

March 24, 2006

Mr. George A. Williams  
Site Vice President  
Grand Gulf Nuclear Station  
Entergy Operations, Inc.  
P. O. Box 756  
Port Gibson, MS 39150

SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 (GGNS), RE: APPLICATION FOR  
AMENDMENT TO THE FACILITY OPERATING LICENSE (FOL) FOR  
PROPOSED RESOLUTION OF KAOWOOL ISSUES, REQUEST FOR  
ADDITIONAL INFORMATION (RAI) (TAC NO. MC8180)

Dear Mr. Williams:

By letter dated August 17, 2005, Entergy Operations, Inc. (the licensee) submitted an amendment request to the FOL for the proposed resolution of Kaowool issues at GGNS.

The NRC staff reviewed the request and determined that additional information is required in order to complete its evaluation. The NRC staff forwarded the draft RAIs to your Matt Crawford, Ron Byrd, and Bill Brice, on February 1, 2006, and forwarded additional draft RAIs to Matt Crawford on February 24, 2006, along with a follow-up RAI on the draft response for RAI question number 1 on February 27, 2006. The above mentioned RAI questions are enclosed.

At the request of Matt Crawford, the NRC staff has made several attempts to schedule a telephone discussion on the proposed responses to the RAIs without success.

In order to complete NRC staff review of GGNS's request by July 1, 2006, please submit the supplemental letter with responses to the RAIs by April 15, 2006.

If you have any questions, please contact me promptly at (301) 415-3308.

Sincerely,

**/RA/**

Bhalchandra Vaidya, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-416

cc: See next page

Enclosure: As stated

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Bhalchandra Vaidya, Project Manager  
Plant Licensing Branch IV  
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Office of Nuclear Reactor Regulation

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Enclosure: As stated

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**ACCESSION NO: ML060800653**

\* No substantial change from RAI Memo

OFFICE	LPL4/PM	LPL4/LA	AFPB/BC *	LPL4/BC
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DATE	03 / 23/2006	03 / 23/2006	02/16/2006	03 / 24/2006

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GRAND GULF NUCLEAR STATION, UNIT 1

APPLICATION FOR AMENDMENT TO THE FACILITIES OPERATING LICENSE

REGARDING PROPOSED RESOLUTION OF KAOWOOL ISSUES

TAC NO. MC8180

REQUESTS FOR ADDITIONAL INFORMATION

- RAI-1.** In Section 4.2.3.3 on *PSA* [Probabilistic Safety Assessment] *Quality*, the licensee states that "... [R]evision [2] of the [GGNS] PSA addressed most of the important observations resulting from the peer review and updated various elements of the analysis. This internal events model was used along with the detailed fire scenario and cable routing information from the GGNS Fire IPEEE [Individual Plant Examination of External Events] analysis to develop an updated Fire PSA model that was used in the risk calculations for this analysis." Since the preceding seems to imply that, while most of the important observations from the peer review had been addressed prior to using the updated internal events model for this analysis, some important observations still remain to be addressed. Please provide a list of these remaining important observations and discuss if failure to have addressed them in any way affects the results of this analysis. If there are any effects, how have they been accounted/compensated for in this analysis?
- RAI-2.** In Section 4.2.3.1 on *Core Damage Frequency* (CDF) and the *Risk Analysis* portion of Attachment 3, the licensee states that "[t]he transient fire frequency for each scenario is weighted based on the area that a fire must be in to result in damage to a given division ... [a]ccording to the Inspection Manual Chapter 0609, Appendix F [*Fire Protection Significance Determination Process* (FPSDP)]." Has the licensee performed an alternate evaluation for transient fire frequency, including weighting, using the more detailed reference which is the basis for the FPSDP, namely NUREG/CR-6850 (Electrical Power Research Institute (EPRI) Topical Report (TR)-1011989), *EPRI/NRC-RES* [Office of Nuclear Regulatory Research] *Fire PRA* [Probabilistic Risk Assessment] *Methodology for Nuclear Power Facilities*? In Volume 2, Chapter 6, of this reference, both a different transient fire frequency and weighting scheme are recommended. A comparison between the results from the licensee's Fire Protection Significance Determination Process (FPSDP)-based estimates and those using NUREG/CR-6850 should be provided, at least for sensitivity purposes.
- RAI-3.** The table *Determination of CDF* on page 24 of Attachment 3, *Change Analysis*, lists the Conditional Core Damage Probability (CCDP) for Scenario 316, Non-failed Division 2, as 1.62E-03. Table 3-12, *Refined Results of Fire PRA*, on page 19 of Enclosure 2, *Grand Gulf* [Nuclear Station] *Fire PRA Quantitative Refinements*, lists this same CCDP as 1.62E-04. Please correct whichever table is in error.
- RAI-4.** Fire modeling analysis of cable interactions in the auxiliary building is based on thermoset cables. In a situation where cables are mixed in a cable tray, this would allow

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a lower threshold for failure and ignition of thermoplastic cables. Thermoplastic cables can provide a path for ignition of adjacent thermoset cables. Are there any situations with mixed cable types in a tray? What failure temperature was used in the fire modeling to damage redundant cables?

**RAI-5.** Fire modeling results will always have a level of uncertainty. Uncertainties in the predications of fire models arise from modeling simplifications employed by an analyst or are inherent to the modeling tools used due to a lack of knowledge concerning the values of key model parameters. Discuss uncertainties associated with the fire modeling results presented in the evaluation.

**RAI-6.** The column line labeling on the various drawings is difficult to read, which inhibits cross referencing with the Background Section (pp. 7-13) of the submittal. Verify that each fire scenario presented is protected by an automatic suppression system and an automatic detection system. Are the fire areas under consideration protected throughout by automatic suppression and detection? Note any other defense-in-depth measures present for each fire scenario.

**RAI-7.** The section *Fire Scenarios* on pages 16 and 17 of Attachment 3, *Change Analysis*, describes two different types of miscellaneous fuel packages: trash bags and Class A combustibles. The trash bags have unit heat release rates ( $\text{kW/m}^2$ ) between 1.5 and 4 times that of the Class A combustibles, based on orientation. Provide a more specific reference for the unit heat release rate for the Class A material. Discuss the difference in unit heat release rates between the miscellaneous Class A fuel packages in the combustible storage areas and the trash bags assumed to be located in the combustible exclusion zones. Are any of the trash bags ever expected to be located in the combustible storage areas? What effect would this have on the fire scenarios presented?

**RAI-8.** Describe the material composition of the trash collection bins referenced in the section *Fire Scenarios* on page 16 of Attachment 3, *Change Analysis*. If the collection bins are made from combustible material, discuss their effect on the appropriate fire scenarios.

**RAI-9.** On page 21 of the section *CDF* of Attachment 3, *Change Analysis*, the assumption is made that the "plausible floor area" used in the calculation of the Weighting Factor for Transient Fires is equal to 50% of the total floor area. This assumption is characterized as conservative. Estimate the actual plausible area in each of the fire zones.

### **RAI-10 : Follow-up Question based on the review of Draft Response to RAI Question 1**

Are the unresolved deficiencies, cited as not appearing in or affecting the fire PRA, of a purely calculational nature such that (1) these initiators CANNOT be induced by fire, or (2) even if they could be induced by fire, the calculational deficiency would not carry over into the resulting accident sequence (i.e., event/fault trees)? For example, referencing the Facts and Observations (F&O) for Element AS-7, if a fire induced a T3B event and fire water was being used to suppress the fire, would there be some limit on the fire water's ability to also provide low pressure makeup to the Reactor Pressure

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Vessel (RPV)? If so, is this degradation of the fire water capability (if any) reflected in the fire CDF for a T3B fire-induced initiating event?

The response must ensure that, although the affected events cited in the F&O's are not fire initiators or fire-related failures, they CANNOT be induced or affected by fire-related failures that, on the surface, would appear to be totally unrelated but, under the surface, somehow could be connected (as discussed in the example for AS-7).

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November 2005