
Grand Gulf Nuclear Station

June 14, 2000

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

Subject: Grand Gulf Nuclear Station
Docket No. 50-416
License No. NPF-29
Response to Request for Additional Information Related to Individual Plant Examination of External Events

GNRO-2000/00049

Ladies & Gentlemen:

Attached is the Grand Gulf Nuclear Section (GGNS) response to your letter dated September 8, 1999, requesting additional information related to the GGNS Individual Pant Examination of External Events (IPEEE).

It is anticipated that this additional information in conjunction with the information providing response to your original request for additional information will be sufficient to allow closure of this topic for GGNS.

Neither this cover letter nor the attachment contains any new commitments for GGNS.

Please contact Lonnie Daughtery at (601)437-2334 should you have any questions or require any additional information.

Yours truly,

William A Eaton

LFD/be
attachment: Grand Gulf Nuclear Station Response to Supplemental Request for Additional Information on IPEEE
cc: (See Next Page)

cc: J. L. Dixon-Herrity (GGNS Senior Resident) (w/a)
D. E. Levanway (Wise Carter) (w/a)
N. S. Reynolds (w/a)
L. J. Smith (Wise Carter) (w/a)
H. L. Thomas (w/o)

Mr. E. W. Merschoff (w/2)
Regional Administrator
U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive,
Suite 400 Arlington, TX 76011

Mr. S. P. Sekerak, NRR/DLPM/PD IV-1 (w/2)
ATTN: ADDRESSEE ONLY
U.S. Nuclear Regulatory Commission
One White Flint North, Mail Stop 07-D1
11555 Rockville Pike
Rockville, MD 20852-2378

Grand Gulf Nuclear Station

Response to Supplemental Request for Additional Information on IPEEE

1. *The Reference 1 response to RAI Question 4 relating to the assumed heat release rates (HRRs) from electrical cabinet fires reiterated information provided in the submittal and/or traceable to the Electric Power Research Institute (EPRI) Fire PRA [probabilistic risk assessment] Implementation Guide, without responding to the original RAI. New EPRI guidance included in Reference 2 should be helpful in formulating a new response. The new guidance provides specific recommendations for higher values of HRRs for electrical control cabinets, which may alter the conclusions based on the damage expected from postulated cabinet fires. Please consider the new guidance and submit a revised response to the original question.*

   Response:

   Section 4.12 of Reference 2 provides that cabinets either meet the criteria for using a heat release rate (HRR) of 65 Btu/s or be re-evaluated using 190 Btu/s.

   As the revised guidance does not impact the four screening elements described in Section 4.6.2 of the GGNS IPEEE, only the fire scenarios for the compartments that required detailed analysis were reviewed to determine if they were impacted by the revised criteria. Since the new heat release rate (HRR) guidance impacts the size of the ignition or damage envelope, only evaluations that were originally performed to exclude damage or propagation from cabinet fires to adjacent equipment are potentially impacted. Four of the compartments, CC202, CC210, CC215 and CT200, have fire scenarios involving electrical cabinets where a HRR of 65 Btu/s was used for this purpose.

   The cabinets that were assigned a HRR of 65 Btu/s contain only IEEE 383 cables and were one of the following types: motor control centers, load centers, load shedding and sequencing panel switchgear, battery chargers, indoor dry type ventilated power transformers, indoor dry type lighting transformers, 125 vdc switchboard, 120 vac switchboards, inverters, breaker panels or control panels (e.g., the remote shutdown panel).

   The electrical cabinets in these compartments were walked down and inspected to verify that the electrical wiring and devices were generally installed neatly and prudently as expected. The walkdowns demonstrated that the cables were bundled and cable terminations were direct and clean without unnecessary use of extra lengths of cable/wire or unused terminal blocks. Based on these walkdowns it is believed that the electrical cabinets at GGNS are typical of electrical cabinets found in other power plants and that the 65 Btu/s HRR previously selected as typical for the cabinets is appropriate. However, no attempt was made to determine whether or not *"the fuel configuration is such that there is reasonable expectation that a fire will remain confined to a single bundle of cables"* as provided by the guidance in Reference No. 2. Instead, the alternative approach was selected (i.e., re-evaluating using 190 Btu/s) since it would be more direct and less labor intensive. This direct approach consisted of the following steps:

   (1) Review Original Fire Scenarios for Each of the Affected Compartments -- The fire scenarios were reviewed to identify where the original analysis took credit for screening electrical cabinet ignition sources or took credit for the operability of specific system cables (e.g., HPCS or offsite power) that were not damaged by the electrical cabinet fires.

   (2) Re-analyze the Ignition and Damage Envelopes -- The vertical and horizontal damage & ignition distances were re-analyzed using the 190 Btu/s heat release rate.

(3) Re-evaluate the Affected Fire Scenarios -- Walkdown the affected compartments to determine whether or not the original scenarios remained valid using the 190 Btu/s ignition and damage envelopes.

(4) Re-evaluate Electrical Cabinet Ceiling Jet Evaluations – Ceiling jet evaluations involving electrical cabinets were revised to incorporate a HRR of 190 Btu/s to determine if there was additional impact to important equipment.

RESULTS: The revised evaluations using a heat release rate of 190 Btu/s resulted in larger damage and ignition envelopes but did not affect any of the assumptions made in the individual fire scenarios. The revised ceiling jet evaluations did not change the conclusions of the original evaluations. Therefore, no changes to the core damage frequency determinations in the original analysis were made as the result of applying the new guidance for electrical cabinet heat release rates.

(2) *The Reference 1 response to RAI Question 6 discussed the assumed heat loss factor (HLF) that was used in the GGNS IPEEE analysis. New EPRI guidance on this subject is included in Reference 2, and should be helpful in formulating a new response to this question. The new EPRI guidance provides recommendations for use of lower values of HLF in determining the effects of hot gas layers. Thus, hot gas layer damage may become a more significant contributor to the fire-induced core damage frequency. Previous conclusions should be re-examined given the new guidance. Please consider the new guidance and submit a revised response to the original question.*

Response:

The guidance in Sections 3.2 and 4.2 of Reference 2 is summarized as follows:

(1) where the virtual surface of the fire is located at or above 0.4H a heat loss factor (HLF) of 0.85 may be used, and
(2) where the virtual surface of the fire is located below 0.4H a HLF of 0.70 should be used and it may be assumed that the HGL descends all the way to the floor.

Therefore, original evaluations that used a HLF of 0.85 with a virtual fire surface at or above 0.4 H were not revised and those evaluations that used a HLF of 0.85 with a virtual fire surface located below 0.4 H were revised. In accordance with the guidance provided in Reference 2, the revised evaluations use a HLF of 0.70.

The new evaluations resulted in a reduction in the amount of cable insulation, oil, and combustible storage that would be required to cause a hot gas layer. Since less heat is required to cause a hot gas layer, new walkdowns of the affected areas by a fire protection engineer were performed to determine whether or not a cable fire, oil fire or permanent storage area fire could generate enough heat to cause a hot gas layer.

All hot gas layer (HGL) evaluations were reviewed to determine if revision was necessary because of the new guidance. All of the hot gas layer evaluations where fires originated in an electrical cabinet were revised using the 190 Btu/s HRR.

HGL evaluations were revised for the following compartments: CA101, CA201, CA301, CC104, CC202, CC210, CC215, CC402 and CT100.

HGL fire scenarios were included in the original analysis for compartments CC104, CC202, CC210, CC215 and CC402. The HGL evaluations for these compartments were revised to reflect the new HLF and HRR criteria.

Evaluations in the original analysis determined that HGL scenarios were not required for CA101, CA201, CA301, and CT100. Therefore, these compartments were re-evaluated using the new criteria as described above. These new evaluations confirmed that no new HGL scenarios are required as a result of application of the new guidance.

RESULTS: The revised analysis using a heat release rate of 190 Btu/s, a heat loss factor equal to 0.70 and the assumption that the HGL descends all the way to the floor did not result in any new HGL scenarios. Therefore, no changes to the CDF determinations in the original analysis were made as the result of the new guidance.

References

1. Entergy Operations, Inc., letter (GNRO-98.00012) from W. K. Hughey to the USNRC, dated February 10, 1998.
2. Electric Power Research Institute (EPRI) Report "Guidance for Development of Response to Generic Request for Additional Information on Fire Individual Plant Examination for External Events (IPEEE)," dated May 1999.