Entergy

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G3NO-2008-00002

October 1, 2008

U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Attention: Document Control Desk

DOCKET: No. 52-024

SUBJECT: Responses to NRC Requests for Additional Information, Letter No. 1 (GG3 COLA)

REFERENCE:

1. Entergy Operations, Inc. letter to NRC – *Application for Combined License for Grand Gulf Unit 3*, dated February 27, 2008 (CNRO-2008-00008) (ADAMS Accession No. ML080640433)

2. NRC letter to Entergy Nuclear, *Request for Additional Information Letter No. 01 Related to SRP Section 19 for the Grand Gulf Combined License Application*, dated September 5, 2008 (ADAMS Accession No. ML0825205810)

Dear Sir or Madam:

In Reference 1, Entergy Operations, Inc. (Entergy) submitted an application for a combined license (COL) for Grand Gulf Nuclear Station (GGNS), Unit 3.

On September 5, 2008, in Reference 2, the NRC requested additional information on two items to support the review of certain portions of the Grand Gulf Unit 3 Combined License Application (COLA). The responses to the following RAIs are provided as Attachments 1 and 2 to this letter:

- RAI Question 19-1, PRA
- RAI Question 19-2, PRA

This letter contains commitments as identified in Attachment 3.

D088
NRO

Should you have any questions, please contact me or Mr. Tom Williamson of my staff. Mr. Williamson may be reached as follows:

Telephone: (601-368-5786)

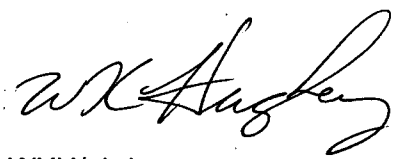
Mailing Address: 1340 Echelon Parkway
Mail Stop M-ECH-21
Jackson, MS 39213

E-Mail Address: twilli2@entergy.com

I declare under penalty of perjury that the foregoing is true and correct.

Executed on October 1, 2008.

Sincerely,



WKH/ghd

Attachments:
1. Response to RAI Question 19-1
2. Response to RAI Question 19-2
3. Regulatory Commitments

cc (email unless otherwise specified; w/o attachments unless otherwise specified):
Mr. T. A. Burke (ECH)
Mr. S. P. Frantz (Morgan, Lewis & Bockius) w/attachments
Mr. B. R. Johnson (GE-Hitachi)
Ms. M. Kray (NuStart)
Mr. P. D. Hinnenkamp (ECH)

NRC Project Manager – GGNS COLA
NRC Director – Division of Construction Projects (Region II)
NRC Regional Administrator - Region IV
NRC Resident Inspectors' Office: GGNS

**ATTACHMENT 1**

**G3NO-2008-00002**

**RESPONSE TO NRC RAI LETTER NO. 1**

**RAI QUESTION NO. 19-1**

## RAI QUESTION NO. 19-1

**NRC RAI 19-1**

The ESBWR Probabilistic Risk Assessment (PRA) (NEDO-33201, Revision 2) does not describe the Grand Gulf yard and service water structure/building fire layout areas and flooding zones since these areas are site specific. In support of meeting the requirement of 10 CFR 52.79(a)(46) pertaining to the plant-specific PRA, the staff requests the applicant provide: 1) description of the fire areas and flooding zones for the Grand Gulf yard and service water structure/building, and 2) description of the impact of these plant-specific fire areas and flooding zones on the PRA results.

**Entergy Response**

Fire Areas

Fire Zone drawings of those portions of the Yard, except for that associated with the Turbine and Electrical Building equipment will be developed six months prior to fuel load. The FSAR will be revised to include this information, as appropriate, as part of a subsequent FSAR update. Refer to the response to COL item 9A.7-2-A in FSAR Section 9A.

For the ESBWR probabilistic internal fire analysis, fire in a given area is assumed to cause failure of all fire-susceptible components in that area. Site-specific results are further bounded by the fact that recovery of the failed system(s) after the postulated fire is not credited in the ESBWR PRA. Using these assumptions, the ESBWR probabilistic fire analysis shows that the risk from fires is still acceptably low. Therefore, the ESBWR probabilistic internal fire analysis is not impacted by Grand Gulf plant-specific fire analyses for the yard and service water areas.

Flooding Zones

The design flood considerations for Unit 3 are based on the local drainage areas shown in FSAR Figure 2.4.1-202, and the grading design shown in FSAR Figure 2.4.1-201. ESBWR DCD Section 3.4.1.1 stipulates that the standard plant grade level is above the design flood level and, as shown in FSAR Sections 2.4.2.3.3.2.3 and 2.4.10, Grand Gulf Unit 3 meets this requirement.

The only components located in the yard that support a safety function are the manual fire hose connections to the Reactor Building and Fuel Building. They provide the capability to connect another source of water to the IC/PCCS pools and the Spent Fuel Pool after seven days following a postulated accident. This timeframe is beyond the PRA mission time and, therefore, external flooding in the yard does not affect PRA results.

Because Service Water is a RTNSS function, as indicated in DCD Appendix 19A Table 19A-4, the design and installation of the Service Water Structure is required to include protection from the effects of external and internal flooding. The Service Water Structure is a site-specific design feature. It is treated in a bounding manner in the ESBWR PRA to demonstrate that site-specific differences in Service Water Structure design do not have a significant effect on the PRA results.

The ESBWR Service Water Structure houses the four Service Water pumps and their associated power supplies and controls. In the ESBWR PRA model, the Service Water Structure is conservatively considered to be one flood zone. All four pumps are assumed to fail in an internal flood. With this conservatism, site specific design differences in the Service Water Structure do not impact the ESBWR PRA results.

The conclusion in DCD Section 19.2.3.2.2 is that there are no significant flood-initiated accident sequences due to the low core damage frequency (CDF). The CDF due to flooding is 1.6 E-9 per year for at-power conditions and 5.2 E-9 per year for shutdown conditions. Overall, the potential effects of Service Water Structure design differences are accounted for by using a bounding analysis, and, therefore, are not significant to the ESBWR PRA results.

**Proposed COLA Revision**

For proposed COLA FSAR changes, see response to RAI 19-2.

**ATTACHMENT 2**

**G3NO-2008-00002**

**RESPONSE TO NRC RAI LETTER NO. 1**

**RAI QUESTION NO. 19-2**

## RAI QUESTION NO. 19-2

### NRC RAI 19-2

FSAR Section 19.5, in support of meeting the requirement of 10 CFR 52.79(a)(46) pertaining to the plant-specific probabilistic risk assessment (PRA), states the following: "The review of site-specific information and plant-specific design information determined that: 1) the DCD PRA bounds site specific and plant-specific design parameters and design features, and 2) these parameters and features have no significant impact on the DCD PRA results and insights." The staff requests the applicant justify the FSAR statements by providing the following: 1) describe the criteria used to determine whether or not site-specific and plant-specific design parameters and design features are bounded by the DCD PRA and explain how the criteria were applied in the evaluation, 2) describe the quantitative criteria used to determine whether or not a site-specific or plant-specific design parameter or design feature has a significant impact on the DCD PRA results and insights, and 3) describe each of the site-specific and plant-specific design parameters and design features that were considered in the evaluation and a brief explanation of the technical basis for concluding there is no significant impact on the DCD PRA results and insights.

### Entergy Response

The ESBWR PRA used the following Grand Gulf site-specific PRA information to develop bounding PRA parameters:

1) Loss of Preferred Power (LOPP) frequency – to determine if the site has unusual off-site power availability problems. The LOPP frequency is divided into plant-centered, switchyard, grid related, and weather related initiating events.

2) Loss of Service Water frequency – to determine if any unusual characteristics would apply to a particular site, with consideration to loss of ultimate heat sink, and the effects of extreme seasonal temperatures.

3) Seismic fragilities – to determine whether the Grand Gulf site-specific design response spectra affects the ESBWR Seismic Margins Analysis (SMA) or the PRA. Note that High Confidence Low Probability of Failure (HCLPF) values will be confirmed as described in Section 19.2.3.2.4.

4) Other Known Site-Specific Issues – to identify site-specific initiating events that are not identified in the ESBWR PRA, such as unique offsite consequence issues.

These parameters represent site-specific parameters that have the potential to affect the PRA. To ensure that the ESBWR PRA is a bounding standard design, the site-specific values for these parameters were used to develop the ESBWR PRA standard values.

Loss of Preferred Power Frequency

The ESBWR LOPP frequencies are based on NUREG/CR-6890, "Reevaluation of Station Blackout Risk at Nuclear Power Plants Analysis of Loss of Offsite Power Events: 1986-2004." The Grand Gulf LOPP frequencies were compared to the ESBWR frequencies to identify any outliers. Although there were variances among the values for the individual LOPP initiating frequencies, the overall Grand Gulf LOPP frequency is less than the ESBWR LOPP frequency and is acceptable. The conclusions in DCD Section 19.2.3.1, "Risk from Internal Events," remain valid for the minor variances in LOPP frequencies.

Loss of Service Water Frequency

The ESBWR Loss of Service Water frequency is based on NUREG/CR-5750, "Rates of Initiating Events at U. S. Nuclear Power Plants: 1987-1995." The contribution of loss of Service Water is less than one percent of core damage frequency (CDF) in the ESBWR PRA. Variances among reported values depend on the design configuration (e.g., redundancy) of the current plants versus the ESBWR design, or external influences such as loss or degradation of heat sink. Although there is a variance in the values between the Grand Gulf and ESBWR PRA loss of Service Water frequencies, their range is acceptable because there is virtually no change in the ESBWR CDF using the Grand Gulf frequency. The conclusions in DCD Section 19.2.3.1, "Risk from Internal Events," remain valid for the minor variances in Loss of Service Water frequencies.

Seismic Fragilities

The ESBWR design incorporates a seismic response spectrum that bounds the potential U.S. sites. The Grand Gulf seismic design response spectrum is departure number GGNS DEP 2.0-1, "Seismic Spectra Exceedance." The effects of the departure have been evaluated and found not to affect the systems considered in the SMA in a manner that could influence the SMA or PRA results.

Other Known Site-Specific Issues

There are no major population areas within the 50-mile radius of the Grand Gulf site, and there are no unusual terrain features that would affect meteorological data or plume dispersion. The conclusions in DCD Section 19.2.5 for offsite consequences remain valid for any potential differences between site features.

Grand Gulf Unit 3 departures from the referenced certified design are listed in FSAR Table 1.8-201. The single departure listed in Table 1.8-201 (GGNS DEP 2.0-1, "Seismic Spectra Exceedance") does not affect the systems considered in the ESBWR PRA model in a manner that would influence the PRA results.

The effect of outage planning and controls on the PRA is included in DCD Table 19.2-3, "Risk Insights and Assumptions," and is addressed through operational program procedures. This DCD Table states that the outage planning and control program is consistent with NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management." The implementation of outage planning procedures is described in FSAR Section 13.5.2.2.9, which states that procedures will provide guidance for the development of refueling and outage plans that will address the guidance described in NUMARC 91-06.

In summary, the ESBWR PRA provides a reasonable representation of the parameters and conditions that are specific to the Grand Gulf site.

**Proposed COLA Revision**

- Appendix 19AA, "Summary of Plant-Specific PRA Review," will be added to the FSAR to incorporate the response to this RAI.
- FSAR Section 19.5, GGNS SUP 19.5-1 will be revised to include a reference to Appendix 19AA.

These changes are shown on the attached FSAR markup.

**Markup of Grand Gulf COLA**

The following markup represents Entergy's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

**Grand Gulf Nuclear Station, Unit 3**
**COL Application**
**Part 2, FSAR**

## 19.5 CONCLUSIONS

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

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GGNS SUP 19.5-1 In accordance with 10 CFR 52.79(a)(46), this report is required to contain a description of the plant-specific PRA and its results. As part of the development of the certified design PRA, site and plant specific information were reviewed to determine if any changes from the certified design PRA were warranted. This review included consideration of site-specific information such as site meteorological data and site-specific population distributions, as well as plant-specific design information that replaced conceptual design information described in the DCD. Section 1.8.5 was also reviewed to determine if there were any departures affecting the PRA results. This review is summarized in Appendix 19AA.

The review of site-specific information and plant-specific design information determined that: 1) the DCD PRA bounds site-specific and plant-specific design parameters and design features and 2) these parameters and features have no significant impact on the DCD PRA results and insights. Therefore, based on this review, it is concluded that there is no significant change from the certified design PRA. In that there are no significant changes from the certified design PRA, incorporation of DCD Chapter 19 into the FSAR satisfies the requirement of 10 CFR 52.79(a)(46) for a description of the plant-specific PRA and its results.

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**Grand Gulf Nuclear Station, Unit 3**
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GGNS SUP 19.5-1 APPENDIX 19AA SUMMARY OF PLANT-SPECIFIC PRA REVIEW

19AA.1 INTRODUCTION

In accordance with 10 CFR 52.79(a)(46), this appendix provides a summary of the plant-specific PRA and its results.

19AA.2 DEVELOPMENT OF THE ESBWR PRA AND PLANT-SPECIFIC PRA

The ESBWR PRA used the following Grand Gulf site-specific PRA information to develop bounding PRA parameters:

- Loss of Preferred Power (LOPP) frequency - to determine if the site has unusual off-site power availability problems. The LOPP frequency is divided into plant-centered, switchyard, grid related, and weather related initiating events.
- Loss of Service Water frequency - to determine if any unusual characteristics would apply to a particular site, with consideration to loss of ultimate heat sink, and the effects of extreme seasonal temperatures.
- Seismic fragilities - to determine whether the Grand Gulf site-specific design response spectra affects the ESBWR Seismic Margins Analysis (SMA) or the PRA. Note that High Confidence Low Probability of Failure (HCLPF) values will be confirmed as described in Section 19.2.3.2.4.
- Other Known Site-Specific Issues - to identify site-specific initiating events that are not identified in the ESBWR PRA, such as unique offsite consequence issues.

These parameters represent site-specific parameters that have the potential to affect the PRA. To ensure that the ESBWR PRA is a bounding standard design, the site-specific values for these parameters were used to develop the ESBWR PRA standard values.

The ESBWR LOPP frequencies are based on NUREG/CR-6890, "Reevaluation of Station Blackout Risk at Nuclear Power Plants Analysis of Loss of Offsite Power Events: 1986-2004". The Grand Gulf LOPP frequencies were compared to the ESBWR frequencies to identify any outliers. Although there were variances among the values for the individual LOPP initiating frequencies, the overall Grand Gulf LOPP frequency is less than the ESBWR LOPP frequency and is acceptable. The conclusions in DCD Section 19.2.3.1, Risk from Internal Events, remain valid for the minor variances in LOPP frequencies.

The ESBWR Loss of Service Water frequency is based on NUREG/CR-5750, "Rates of Initiating Events at U. S. Nuclear Power Plants: 1987-1995." The contribution of loss of Service Water is less than one percent of core damage frequency (CDF) in the ESBWR PRA. Variances among reported values depend

on the design configuration (e.g., redundancy) of the current plants versus the ESBWR design, or external influences such as loss or degradation of heat sink. Although there is a variance in the values between the Grand Gulf and ESBWR PRA loss of Service Water frequencies, their range is acceptable because there is virtually no change in the ESBWR CDF using the Grand Gulf frequency. The conclusions in DCD Section 19.2.3.1, Risk from Internal Events, remain valid for the minor variances in Loss of Service Water frequencies.

The ESBWR design incorporates a seismic response spectrum that bounds the potential US sites. The Grand Gulf seismic design response spectrum is departure number GGNS DEP 2.0-1, "Seismic Spectra Exceedance." The effects of the departure have been evaluated and found not to affect the systems considered in the SMA in a manner that could influence the SMA or PRA results.

There are no major population areas within the 50-mile radius of the Grand Gulf site, and there are no unusual terrain features that would affect meteorological data or plume dispersion. The conclusions in DCD Section 19.2.5 for offsite consequences remain valid for any potential differences between site features.

Grand Gulf Unit 3 departures from the referenced certified design are listed in FSAR Table 1.8-201. The single departure listed in Table 1.8-201 (GGNS DEP 2.0-1 "Seismic Spectra Exceedance") does not affect the systems considered in the ESBWR PRA model in a manner that would influence the PRA results.

## 19AA.3 INTERNAL FIRE ANALYSIS AND INTERNAL FLOODING

### 19AA.3.1 INTERNAL FIRE ANALYSIS

Fire Zone drawings of those portions of the Yard, except for that associated with the Turbine and Electrical Building equipment will be developed six months prior to fuel load. The FSAR will be revised to include this information, as appropriate, as part of a subsequent FSAR update (reference Section 9A.4.7).

For the ESBWR probabilistic internal fire analysis, fire in a given area is assumed to cause failure of all fire-susceptible components in that area. Site-specific results are further bounded by the fact that recovery of the failed system(s) after the postulated fire is not credited in the ESBWR PRA. Using these assumptions, the ESBWR probabilistic fire analysis shows that the risk from fires is still acceptably low. Therefore, the ESBWR probabilistic internal fire analysis is not impacted by Grand Gulf plant-specific fire analyses for the yard and service water areas.

### 19AA.3.2 INTERNAL FLOODING ASSOCIATED WITH THE YARD AREA

The design flood considerations for Unit 3 are based on the local drainage areas shown in FSAR Figure 2.4.1-202, and the grading design shown in FSAR Figure 2.4.1-201. DCD Section 3.4.1.1 stipulates that the standard plant grade level is above the design flood level and, as shown in FSAR Sections 2.4.2.3,3.2.3 and 2.4.10, Grand Gulf Unit 3 meets this requirement.

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The only components located in the yard that support a safety function are the manual fire hose connections to the Reactor Building and Fuel Building. They provide the capability to connect another source of water to the IC/PCCS pools and the Spent Fuel Pool after seven days following a postulated accident. This timeframe is beyond the PRA mission time and, therefore, external flooding in the yard does not affect PRA results.

19AA.3.3 INTERNAL FLOODING ASSOCIATED WITH THE SERVICE WATER BUILDING

Because Service Water is a RTNSS function, as indicated in DCD Appendix 19A Table 19A-4, the design and installation of the Service Water Structure is required to include protection from the effects of external and internal flooding. The Service Water Structure is a site-specific design feature. It is treated in a bounding manner in the ESBWR PRA to demonstrate that site-specific differences in Service Water Structure design do not have a significant effect on the PRA results.

The Service Water Structure houses the four Service Water pumps and their associated power supplies and controls. In the ESBWR PRA model, the Service Water Structure is conservatively considered to be one flood zone. All four pumps are assumed to fail in an internal flood. With this conservatism, site specific design differences in the Service Water Structure do not impact the ESBWR PRA results.

The conclusion in DCD Section 19.2.3.2.2 is that there are no significant flood-initiated accident sequences due to the low CDF. The CDF due to flooding is 1.6 E-9 per year for at-power conditions and 5.2 E-9 per year for shutdown conditions. Overall, the potential effects of Service Water Structure design differences are accounted for by using a bounding analysis, and, therefore, are not significant to the ESBWR PRA results.

19AA.4 SUMMARY

In summary, the ESBWR PRA provides a reasonable representation of the parameters and conditions that are specific to the Grand Gulf site.

**ATTACHMENT 3**

**G3NO-2008-00002**

**REGULATORY COMMITMENTS**

## REGULATORY COMMITMENTS

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

| COMMITMENT | TYPE (Check one) | | SCHEDULED COMPLETION DATE (If Required) |
|---|---|---|---|
| | ONE-TIME ACTION | CONTINUING COMPLIANCE | |
| Entergy will revise FSAR Section 19.5 and Appendix 19AA, as indicated in the draft revisions included in Attachment 2 of this letter, in Revision 1 of Part 2 of the COL application. | ✓ | | Future COLA Submittal |