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CNRO-2008-00014

April 9, 2008

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

DOCKET: NRC Project No. 744

SUBJECT: Response to USNRC COLA Acceptance Review Questions (Geologic and Seismic Information)

REFERENCE: Entergy Operations, Inc. (EOI) letter to USNRC – Application for Combined License for Grand Gulf Unit 3 (CNRO-2008-00008), dated February 27, 2008.

Dear Sir or Madam:

In the referenced letter, Entergy Operations, Inc. (Entergy) submitted an application for a Combined License (COL) for Grand Gulf Nuclear Station, Unit 3.

On March 19, 2008, Entergy met with the NRC Staff to discuss technical aspects of the COL application in support of the NRC's acceptance review of the application. During that meeting and in subsequent telephone conferences, the NRC Staff raised questions about the content of the COL application Part 2, FSAR Sections 2.5.1 and 2.5.3. The information included in Attachment 1 is provided to address the Staff's questions relative to the content of these sections.

Subsequent to this letter, Entergy will develop necessary changes to FSAR Sections 2.5.1 and 2.5.3 (and associated changes to FSAR Section 2.5.4). The proposed changes would be discussed with the NRC Staff, as necessary, to ensure the content meets Staff needs. These FSAR changes will be incorporated into Revision 1 of the COL application, and submitted at a later date, yet to be determined. See Attachment 2 for statement of commitment.

Should you have any questions, please contact me or Tom Williamson (601-368-5786).

D079
NRO

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

Executed on April 9, 2008.

Sincerely,

WKH/ghd

Attachments: 1. Response to NRC Questions – GGNS COLA FSAR Sections 2.5.1, 2.5.3, and 2.5.4
2. List of Regulatory Commitments

cc: Mr. T. A. Burke (ECH)
Mr. S. P. Frantz (Morgan, Lewis & Bockius)
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

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NRC STAFF ISSUE

In Entergy's meeting with the NRC Staff on March 19, 2008, regarding the Grand Gulf Nuclear Station (GGNS) Unit 3, Combined License Application (COLA), the NRC Staff raised questions regarding COLA Part 2, FSAR Sections 2.5.1 and 2.5.3. These FSAR sections incorporate by reference the GGNS Early Site Permit (ESP) Site Safety Analysis Report (SSAR) Sections 2.5.1 and 2.5.3, with no supplements or variances. Because SSAR Sections 2.5.1 and 2.5.3 had been incorporated by reference, with no supplements or variances, it was not clear to the NRC Staff as to the continued validity of ESP stage conclusions in these SSAR sections given the later COL stage characterizations provided in FSAR Section 2.5.4.

ENTERGY RESPONSE

The following information and clarification is provided in response to the NRC Staff questions.

A. Background, General Approach to COLA FSAR Section 2.5

The ESP SSAR Section 2.5 provided information on the geological, seismological, and geophysical characteristics of the Site Region (200-mile radius), Site Vicinity (25-mile radius), Site Area (5-mile radius), and Site Location (0.6-mile radius). SSAR Section 2.5.1.1 addressed geology, seismology, and geophysics related to areas more distant from the site itself, that is, Site Region, Site Vicinity, and Site Area. SSAR Section 2.5.1.2 focused on the geology, providing information on the physical setting, geological history, and subsurface conditions within the Site Area and, in most detail, on the Site Location.

At ESP, information on the Site Region, Site Vicinity, and Site Area was largely based on research, review, and reporting of literature and other referenced analyses of geological and seismological matters. The information and analyses for the Site Location was founded on the original geotechnical characterization of the GGNS site, supporting Unit 1 licensing, and augmented by limited additional borings and in-situ testing performed specifically for the proposed ESP site.

To support the COL application, with a specific plant design selected and the plant footprint, embedment depth, and other related design requirements defined, more detailed site geologic investigations were performed to characterize subsurface conditions. Additional in-situ testing and required laboratory testing and results analyses were also completed. This work was performed, and the information was reported in FSAR Section 2.5.4 to address numerous ESP COL Action Items [as documented in the NRC Final Safety Evaluation Report (NUREG-1840) and also listed in the Grand Gulf early site permit (ESP-002), Appendix C]. Each ESP COL Action Item was addressed in the FSAR (as indicated by the appropriate left margin annotation).

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The primary tasks performed during the COL investigation program related to additional borings, laboratory testing, geophysical analyses, and field reconnaissance. The COL investigation program included 97 boreholes (FSAR Section 2.5.4.3.1.2), in-situ geophysical testing in 13 boreholes, 23 pressuremeter tests, 28 CPT soundings, 4 test pits, and 15 Spectral Analysis of Surface Waves (SASW) surveys, as well as additional field reconnaissance and extensive site-specific groundwater monitoring. The resulting data provided a much more detailed understanding of surface and subsurface geologic conditions and supported refinement of the Site Location stratigraphic framework. The results of the COL investigation regarding stratigraphy and lithology were reported in detail in FSAR Section 2.5.4. As discussed in FSAR Section 2.5.4.1.1, this refined stratigraphic framework was compared with GGNS Unit 1 and ESP SSAR borehole results. FSAR Table 2.5.4-201, "Summary of Stratigraphic Units and Correlation to Previous Studies," provides a summary comparison of the more refined COL stage understanding of stratigraphy with the prior SSAR and GGNS Unit 1 work.

Investigations during the ESP stage regarding the potential for surface fault rupture were reported in SSAR Section 2.5.3. During the COL stage, in addition to geotechnical borings, investigations included additional geologic field mapping (with stereoscopic aerial photograph analysis) and field geomorphic mapping of slopes. This work supported analysis and conclusions of the site's lack of potential for surface faulting, continuity of deposits, and long term tectonic stability of the Site Location.

B. Status of SSAR Sections 2.5.1 and 2.5.3 Conclusions

Table 1 provides a listing of key conclusions reached in SSAR Sections 2.5.1 and 2.5.3. The Evaluation Summaries in the table provide a brief discussion of applicable aspects of the COL investigation and analyses relative to each listed SSAR conclusion and demonstrate that these SSAR conclusions remain valid, with one clarification related to foundation bearing material.

Evaluation Summary Item A.12, provided in the attached Table 1, pertains to the SSAR Section 2.5.1.2.5 and 2.5.4.4 statements regarding the use of loess material for safety-related structure foundation bearing. FSAR Section 2.5.4 (as noted in the Evaluation Summary for Item A.12) addresses and evaluates the acceptability of use of the loess in combination with structural backfill for the fire water storage complex (FSWC). This represents a change to statements in SSAR Sections 2.5.1.2.5 and 2.5.4.4. This change will be addressed in a request for variance related to changes to SSAR Section 2.5.1.2, as described below.

The COL stage investigation of Site Location geology, reported in FSAR Section 2.5.4, evaluated both SSAR and GGNS Unit 1 investigations, in light of the substantial additional site-specific data obtained during the COL stage program. The evaluation process included a review and interpretation of previous study data to assure proper consideration and inclusion in the COL analyses and reporting.

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The COL investigation was limited to the Site Location and primarily focused on documenting subsurface conditions and geotechnical properties of the Site Location. Therefore, issues related to regional geology (i.e., Site Region, Site Vicinity, and Site Area) were not revisited. Had the site-specific COL investigation revealed evidence or results inconsistent with the conclusions reached in SSAR Sections 2.5.1 and 2.5.3 regarding the regional geology, additional review and evaluation would have been included in FSAR Sections 2.5.1, 2.5.3, and 2.5.4. As noted above, the Table 1 Evaluation Summaries indicate that SSAR Section 2.5.1 and 2.5.3 conclusions remain valid, with one clarification noted.

While not directly related to FSAR Sections 2.5.1 and 2.5.3, it should be noted that additional earthquake information obtained during the COL investigation was evaluated for compliance with appropriate SSAR analyses and conclusions. This included information regarding two recent (2006) seismic events recorded in the Gulf of Mexico. This new earthquake information was included in the revised FSAR Section 2.5.2 Probabilistic Seismic Hazards Analysis description.

C. Proposed Approach to FSAR Section 2.5 Changes

Subsequent to this letter, in response to the NRC Staff questions, changes will be developed in FSAR Section 2.5. Entergy will revise FSAR Sections 2.5.1, 2.5.3, and 2.5.4, as discussed below, and the revisions will be submitted as part of Revision 1 of the COL application. The following summarizes the changes to FSAR Sections 2.5.1, 2.5.3 and 2.5.4.

In that SSAR Sections 2.5.1 and 2.5.3 were incorporated into the FSAR without change, proposed changes (topically described below) to supplement or revise SSAR material will in some cases require the use of SSAR section numbering not used in the current COLA Revision 0 FSAR. For clarity, such sections mentioned below (and in Table 1) are prefaced with "new" the first time they are mentioned below.

- **FSAR Section 2.5 (Geology, Seismology, and Geotechnical Engineering)**

  The introductory material in SSAR Section 2.5 (i.e., pp. 2.5-1 and -2) will be supplemented in FSAR Section 2.5 to clarify the relationship of ESP stage investigations to those performed to support the COL application.

- **FSAR Section 2.5.1 (Basic Data) and New FSAR Section 2.5.1.1 (Regional Geology)**

  The bulk of this material pertains to regional geology, and only minor clarifications will be provided consistent with the updated, more detailed descriptions of site stratigraphy and lithology.

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- **FSAR New Section 2.5.1.2 (Site Geology)**

  The majority of FSAR Section 2.5.4.1.1 (Site Stratigraphy and Lithology), FSAR 2.5.4.1.2 (Geologic Material Descriptions), and FSAR Section 2.5.4.1.3 (Geologic History) will be relocated into FSAR Section 2.5.1.2. In addition, FSAR Table 2.5.4-201, and supporting figures will also be relocated to FSAR Section 2.5.1.2. With the relocation of this material to FSAR Section 2.5.1.2, clarifying information will be added to better describe the relationship of ESP stage work and the results of the COL investigations and analyses regarding stratigraphy by providing the current, refined classifications of subsurface materials. This relocation of the above mentioned FSAR Section 2.5.4 material to FSAR Section 2.5.1, will replace information in SSAR 2.5.1.2, that was incorporated by reference. This is considered a deviation from the SSAR; therefore, a variance from the ESP will be requested. This request for variance will be described in COLA Part 7 (Departures Report).

  In addition, SSAR Section 2.5.1.2 (as incorporated into FSAR Section 2.5.1.2) will be revised to reflect the clarification to SSAR Sections 2.5.1.2.5 and 2.5.4.4 statements regarding the use of loess material for safety-related structure foundation bearing, as described in Part B above. This change will be addressed in the request for variance related to changes to SSAR Section 2.5.1.2.

- **FSAR 2.5.3 (Surface Faulting)**

  This section will be revised to provide supplemental relevant information from the COL investigations, confirming SSAR conclusions regarding the potential for surface fault rupture at the Site Location.

- **FSAR 2.5.4 (Stability of Subsurface Materials and Foundations)**

  This section will be revised, as necessary, to support relocation of material, as discussed in Item C.3 above, into FSAR Section 2.5.1.2.

- **COLA Part 7 (Departures Report)**

  COLA Part 7 will be revised to add a request for variance related to changes in SSAR Section 2.5.1.2. This variance will also address changes to SSAR Section 2.5.1.2.5, relating to the limited use of loess for foundation bearing as discussed in Item A.12 of Table 1 below.

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Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions			
Item	**SSAR Section, Page**	**SSAR Conclusion Statement**	**Evaluation Summary**
A	**2.5.1**		
A.1	2.5.1.1 p. 2.5-4	The Site Region is characterized by extremely low rates of earthquake activity (Figure 2.5-5).	The COL investigation was limited to the Site Location and primarily focused on documenting subsurface conditions and geotechnical properties of the Site Location. Regional earthquake recurrence rates were not addressed by the COL investigation program but are supported by reference as stated in SSAR Section 2.5.1.1 and are unaffected by the COL investigation and analyses.
A.2	2.5.1.1.6 p. 2.5-37	This low rate of activity has characterized the seismicity of the Gulf Coast Plan for over 150 years, and most likely throughout the Quaternary.	See the Evaluation Summary for Item A.1 (above).

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Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions

Item	SSAR Section, Page	SSAR Conclusion Statement	Evaluation Summary
A.3	2.5.1.1.6 p. 2.5-37	Furthermore, no faults have been mapped within approximately 90 miles of the proposed location of the new facility at the Grand Gulf Nuclear Station.	Geologic field mapping including stereoscopic aerial photograph analysis was performed during the COL investigation at the Site Location (FSAR Figure 2.5.4–202), and field geomorphic mapping of slopes on site were done to address slope stability (FSAR Figure 2.5.5–204). No evidence for surface fault rupture was found. Additionally, 97 geotechnical borings were advanced at the Site Location. The stratigraphic information was processed in a GIS database and numerous geologic cross sections and subsurface structural contour maps were produced (FSAR Figures 2.5.4–215 to 2.5.4–232). These figures demonstrate the continuity of the deposits of Miocene and younger age, and the long-term tectonic stability of the Site Location. Results of geophysical studies (SASW as discussed in FSAR Section 2.5.4.2.2 and FSAR Figure 2.4.5-260) during the COL investigation were evaluated for evidence of non-tectonic activity. The results support the continuity of the deposits and the long term tectonic stability of the Site Location. Regional faulting was not addressed in the COL investigation program, but the conclusion in SSAR Section 2.5.1.1.6 regarding faults beyond the Site Location is unaffected by the COL investigation and analyses.

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Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions

Item	SSAR Section, Page	SSAR Conclusion Statement	Evaluation Summary
A.4	2.5.1.2.2 pp. 2.5-38, 39	1. Deposits of at least Oligocene and younger age dip very gently southward and are laterally continuous across the Site Region. These deposits are not deformed and thus document long term tectonic stability. 2. The Oligocene and younger deposits demonstrate a long period of tectonic stability and the absence of tectonic deformation in the Site Area and Site Location.	Substantial additional subsurface information from the COL investigation allowed refinement of the site stratigraphic interpretations (FSAR Table 2.5.4-201). The majority of the 97 borings in the COL investigation program extended into the Miocene Catahoula Formation. One borehole (B-1013, FSAR Appendix 2AA) was extended through the Catahoula Formation and penetrated the Glendon Limestone. The subsurface stratigraphic interpretation is shown in FSAR Figures 2.5.4-217 through 2.5.4-232 and demonstrates the long-term stability of the site through the Miocene and the absence of tectonic deformation in the Site Location. Structural information of the Oligocene Glendon Limestone was not established in the COL investigation due to limited deep subsurface information, but is supported by reference in SSAR Section 2.5.1.2.2 and Figure SSAR Figure 2.5-13 and is unaffected by the COL investigation and analyses.

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Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions

Item	SSAR Section, Page	SSAR Conclusion Statement	Evaluation Summary
A.5	2.5.1.2.2 p. 2.5-39	The Oligocene depositional environment in the Site Area was dominated by shallow marine seas, in which the Glendon Limestone and Byram Marl formations of the Vicksburg Group were deposited. These deposits primarily consist of limestone and marl with interbedded calcareous sands and clays. The Byram Marl was overlain by the late Oligocene Bucatunna Clay Formation, ... The Glendon Limestone occurs at a depth of approximately 300 feet beneath the Site Area. These deposits are overlain unconformably by the Miocene Catahoula Formation.	The COL investigation program included one borehole (B-1013, FSAR Appendix 2AA; FSAR Figure 2.5.4-207) that penetrated the Miocene Catahoula Formation. Borehole B-1013 encountered the Oligocene Bucatunna Formation unconformably underlying the Miocene Catahoula Formation at a depth of 372 feet. Borehole B-1013 further encountered the Oligocene Glendon Limestone formation underlying the Bucatunna Formation at a depth of 447 feet below site grade. This site-specific information is presented in FSAR Section 2.5.4.1.2.4 and supports the regional discussion in SSAR Section 2.5.1.2.2 that is unaffected by the COL investigation and analyses.

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Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions

Item	SSAR Section, Page	SSAR Conclusion Statement	Evaluation Summary
A.6	2.5.1.2.2 p. 2.5-39	The surface of the Catahoula Formation was deeply eroded at the site prior to deposition of the Pliocene to Pleistocene age Upland Complex based on the structural contour map shown on Figure 2.5-29.	Substantial additional subsurface information from the COL investigation allowed refinement of the site stratigraphic interpretations (FSAR Table 2.5.4-201). The majority of the 97 borings in the COL investigation program extended through the refined stratigraphic units identified as the Upland Complex alluvium and Upland Complex old alluvium and into the Catahoula Formation (FSAR Appendix 2AA). The top of the Catahoula Formation is described in the text (FSAR Sections 2.5.4.1.4.2.1 and 2.5.4.1.2.3.4) and graphically illustrated (FSAR Figures 2.5.4-217 through 2.5.4-232, and Figure 2.5.4-267) at the Site Location. The top of the Catahoula elevation ranges between minus 37 and plus 93 feet (NAVD 88) and represents an irregular erosional unconformity with the overlying Upland Complex old alluvium at the Site Location. This prominent deep, northeast-trending buried paleochannel in-filled by Upland Complex old alluvium is present along the west margin of the GGNS Unit 3 power block. Dimensions of the channel are well demonstrated by Figure FSAR 2.5.4-232. This buried channel may reflect a former location of a tributary drainage to the Mississippi River or a possible meander course of the Mississippi River during the early Pleistocene. This better understanding of the top of the Catahoula surface from the COL investigation supports the conclusions stated in SSAR Section 2.5.1.2.2.
A.7	2.5.1.2.2 p. 2.5-39	Pliocene-Pleistocene Upland Complex deposits unconformably overlie the eroded surface of the Catahoula Formation.	See the Evaluation Summary for Item A.6 (above).

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Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions			
Item	**SSAR Section, Page**	**SSAR Conclusion Statement**	**Evaluation Summary**
A.8	2.5.1.2.3.1.1 p. 2.5-40	The Quaternary deposits described in this section typically have an unconformable depositional relationship with the underlying Pliocene to Pleistocene Upland Complex, or Tertiary Catahoula deposits, described below.	Substantial additional subsurface information from the COL investigation allowed refinement of the site stratigraphic interpretations (FSAR Table 2.5.4-201). The Quaternary deposits are described in FSAR Sections 2.5.4.1.2.2 and 2.5.4.1.2.3. These Quaternary deposits are identified as predominantly alluvial or aeolian with unconformable depositional relationships supporting the conclusions stated in SSAR Section 2.5.1.2.3.1.1.
A.9	2.5.1.2.3.1.1.2 p. 2.5-41	The loess unconformably overlies Upland Complex deposits.	Substantial additional subsurface information from the COL investigation allowed refinement of the site stratigraphic interpretations (FSAR Table 2.5.4-201). These refined stratigraphic interpretations included subdivision of the Upland Complex into two subunits: 1) Upland Complex alluvium, and 2) Upland Complex old alluvium. Additionally the loess was subdivided into two subunits: 1) Upper loess, and 2) Lower loess. These depositional units are described in FSAR Sections 2.5.4.1.2.3. FSAR Section 2.5.4.1.2.3.2 states that Lower loess rests unconformably over Pleistocene Upland Complex Alluvium, thus supporting the conclusion in SSAR Section 2.5.1.2.3.1.1.2.
A.10	2.5.1.2.4.1 p. 2.5-43	No faults are mapped within the 5-mile radius of the Site Area.	The COL investigation was limited to the Site Location. Evaluation of data collected from this investigation, as stated in the Evaluation Summary for Item A.3, supports the conclusion that there is no evidence of Quaternary faulting or capable tectonic sources at the Site Area.
A.11	2.5.1.2.5 p. 2.5-44	On the basis of review of existing UFSAR and site investigation data, the proposed ESP location appears to be suitable for support and good performance of the new facility.	The COL investigation was limited to the Site Location. Evaluation of data collected from this investigation, as stated in the Evaluation Summary for Item A.3 (above), supports the conclusion that the proposed ESP location appears to be suitable for support and good performance of the new facility.

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Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions

Item	SSAR Section, Page	SSAR Conclusion Statement	Evaluation Summary
A.12	2.5.1.2.5 p. 2.5-46	However, loess is ... not suitable for support of heavy or safety-related structures.	This SSAR conclusion remains valid, with one clarification. FSAR Section 2.5.4 addresses and evaluates the acceptability of use of the loess in combination with structural backfill for the fire water storage complex (FSWC). FSAR Sections 2.5.4.1.1 and 2.5.4.1.2 describe subsurface materials underlying the FWSC, and the material properties of Upper and Lower loess are discussed FSAR Sections 2.5.4.2.2.1.2 and 2.5.4.2.2.1.3, respectively. Excavation and backfill are discussed in FSAR Section 2.5.4.5 with the extent of lateral and vertical excavation and foundation design for the FWSC discussed in FSAR Sections 2.5.4.5.1.3 and 2.5.4.5.1.4, respectively, and graphically represented in FSAR Figure 2.5.4-263. Static stability and suitability of this foundation approach is discussed in FSAR Sections 2.5.4.10 and 2.5.4.12. The limited use of loess material for foundation bearing for the FWSC, as discussed and evaluated in FSAR Section 2.5.4, represents a change to the subject conclusion. A variance to the ESP will be requested, as part of planned revisions to (new) FSAR Section 2.5.1.2.
A.13	2.5.1.2.6 p. 2.5-46	There are no mining or underground mineral extraction activities occurring on or near the site, and ground water extraction is nominal in the site area. Therefore, there are no human activities that will adversely affect the site geologic conditions or cause potential permanent ground deformation at the site.	The COL investigation was limited to the Site Location. However, additional stereoscopic aerial photograph analysis included portions of the Site Area nearest the site. No indications of surface mining or underground mineral extraction activities were noted. This SSAR conclusion regarding mining and mineral extraction is unaffected by the COL investigation and analyses. . COL investigation surveys of ground water extraction were limited to the Site Location and do not modify or update Site Area ground water extraction conclusions stated in SSAR Section 2.5.1.2.6.

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Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions			
Item	**SSAR Section, Page**	**SSAR Conclusion Statement**	**Evaluation Summary**
B	**2.5.3**		
B.1	2.5.3 p. 2.5-71	There is no potential for surface fault rupture at the Grand Gulf Site Location, and there are no capable tectonic sources within a 5-mile radius of the site (Site Area).	Geologic field mapping including stereoscopic aerial photograph analysis was performed during the COL investigation at the Site Location (FSAR Figure 2.5.4–202), and field geomorphic mapping of slopes on site were done to address slope stability (FSAR Figure 2.5.5–204). No evidence for surface fault rupture was found during these COL site investigations. Additionally, 97 geotechnical borings were advanced at the Site Location. The stratigraphic information from these borings was processed in a GIS database and numerous geologic cross sections and subsurface structural contour maps were produced (FSAR Figures 2.5.4–217 through 2.5.4–232). These figures demonstrate the continuity of the deposits of Miocene and younger age, and the long term tectonic stability of the Site Location. Results of geophysical studies (SASW; FSAR Section 2.5.4.2.2 and FSAR Figure 2.4.5-260) during the COL investigation were evaluated for evidence of non-tectonic activity. The results support the continuity of the deposits and the long term tectonic stability of the Site Location. Conclusions of previous investigations and analyses regarding this item beyond the Site Location are unchanged by the COL investigations and analyses.
B.2	2.5.3.3 p. 2.5-73	As previously discussed, there is no evidence of Quaternary fault offset in the Site Location or the Site Area.	See the Evaluation Summary for Item B.1 (above).

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Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions

Item	SSAR Section, Page	SSAR Conclusion Statement	Evaluation Summary
B.3	2.5.3.3 p. 2.5-73	Furthermore, there is no evidence of non-tectonic deformation at the site or in the Site Area.	Evaluation of geologic and geomorphic mapping (FSAR Figures 2.5.4–202 and 2.5.5–204, respectively) performed during the COL investigation and evaluation of subsurface borings (FSAR Appendix 2AA) and their derivative products (FSAR Figures 2.5.4-217 through 2.5.4-232) found no evidence for non-tectonic deformation such as salt diapirs, volcanic intrusion, collapse structures, growth faults, or adverse rock joint set orientations and stability. These aspects of geologic stability are further described is FSAR Section 2.5.4.1.4. Results of geophysical studies (SASW; FSAR Section 2.5.4.2.2 and FSAR Figure 2.4.5-260) during the COL investigation were evaluated for evidence of non-tectonic activity. The results support the continuity of the deposits and the long term tectonic stability of the Site Location. Conclusions of previous investigations and analyses regarding this item beyond the Site Location remain unchanged by the COL investigations and analyses.
B.4	2.5.3.4 p. 2.5-73	There are no capable tectonic sources within 5 miles of the Grand Gulf Site.	The COL investigation was limited to the Site Location. Evaluation of data collected from this COL investigation, as stated in the Evaluation Summary for Item B.1 (above), supports the conclusion that there is no evidence of Quaternary faulting or capable tectonic sources at the Site Location. Conclusions of previous investigations and analyses regarding this item beyond the Site Location remain unchanged by the COL investigations and analyses.
B.5	2.5.3.5 p. 2.5-74	There are no faults mapped closer than 90 miles to the site, or within either the Site Vicinity or Site Area.	See the Evaluation Summary 4 for Items B.1 and B.4 (above).

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Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions

Item	SSAR Section, Page	SSAR Conclusion Statement	Evaluation Summary
B.6	2.5.3.5 p. 2.5-74	Subsurface borings completed for the existing Grand Gulf Nuclear Station document the absence of faulting in the Site Area.	Substantial additional subsurface information from the COL investigation allowed refinement of the site stratigraphic interpretations (FSAR Table 2.5.4-201). These refined stratigraphic interpretations were applied to the boring logs from the geotechnical investigation for Unit 1 licensing. The reinterpreted boring logs from Unit 1 and the SSAR, as stated in FSAR Section 2.5.4.1.1, support the conclusion of the absence of faulting in the Site Area (FSAR Figure 2.5.4-225). A selected group of reinterpreted boring logs are shown on FSAR Figure 2.5.4-225 which shows the cross sectional relationship of the stratigraphy with respect to Unit 1 and Unit 3.
B.7	2.5.3.5 p. 2.5-74	The continuity of subsurface deposits demonstrates the tectonic stability of the Site Location, Site Area, and Site Vicinity from at least Oligocene time, approximately 30 Ma to the present. The top of the Oligocene Glendon Limestone Formation slopes to the southeast. The surface appears to have been eroded, forming a buried drainage basin morphology, but does not show morphology indicative of tectonic deformation.	Substantial additional subsurface information from the COL investigation allowed refinement of the site stratigraphic interpretations (FSAR Table 2.5.4-201). The majority of the 97 borings in the COL investigation program extended into the Miocene Catahoula Formation. One borehole (B-1013, FSAR Appendix 2AA) was extended through the Catahoula Formation and penetrated the Oligocene Glendon Limestone Formation. The subsurface stratigraphic interpretation is shown in FSAR Figures 2.5.4-217 through 2.5.4-232 and demonstrates the long term stability of the site through the Miocene; however, structural information of the Oligocene Glendon Limestone was not established due to limited subsurface information.

ATTACHMENT 1
Response to NRC Questions - GGNS COLA FSAR Sections 2.5.1, 2.5.3, and 2.5.4

Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions			
Item	**SSAR Section, Page**	**SSAR Conclusion Statement**	**Evaluation Summary**
B.8	2.5.3.5 p. 2.5-74	The morphology of the Catahoula Formation is related to former stream erosion. The top of the Catahoula surface shows no morphology indicative of tectonic deformation.	Substantial additional subsurface information from the COL investigation allowed refinement of the site stratigraphic interpretations (FSAR Table 2.5.4-201). The majority of the 97 borings in the COL investigation program extended into the Catahoula Formation and the top of the Formation is described in the text (FSAR Sections 2.5.4.1.4.2.1 and 2.5.4.1.2.3.4) and graphically illustrated (FSAR Figures 2.5.4-217 through 2.5.4-232, Figure 2.5.4-267) at the Site Location. The top of the Catahoula elevation ranges between minus 37 and plus 93 feet (NAVD 88) and represents an irregular erosional unconformity with the overlying Upland Complex old alluvium at the Site Location. This prominent deep, northeast-trending buried paleochannel in-filled by Upland Complex old alluvium is present along the west margin of the GGNS Unit 3 power block. Dimensions of the channel are demonstrated by Figure FSAR 2.5.4-232. This buried channel may reflect a former location of a tributary drainage to the Mississippi River or a possible meander course of the Mississippi River during the early Pleistocene. This better understanding of the top of the Catahoula surface from the COL investigation supports the conclusions stated in SSAR section 2.5.3.5 and further demonstrates the long term tectonic stability of the Site Location.

ATTACHMENT 1
Response to NRC Questions - GGNS COLA FSAR Sections 2.5.1, 2.5.3, and 2.5.4

Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions

Item	SSAR Section, Page	SSAR Conclusion Statement	Evaluation Summary
B.9	2.5.3.5 p. 2.5-74	The surface of terrace deposits shows no morphology indicative of tectonic deformation.	Substantial additional subsurface information from the COL investigation allowed refinement of the site stratigraphic interpretations (FSAR Table 2.5.4-201). The terrace deposits in this statement refer to the Upland Complex alluvium and Upland Complex old alluvium described in the COL investigation as shown in FSAR Table 2.5.4-201. The top of the Upland Complex alluvium is described in the FSAR text (FSAR Sections 2.5.4.1.2.3.3 and 2.5.4.2.2.1.5) and graphically illustrated (FSAR Figures 2.5.4-217 through 2.5.4-228, 2.5.4-230, and 2.5.4-231) for the Site Location. This better understanding of the top of the Upland Complex alluvium and Upland Complex old alluvium surfaces from the COL investigation supports the conclusions stated in SSAR section 2.5.3.5 and further demonstrates the long term tectonic stability of the Site Location.
B.10	2.5.3.6 p. 2.5-74	There are no zones of Quaternary deformation requiring detailed investigation with the Site Area.	As stated in the Evaluation Summary for Item B.1 (above), the COL geotechnical evaluations support the conclusive statement in SSAR 2.5.3.6.

ATTACHMENT 1
Response to NRC Questions - GGNS COLA FSAR Sections 2.5.1, 2.5.3, and 2.5.4

Table 1. Review of SSAR Sections 2.5.1 and 2.5.3 Key Conclusions			
Item	**SSAR Section, Page**	**SSAR Conclusion Statement**	**Evaluation Summary**
B.11	2.5.3.7 p. 2.5-74	As discussed above, geologic cross sections and structure contour maps of the Site Vicinity, Site Area, and Site Location demonstrate the continuity of deposits of Oligocene and younger age, and the long-term tectonic stability of the Site Area. Therefore, the potential for surface-fault rupture at the site is considered negligible. In addition, there in no evidence of non-tectonic deformation in the Site Location or Site Area such as collapse structures, salt diapirs, growth faults, volcanic intrusion, etc.	See the Evaluation Summaries for Items B.1 and B.3 (above).

ATTACHMENT 2
List of 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 2.5.1, 2.5.3, and 2.5.4, as discussed in Attachment 1, Part C, of this letter, and the revisions will be submitted as part of Revision 1 of the COL application.	✓		COLA Revision 1 Submittal