

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DOCKETED
USNRC

ATOMIC SAFETY AND LICENSING BOARD

November 6, 2006 (1:35pm)

Before Administrative Judges:

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Lawrence G. McDade, Chairman
Nicholas G. Trikouros
Dr. Richard E. Wardwell

SERVED November 6, 2006

In the Matter of

SYSTEM ENERGY RESOURCES, INC.

(Early Site Permit for Grand Gulf ESP Site)

Docket No. 52-009-ESP

ASLBP No. 04-823-03-ESP

November 6, 2006

ORDER

(Requesting Specific Summary Exhibits and Supplemental Briefs)
(Identifying Hearing Issues and Requesting Evidentiary Presentations on Specific Issues)

Summary Exhibits and Matters Requiring Additional Briefing

Based on the present record of the Grand Gulf Early Site Permit (ESP) proceeding, the Board requests the NRC Staff to prepare specific summary exhibits in order to help document the scope, assumptions, and limitations of its safety and environmental review of System Energy Resources, Inc. (SERI) ESP application. In making these requests, the Board recognizes that most of what we are asking the Staff to submit has already been prepared (see e.g., FSER, App. A; FEIS, App. J). We make these somewhat duplicative requests, however, in an effort to draw together in one place a clear, concise, easily referenced statement of all that has been resolved at this ESP stage, and all that has been deferred for resolution to the COL stage.

Specifically, the Board requests the following summary exhibits, each in table form:

- (1) Prepare a comprehensive table of all Plant Parameter Envelope (PPE) values, including their definition, units and bounding values, and type of value (i.e., unit specific or total facility requirement). In addition, designate which items were used in the FSER and which were used for the FEIS.

- (2) Duplicate the following FSER tables and update them to include any new or modified information since the FSER was issued.
 - (i) Permit conditions (FSER, App. A, Table A.1)
 - (ii) COL action items (FSER, App. A, Table A.2)
 - (iii) Site characteristics (FSER, App. A, Table A.3)
 - (iv) Bounding parameters (FSER, App. A, Table A.4).
- (3) List and summarize (in a table):
 - (i) All of the safety and environmental issues that the NRC Staff believes SERI has resolved in their ESP application and, accordingly, need not be reviewed again at the COL stage. Identify if there are any Staff assumptions or SERI commitments associated with these.
 - (ii) All of the safety and environmental issues that the Staff believes have not been resolved. Identify if there are any COL action items associated with these.

For (i) and (ii), list as many components of the safety assessment as possible, and the many sub-categories that were evaluated for each of the environmental impact categories. Include all resolved issues for fuel cycle, transportation, and decommissioning (e.g. FEIS § 6.0) and cumulative impacts (e.g. FEIS § 7.0).

- (4) List and summarize (in separate tables) each statement made by SERI in its Site Safety Analysis Report (SSAR) and Environmental Report (ER) that constitute:
 - (i) commitments to address specific issues in the design, construction, and operation of the proposed plant(s);
 - (ii) planned compliance with current laws, regulations, and requirements;
 - (iii) commitments to perform certain activities and take certain actions at the COL stage, should it be granted an ESP license;
 - (iv) other statements made by SERI in its SSAR or ER, or in response to NRC Staff Requests for Additional Information related to future actions and activities by SERI, and how the impacts of those actions were considered in the Staff's analysis (e.g. FEIS, App. J, Table J-1).
- (5) Key assumptions made by the NRC Staff in assessing safety issues and environmental impacts, which, if incorrect, could require that an issue be revisited at the COL stage (e.g. FEIS, App. J, Table J-2).
- (6) Measures and controls to limit adverse environmental impacts during construction (e.g. FEIS § 4.10) and operations (e.g. FEIS § 5.11).
- (7) Mitigative measures listed by SERI in its ER, and activities planned by various State and county governments (e.g. infrastructure upgrades) that were used by the NRC Staff in assessing significance levels (as discussed in FEIS § 5, 2nd ¶).

In addition to these tables, the Board requests the NRC Staff summarize and discuss the rationale it used during its review of the SSAR in making the following determinations: (1) when additional work by SERI at the ESP stage was necessary; (2) when additional work by

SERI could be delayed to the COL stage; or (3) when existing information was sufficient to support the ESP application and no additional work would be required.

Hearing Issues

The Board is tasked with determining whether the application submitted by SERI and the record of this proceeding contain sufficient information, and whether the NRC Staff's review of the application has been adequate to support a finding that:¹

- (i) the issuance of an ESP will not be inimical to the common defense and security or to the health and safety of the public (Safety Issue 1);
- (ii) taking into consideration the site criteria contained in 10 C.F.R. Part 100, a reactor or reactors having characteristics that fall within the parameters for the site, can be constructed and operated without undue risk to the public health and safety (Safety Issue 2); and
- (iii) in accordance with the requirements of Subpart A of 10 C.F.R. Part 51, the ESP should be issued as proposed.

Additionally, the Board must determine whether:

- (i) the requirements of Section 102(2)(A), (C), and (E) of the National Environmental Policy Act of 1969 (NEPA) and 10 C.F.R. Part 51 have been complied with in this proceeding;
- (ii) the final balance among the conflicting factors contained in the record of the proceeding indicate that granting the ESP is the appropriate action to be taken; and
- (iii) after considering reasonable alternatives, the ESP should be issued, denied, or appropriately conditioned to protect environmental values.

To help clarify the scope and limitations of the ESP license sought by SERI, please address the following hearing issues as they relate to matters of safety and the environment.

A. Site Characterization

- (1) For each area noted below, summarize and discuss the existing site characterization data, and any additional data that will be needed at the COL stage.

¹ 69 Fed. Reg. 2636 (Jan. 16, 2004).

- (i) Hydrogeologic characterization of the shallow aquifers in the loess and alluvium and the deeper aquifers of the Catahoula/old alluvium that was used to estimate aquifer yield, water quality and drawdown conditions for the purpose of:
 - (a) demonstrating that an adequately designed ground water well system capable of withdrawing 3,570 gpm could be provided for the proposed plant(s) without impacting the water quality of the aquifer;
 - (b) defining construction dewatering requirements, and drawdown effects on existing structural support and lateral loads against finished foundation walls.
 - (ii) Characterization of the existing fill material for foundation design and to define construction conditions.
 - (iii) Deep explorations in the power block footprint to evaluate the potential for a karst formation.
 - (iv) Effect of river flooding on future erosion of the bluff and any retrogressive sloughs of the bluff.
 - (v) Mississippi River sediment characterization for construction of the intake and discharge structures and operation of the water intake and treatment plant.
 - (vi) Shear strength and creep characteristics of the loess for retrogressive slope deformations of the bluff that might impact the integrity of the proposed plant(s).
 - (vii) Baseline surface and ground water quality to quantify potential impacts for the existing plant to assure sufficient data is available to discriminate between the existing plant and the proposed plant(s).
 - (viii) Subsurface hydrological and chemical properties of the aquifer and definition of composition of the radwaste effluent.
- (2) Summarize and explain the factual record for each of the following.
- (i) Long term stability of the bluff and its potential impact on the integrity of the proposed plant(s).
 - (ii) Sufficient knowledge of the subsurface hydrological and chemical properties of the aquifer and composition of the radwaste effluent to meet 10 C.F.R. § 100.20(c)(3) requirements for site suitability determination factors relating to accidental releases to the liquid pathway.

B. Monitorability of Inadvertent Radiological Releases

It is the opinion of the Board that the suitability of the Grand Gulf site for the eventual construction of an additional plant(s) hinges, in part, on SERI's ability to (1) detect discharges from plant systems, structures, and components that have a potential for the inadvertent release of radioactivity into the site soils or into the surface and ground water, and (2)

determine whether future detections of radiation are the result of historic impacts from the existing facility, or are the result of new contamination from the proposed plant(s). In this regard, address site monitorability relating to surface water, ground water, and shallow soil impacts and sediments by:

- (1) presenting the existing knowledge base with detailed descriptions of the exploration program, aquifer testing, hydraulic modeling, and transport estimates used to characterize the site aquifer(s), and surface water courses;
- (2) describing and illustrating the extent of the existing radiological concentrations in the soil, sediment, surface water and ground water at the site, and the monitoring program used to quantify existing impacts;
- (3) summarizing meteorological, geologic and hydrogeologic data that can be used to estimate migration pathways for future impacts from plant(s) at the site;
- (4) explaining how the impact from a hypothetical release from the new plant could be separated from the historic impacts, and, as a corollary, if a future radiological release was detected, how would it be possible to determine which plant is the source of the impact;
- (5) describing the reasons why the potential un-monitorability of the site would or would not possibly eliminate this site from future consideration for a new plant.

C. Seismic Impacts

Summarize and discuss the process that was utilized by the NRC Staff to evaluate the seismicity at the site, including specific steps used to evaluate the relevance, precision, and accuracy of analytical and digital models.

D. Slope and Foundation Stability

The geotechnical stability of the bearing strata and exterior earthen slopes (i.e. bluff) is a fundamental site characteristic that, the Board believes, could be quantified and addressed in this ESP application. In this regard, provide the following.

- (1) A comprehensive geologic description (e.g. cross-sections, profiles, isopach maps, etc.) of site strata from beneath the ESP power block and extending to the Mississippi River, showing the location of the various strata at the site and using the most recent nomenclature that will be carried over to the COL stage. As this is done, resolve any discrepancies between SSAR Figures 2.5-36, 2.5-37, and 2.5-75 to 2.5-77. In the description, show (or eliminate as an archaic term) the

following: loess, upland complex, upland alluvium, new alluvium, young alluvium, old alluvium, clay-silt alluvium, sand-gravel alluvium, fill, Catahoula Formation.

- (2) Existing geotechnical information with specific emphasis on the shear strength, creep, and consolidation characteristics of the loess, alluvium, and Catahoula Formation.
- (3) Discussion of the potential for slope deformations of the bluff due to creep and/or retrogressive movements.
- (4) Description of the impacts of flooding on erosion of the bluff and slough material on the bluff as it might affect the integrity of the plant.
- (5) Technical analyses which support the opinions expressed in FSER §§ 2.5.4 and 2.5.5 including, but not limited to:
 - (i) stability analyses of existing bluff under varying conditions (including high water table conditions, plant setbacks, etc.) to indicate degree of safety;
 - (ii) ground water flow estimates into excavation or measured values from previous construction for existing plant;
 - (iii) bounding values of typical plant loads to verify no fatal flaw.

E. Alternative Analyses

(Presentation requested:
approx. 1 hour)

The ESP license sought by SERI for the Grand Gulf site will not authorize any construction, and as a result, will not directly result in any environmental impact. However, in order to meet the goals of an ESP (i.e. banking a site), discuss why the alternative analyses included in the FEIS do or do not evaluate potential site impacts from the construction and operation of the proposed plant(s) and how future construction may affect the environmental factors² that might conflict with the issuance of an ESP. Within this discussion, include a summary of the following alternative analyses.

- (1) Review of alternative power generations.
- (2) Plant design alternatives.

² In accordance with 10 C.F.R. § 51.45, factors that might conflict with the issuance of an ESP include: (1) impact of proposed action on the environment; (2) unavoidable adverse environmental impacts; (3) alternatives to the proposed action; (4) conflicts between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and (5) irreversible and irretrievable commitments of resources.

- (3) Site alternatives, including:
 - (i) site screening procedures;
 - (ii) impact assessment for ESP's unresolved issues;
 - (iii) summary of alternative site comparison.

F. Evaluation of Cumulative Site Impacts

(Presentation requested:
approx. 30 min.)

It is the opinion of the Board that some issues will have an impact on the site which may be cumulative with respect to the number of plants, including any existing plants on the site. Accordingly, explain which parameters were, or should have been, evaluated in this regard. In its response to the Board's FSER Inquiry No. 2, the NRC Staff indicated that in the FEIS it evaluated the impact of the combined radiological effluent discharges from the existing operating unit and the proposed plant(s). For both the FSER and the FEIS, identify and discuss all of the issues that have or will contribute to cumulative effects. In addition, discuss whether the impacts of radiological effects should or should not be the only cumulative impact that needs to be considered in order to properly qualify the site.

G. Evaluation of Plant Parameter Envelope

(Presentation requested:
approx. 1 hour)

The list of PPE parameters provided in SERI's ESP application appears to be incomplete with respect to those identified in the Nuclear Energy Institute (NEI) guidance. In addition, the relationship between the PPE parameters provided in SERI's ESP application and the maximum MWt and MWe in the ESP analyses performed by the NRC Staff, is not clear to the Board. In regards to these issues please address the following.

- (1) Indicate any PPE parameters that are on the NEI list, but are not included in the PPE table for the Grand Gulf ESP (i.e. Exhibit 1 requested supra p. 1).
- (2) Discuss how the analyses that use the PPE parameters support the maximum site reactor power requested by the Applicant. Provide separate discussions for the FSER and the FEIS analyses.
- (3) Identify and discuss any differences or inconsistencies in the treatment of the PPE between the FSER and the FEIS.

- (4) Discuss the completeness of the PPE parameters for the Grand Gulf ESP and why it is acceptable for the Grand Gulf PPE to provide only a subset of the parameters identified in NEI 01-02.

H. Continuity between the ESP Stage and COL Stage (Presentation requested: approx. 1 hour)

The FSER and FEIS each identify numerous unresolved items, Applicant commitments, NRC Staff assumptions, deferred issues, COL action items and permit conditions. In the course of its review, the Board has indicated its belief that a number of items, not currently on any list, should be formally captured for transition to the COL stage. It is not clear to the Board how these unresolved items, commitments, assumptions, and deferred issues will be tracked between the ESP and the COL stage, and then subsequently managed (i.e. discovered, implemented, reviewed, and approved), so as to assure that they are satisfactorily completed at the COL stage. The Board is also concerned that these items are not complete and that the Staff has not been consistent in its identification of such items. Accordingly, the Board wishes to ascertain whether the Staff is utilizing a consistent approach for formally characterizing the conclusions and limitations of the ESP for unambiguous transition to the COL stage. In this regard please:

- (1) Demonstrate the progression from the ESP to the COL stage in terms of the use of formal lists such as Applicant commitments, Staff assumptions, COL action items, etc., and demonstrate that the list(s) are sufficiently comprehensive.
- (2) Summarize how reviews were conducted and what steps were taken to assure consistency among the Staff reviewers and contractors.
- (3) Discuss the logic behind how the Staff's chose which transition items would be formally documented and which would not.

In addition, there are several Staff proposed conditions to the ESP that appear to be difficult, if not impossible, to achieve during the COL stage due to the absolute nature of the requirements. Explain in detail how the following conditions will be achieved at the COL stage.

- (1) Shear wave velocity of 1000 fps or greater for the foundation of the power block.
- (2) Design features to preclude all accidental releases of radionuclides into any potential liquid pathway and the extent of the monitoring system needed to assure that this condition is not violated.

I. Radiological Reviews and Confirmatory Analyses (Presentation requested:
approx. 2 hours)

A number of radiological analyses have been performed by SERI in support of the Grand Gulf ESP application, including accident releases as well as normal releases. Since the results of these analyses are critical to the acceptability of the site, the Board would like an overview of the radiological analyses performed by SERI and the NRC Staff's review of these analyses, including details regarding the nature of confirmatory analyses performed (or not performed) by the NRC Staff or its contractors.

- (1) Discuss the selection of the design basis accidents and explain the difficulties associated with event names that appear in the SSAR, FSER, and FEIS.
- (2) For accident releases, provide an overview of the radiological analyses and results for the design basis events. Include the key input, assumptions and methodology. For each analysis, discuss the Staff review that was performed, including the method and results of the confirmatory analyses.
- (3) For normal releases, provide an overview of the radiological analyses and results, and discuss the Staff review that was performed including the method and results of the confirmatory analyses.
- (4) For the severe accidents discussed in the FEIS, provide an overview of the MACCS2 analyses, results, and the nature of the NRC Staff's review, including the results of any confirmatory analyses for the air and water ingestion pathways. For the non-MACCS2 severe accident effects, such as groundwater release, elaborate further on the basis for the conclusion that the risks for these pathways are acceptably small.
- (5) Explain why the contribution of external events was not specifically factored into the core damage frequencies used in the presentation of the analysis results.
- (6) Address whether or not ESP Permit Condition 2 (FSER, App. A, Table A.1) precludes the need to perform an analysis of the liquid radwaste tank failure event at the COL stage, or to what extent it impacts the assumptions associated with the analysis of such an event.

J. Miscellaneous Issues

The answers to a number of the Board's questions that were submitted to the NRC Staff on September 13, and October 3, 2006, did not fully address the issues of concern to the Board, or the answers raised additional issues that need to be further discussed for completeness. In this regard, be prepared to discuss at the hearing follow-up questions provided in Attachment A (FSER) and Attachment B (FEIS). Prefiled testimony need not be provided for these questions, but witnesses should be available who are prepared to answer them.

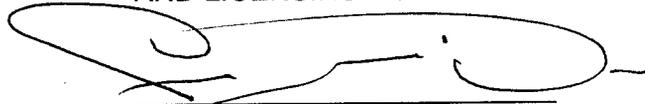
Administrative Matters

If the NRC Staff desires any clarification of any aspect of this Order, it should request a prehearing conference during the week of November 13, 2006. This request must include proposed times for the conference that meet the availability of both the NRC Staff and SERI.

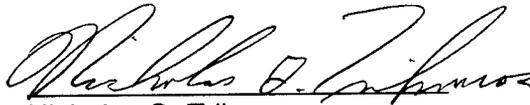
As indicated in our Order of October 11, 2006, a prehearing conference will be convened on the morning of November 28, 2006, beginning at 10:00 A.M., and the hearing will then begin on the morning of November 29, 2006 at 9:00 A.M., and will continue every workday until completed.

IT IS SO ORDERED.

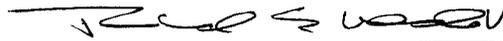
THE ATOMIC SAFETY
AND LICENSING BOARD³



Lawrence G. McDade, Chairman
ADMINISTRATIVE JUDGE



Nicholas G. Trikouros
ADMINISTRATIVE JUDGE



Dr. Richard E. Wardwell
ADMINISTRATIVE JUDGE

Rockville, Maryland
November 6, 2006

³ Copies of this Order were sent this date by Internet e-mail transmission to counsel for (1) SERI and (2) the NRC Staff.

ATTACHMENT A

Grand Gulf ESP FSER Inquiries – Mandatory Hearing

Inquiry No.	SER Page	SER Section	Inquiry
2	General	General	<p>In order to determine site acceptability, shouldn't the normal effluent evaluations (see, e.g., SER §§ 1-3) consider the combined effluents of all plants at the Grand Gulf site – i.e. existing and new facilities? If no, why not?</p> <p>Response: No. The ESP evaluation is based on the plant parameter envelope addressed by the Applicant. The regulations (10 CFR 52.17(a)(1)(iv)) state that an ESP application should describe the anticipated maximum levels of radiological effluents that each facility will produce. Thus, the Staff evaluated the impact from the proposed ESP facility.</p> <p>However, in NUREG-1817, Environmental Impact Statement for an Early Site Permit (ESP) at the Grand Gulf ESP Site, the Staff did evaluate the impact of the combined radiological effluent discharges from the existing operating unit and proposed reactors. This is documented in Section 5.9, Radiological Impacts of Normal Operation.</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: Should not the cumulative effluent impacts, for both the potential ESP plant(s) and the existing facility, be evaluated for safety issues as well as environmental issues?</p>
3	General	General	<p>For each of the computer code analyses performed in support of the application, please provide the following information:</p> <p>(A) Name of code (B) Revision Number (C) Purpose for which it was used in ESP application (D) Extent of the Staff's review of the code (E) Extent of the Staff's review of input/output (F) Any confirmatory analyses performed by the Staff (G) Review results and any review documentation produced by the Staff.</p> <p>Response: See Attachment B.</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: The following codes were not described in the Staff's Attachment B: (1) NETVAC (SER p.13-61);</p>

Inquiry No.	SER Page	SER Section	Inquiry
			<p>and (2) RADTRAD. (A) Please provide for each of these codes the information requested above. (B) Please list any other codes used by the Applicant or the Staff that have not been described in the Staff's Attachment B, and provide the information requested above for each code.</p>
6	General	General	<p>Many items were deferred from the ESP stage with a commitment to perform/address the issue at the COL stage. Please address the following: (A) With regards to draft SER open items: (1) Please discuss how the open items were tracked to assured that they were resolved. (2) Summarize any remaining open items, and highlight if these are now COL Action Items and if not, explain why not. (B) Some items deferred to the COL stage were listed as COL Action Items, others were simply noted as future commitments, while others were made into Permit Conditions. (1) Is there a comprehensive list of all commitments made by the Applicant and/or issues stated by the Staff in their review that were deferred from the ESP stage and are to be addressed during the COL stage (that are not already denoted as COL Action Items)? If not, please provide one. (2) What are the criteria for determining whether to list a commitment as a Permit Condition, a COL Action Item, or just a deferred COL item? (3) How are deferred commitments that are not listed as COL Action Items documented at this stage (so as to ensure fulfillment at the COL stage), and how will they be documented as complete during the COL stage? (C) The SER states (p. 1-8) that the "list of COL action items is not and should not be considered exhaustive." What are the implications of this for a COL application which references the ESP? Also, are all COL action items listed in Appendix A and if not, where are they recorded?</p> <p>Response: See Attachment B.</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: (A)(2) (i) Is Open Item 2.3-5 addressed by Table 2.3.5-1 (SER pp. 2-59 to 2-60) rather than on SER p. 2-62, as indicated by the Staff in its response to the Board's SER questions (Att. B at 11)?</p>

Inquiry No.	SER Page	SER Section	Inquiry
			<p>(ii) What is the specific description of Open item 2.5-3, which is referenced on SER p. 2-187?</p> <p>(iii) How can Open Item 13.3-3 (requesting additional information related to the OSC, TSC, & EOF) be resolved when the Staff “concludes that the proposed major feature H is unacceptable” (SER p. 13-53)?</p>
8	SSAR Table 1.3-1	-----	<p>The PPE (SSAR Table 1.3-1) identifies 4300 MWt as the maximum plant size, based on 3926 MWt with a 10% uprate.</p> <p>(A) How is this value utilized with respect to the number of plants to be built? What is the significance of this number?</p> <p>(B) The ESBWR is identified in its DCD as being 4500 MWt. What are the implications of this since the ESBWR is on the list of possible plants for this site?</p> <p>(C) The SSAR goes on to say that the reactor power goal is 2000 MWe. Does this value include the existing plant and is this reflected anywhere in the PPE?</p> <p>Response:</p> <p>(A) With respect to the SER, reactor thermal power is important only in how it affects values that are limiting such as offsite post-accident dose.</p> <p>(B) The ESBWR is currently characterized as being a 4500 MWt plant. If a future applicant wishes to reference the ESP for plants with a higher output than 4300 MWt, that applicant must justify the higher output at the CP or COL stage.</p> <p>(C) The value of 2000 MWe does not include the current operating plant. This number is not a bounding value and is not explicitly covered by the PPE. The value was chosen by the Applicant as an estimated target for power production from any new unit or units.</p> <p>SERI Input:</p> <p>(A) In addition to the Staff response, SERI notes that the PPE bounding value for “Megawatts Thermal” (Item 17.3, SSAR PPE Table 1.3-1) is utilized for other considerations in evaluation of environmental impacts. For example, megawatts thermal would be a consideration in the evaluation of environmental impacts related to normal and accident dose consequences, transportation of radioactive materials, and uranium fuel cycle impacts.</p> <p>(B) The PPE value for megawatts thermal (4300 Mwt) listed in SSAR Table 1.3-1 represents the postulated design parameter. If the selected facility (in this example the thermal design power level for the ESBWR in its DCD) does not fall within this value, a COL application referencing the ESBWR design shall include a request for variance that complies with §§ 52.39 and 52.93.</p> <p>(C) PPE values listed in SSAR Table 1.3-1 are based on the PPE development process described in SSAR Section 1.3.1.3. SSAR</p>

Inquiry No.	SER Page	SER Section	Inquiry
			<p>Table 1.3-1 lists those parameters relevant to the safety analyses. For each parameter, the most limiting value was selected. As described in the Staff response, the 2000 MWe value is a "target site capacity" and is discussed in detail in SSAR Section 1.3.1.4. The establishment of this value was an "initial step in PPE development" (SSAR, page 1.3-4). This value is not applicable to the PPE SSAR Table 1.3-1 and plays no direct role in the safety analyses. (The site target goal for MWe is a tool used in the environmental report and will be explained in SERI comments associated with the Board Inquiries regarding the Environmental Report.)</p> <p>Board Reply: Does not the capacity of the transmission lines depend upon the MWe? If so, should not this value be part of the PPE?</p>
18	2-37	2.3.1.3	<p>The Staff includes in its proposed regional climatology site characteristics (see Table 2.3.1-7) a recommendation to combine the 100-year snowpack with the 48-hour PMWP for roof loads. How will this recommendation be incorporated into the ESP license?</p> <p>Response: Both the 100-year snowpack and the 48-hour probable maximum winter precipitation (PMWP) will be listed as separate winter precipitation site characteristics in the ESP license as shown in Section A.3 of Appendix A (Site Characteristics). Both Grand Gulf ESP SER section 2.3.1.3 and SRP section 2.3.1 discuss how winter precipitation loads should be based on the weight of the 100-year snowpack at ground level plus the weight of the 48-hour PMWP at ground level for the month corresponding to the selected snowpack. Both documents also state that a COL or CP applicant may choose and justify an alternative method for defining the extreme winter precipitation load by demonstrating that the 48-hour PMWP could neither fall nor remain on the top of the snowpack and/or building roofs.</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: As a resolution of this discussion, will all four (4) tables in Appendix A of the SER be included in the ESP license?</p>
26	2-127	2.4.12.1	<p>What information did the Applicant use to select the reported hydraulic conductivities of the alluvium, terrace deposits, and Catahoula Formation?</p> <p>Response: For the operating unit at Grand Gulf, the UFSAR (2.4-42-</p>

Inquiry No.	SER Page	SER Section	Inquiry
			<p>44) states that K values for the alluvium formation are determined based on a constant-rate aquifer test, K values for the terrace deposit layer are based on both constant- and falling-head permeability tests, and K values for the Catahoula formation are based on laboratory consolidation tests on samples. For the ESP review, the Staff did not re-examine the exact nature and the range of hydraulic conductivities mentioned by the Applicant. The Staff considers these values to be a qualitative description of the conductivities of regional aquifers and not the basis for local conductivities, which should be estimated through field tests at the site. COL Action Item 2.4-9 states that a COL or CP applicant should provide detailed groundwater information including the depth of perched aquifers. This information, combined with the detailed design, will be adequate to assess the specific design at the COL stage.</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: Why does COL Action Item 2.4-9 not read as follows: "A COL or CP applicant should provide detailed ground water information including the location, depth, saturated thickness, and hydraulic conductivity of all perched, unconfined, and confined aquifers at the ESP site"?</p>
27	2-127	2.4.12.1	<p>The SER reports the Applicant's estimate that a maximum of 3570 gpm of groundwater would be needed during routine operations. What explorations and testing were performed to define the aquifer water limits and verify its yield to assure that the site could provide this flow without affecting either aquifer quality, the existing plant's needs, or the structural integrity of the buildings?</p> <p>Response: Excavation, construction, and fill of the subgrade portion of the ESP facility will considerably disrupt the near-field subsurface hydrology. Before a more detailed plant design is available including specific information of the changes in the subsurface environment directly caused by the construction and any active or passive dewatering systems, the Staff concluded that a detailed evaluation of the existing subsurface environment is not useful. COL Action Items 2.4-8 and 2.4-9 state that a COL or CP applicant should provide detailed groundwater information including the depth of perched aquifers. This information, combined with the detailed design, will be adequate to assess the specific design at the COL stage. In the FEIS, the issue of the potential impact of groundwater</p>

Inquiry No.	SER Page	SER Section	Inquiry
			<p>withdrawals on water quality within the Catahoula aquifer is unresolved. Prior to issuance of a COL, the COL applicant will need to demonstrate that groundwater withdrawals will not result in degradation of the water quality in the Catahoula aquifer.</p> <p>For the operating unit at Grand Gulf, the Applicant performed aquifer tests on two wells, #3 and #5, at the average pumping rates of 8000 gpm and 7600 gpm, respectively, which exceed the maximum planned withdrawal rate. Based on an analytical drawdown approach, the Applicant concluded that the groundwater levels in the site area are slightly modified as a result of the effects of radial collector well field pumpage, construction dewatering, topographic modifications, relocation of surface drainage systems, and structure installation (GG UFSAR, 2.4-44-46). Based on the above, the Staff expects that the impact of construction and operation of the ESP facility would have a minimal impact on the existing plant. Impact of construction on the existing plant is covered under the provisions of Part 50.</p> <p>SERI Input: Characterization of the ground water and the aquifers on the GGNS site was done during the site exploration work that supported construction and operation of GGNS Unit 1, as documented in the Unit 1 UFSAR. For this early site permit application, this characterization was deemed adequate, and no additional characterization was done.</p> <p>Refer to SERI response to Inquiry No. 20 for a discussion of makeup water requirements. From the application SSAR Section 2.4.12.1.3.1: "Makeup (cooling tower makeup and other raw water needs) and normal service water for a new facility would be supplied from the Mississippi River via an intake located on the east bank of the river on the north side of the existing barge slip (see Section 2.4.11 and Figure 2.1-1). <u>Ground water would likely be</u> utilized for general plant water uses including potable, sanitary, fire protection, demineralized water, and landscape maintenance. The expected average consumption of ground water for these uses is approximately 1,310 gpm (Table 1.3-1). The expected maximum consumption of ground water for these uses is approximately 3,570 gpm (Table 1.3-1). Since the existing GGNS Unit 1 facility ground water wells would not have adequate capacity for a new facility, the installation of additional wells (likely in the Catahoula formation) for these purposes would be necessary, <u>if ground water is the desired source.</u> [emphasis added]" As noted in the above quote ground water could be used as a source of some of the makeup; however, should the aquifer not be capable of supporting the needs for the new plant and the existing plant, other sources could be used; i.e., the river intake.</p> <p>With regard to the question water quality and withdrawal quantity, the EIS states: "An applicant for a CP or COL</p>

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			<p>referencing an ESP for the Grand Gulf ESP site would need to provide additional information on the ability of the Catahoula aquifer to sustain withdrawals in order for the staff to make a significance determination with respect to this resource. Use of wells that withdraw from the Catahoula formation would be in accordance with applicable standards published in the MDEQ groundwater use and protection regulations (MDEQ1994), and necessary permits would be obtained from the MDEQ. MDEQ regulations allow for permit denial or reduction of withdrawal rate if such a withdrawal is expected to interfere with existing permitted uses or if it conflicts with the public interest.” (EIS at 5-8 and 5-9)</p> <p>Wells #3 and #5 are located in the Mississippi River alluvium, so the results of aquifer tests for these wells are not directly applicable to the issue of potential impacts to the Catahoula aquifer. It is possible that the Mississippi River alluvium could be used as a potable water supply source.</p> <p>With regard to the question regarding structural integrity of the of the buildings, the SER states: “... Since the maximum withdrawal rate is short-term, it is not relevant for the consideration of ground subsidence because any impact on the subsurface ground water table would also be temporary. The applicant also stated that this water supply (3570 gpm) <u>will likely come from a variety of sources</u>, including, but not necessarily limited to, ground water and/or surface water.” [emphasis added] (SER at 2-77)</p> <p>“The applicant stated that inspection and monitoring procedures will be developed for the construction phase of the ESP facility. Observation wells would be installed and monitored periodically throughout the construction of the ESP facility to measure ground water levels and to verify that ground water drawdown and radius of influence evolve as predicted.” (SER at 2-77)</p> <p>Board Reply: Does the fact that wells #3 and #5 are in the Mississippi alluvium alter your response to this inquiry? Do the withdrawal rates include the needs for the existing plant as well as the proposed plant(s)?</p>
30	2-132 to 2-140	2.4.13	<p>How will potential impacts from the new plant be separated from any existing impacts or future releases from the existing plant?</p> <p>Response: For impacts to members of the public and the environment from normal gaseous and liquid effluents, multi-unit plants typically have separate radioactive waste storage tanks and systems, components, and discharge points in order to control, monitor and document the type and amount of radioactive effluents discharged into the environment from each reactor unit. The standard NRC Technical Specifications for normal radiological</p>

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			<p>gaseous and liquid effluents have controls that are on a unit specific basis. Thus, the Staff expects that at the COL stage an applicant will provide a sufficient level of detail to allow the Staff to evaluate the radiological impact of normal operation of a new unit as distinct from that of any existing operating unit.</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: How will impacts to soils, sediment, surface water and groundwater be attributed to the responsible plant?</p>
33	2-138	2.4.13.3	<p>It is stated that the K_d values for Cs-137 and Sr-90 used in the ESP application "were established for site-specific calculations in the GGNS Unit 1 UFSAR." How were these coefficients established?</p> <p>Response: The Staff does not know how they were established but does not believe that it is necessary to know. The specific K_d values do not require review because Permit Condition 2 requires the plant design to preclude any and all future accidental releases into any potential liquid pathway.</p> <p>SERI Input: The GGNS Unit 1 UFSAR evaluated a radwaste system failure and subsequent leakage into groundwater (GGNS UFSAR 2.4.13.3). Key parameters used in the analyses, including the subject K_d values listed in the SER (p. 2-138) are shown in GGNS UFSAR Table 2.4-27. K_d values for Sr and Cs were calculated based on site soil types, equations on UFSAR page 2.4-49, and scientific literature sources (UFSAR Section 2.4.15, References 32 through 36).</p> <p>Board Reply: (1) Aren't the distribution coefficients a fundamental site characterization that contributes to the understanding of the suitability of the location for an ESP? Likewise, doesn't the ability to monitor potential groundwater impacts relate to an understanding of the existing conditions which, in turn, relates in part to the retardation equation? (2) Please provide the equations used to calculate K_d and References 32 to 36 from the GGNS Unit 1 UFSAR, noted by SERI above.</p>
34	2-138	2.4.13.3	<p>The second table on page 2-138 shows values for terrace formation. It is not clear why there would be values for a geologic</p>

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			<p>feature rather than for the material of which it is comprised (<u>e.g.</u> alluvium).</p> <p>(A) What material comprises these features and how does it differ from the two layers of alluvium for the Upland Complex?</p> <p>(B) Why is it not covered by either the clay-silt alluvium or the alluvium aquifer?</p> <p>Response: (A and B). Permit Condition 2 requires the plant design to preclude any and all future accidental releases into any potential liquid pathway. Therefore, the Staff did not conduct any evaluation of the specific hydraulic properties relevant to estimating the transport of accidental radwaste releases.</p> <p>SERI Input: SERI provides further clarification to these questions: (A) The terrace is comprised of alluvial materials of the Upland Complex. The term "terrace formation" was used in SSAR 2.4 to differentiate this formation from the geologically more recent Mississippi River alluvium located west of the bluffs. (B) The terrace alluvial materials have a lateral relationship to the clay-silt alluvium and alluvial aquifer, as illustrated on SSAR Figure 2.4-29. Terrace alluvial materials are located east of the bluffs. The geologically more recent clay-silt alluvium and the alluvial aquifer are located west of the bluffs. Because of this lateral relationship, the terrace materials do not cover the clay-silt alluvial and alluvial aquifer.</p> <p>Board Reply: Assuming SERI intended to reference above Figure 2.4-37 instead of Figure 2.4-29 of the SSAR, please clarify where the clay-silt alluvium is located at the Grand Gulf site, and its relationship to the alluvium aquifer.</p>
36	General	2.5.1	<p>There appear to be some inconsistencies when discussing the geologic strata at the site:</p> <p>(A) Some sections mention that the plant will be founded on the Catahoula Formation and other sections mention the Upland Complex. Which is it?</p> <p>(B) There are various representations of geologic strata beneath the site (<u>e.g.</u> description on page 2-161, 2-196-97; SSAR Figures 2.4-37, 2.5-76). Please discuss:</p> <p>(1) The discrepancies between these representations and describe further the relationship between terrace deposits and the Upland Complex.</p> <p>(2) The difference between the "Old Alluvium" and "New Alluvium" and verify that they both are part of the Upland Complex.</p>

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			<p>Response: See Attachment B.</p> <p>SERI Input: See Attachment B for SERI comments.</p> <p>Board Reply: SERI's additional input confuses the issue, because boring WLA-3 is not apparently shown on SER Fig. 2.5-37 nor is the inferred fill. Please clarify.</p>
41	2-192	2.5.3.1.1	<p>What was the spacing of the borings along the Mississippi River that allowed USACE to conclude that the Quaternary deposits are not faulted?</p> <p>Response: The Staff does not know the spacing of the borings. This is a summary obtained by the Applicant after it reviewed the US Army Corps of Engineering report, "Geomorphology and Quaternary Geological History of the Lower Mississippi Valley," dated 1994. The Staff believed that the report, which covers an extensive region, did not play a critical role in determining that Quaternary deposits were not deformed at the site. The Applicant used various sources and methods to study the subsurface strata and concluded that Quaternary deposits are not deformed at the site.</p> <p>SERI Input: SERI believes the Staff response to be incorrect, based possibly on review of the wrong USACE study, and suggests the following edits to the Staff's response. <u>In 1950, the USACE postulated the existence of regional faults along the Lower Mississippi River Valley (Krnitzsky, 1950, Ref. #163 of SSAR). Subsequent to this, the USACE compiled borehole and stratigraphic data to evaluate these postulated faults and concluded that the faults are not present (USACE, 1972, Ref. #204 of SSAR). The spacing of borehole data in the USACE 1972 study is highly variable but ranged from several hundred feet to several miles. The USACE 1972 study was regional in nature, and the Applicant did not use this study to demonstrate the absence of faulting at the ESP site, except to help establish the stratigraphic context of the site area. The Staff does not know the spacing of the borings. This is a summary obtained by the Applicant after it reviewed the US Army Corps of Engineering report, "Geomorphology and Quaternary Geological History of the Lower Mississippi Valley," dated 1994. The Staff believed that the report, which covers an extensive region, did not play a critical role in determining that Quaternary deposits were not deformed at the site. The Applicant used various other sources and methods to study the subsurface strata and concluded that Quaternary deposits are not deformed at the site.</u></p>

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			<p>Board Reply: What are the “other sources” referred to by SERI that it used to determine that the Quaternary deposits are not deformed?</p>
42	General	2.5.4.1	<p>Statements are made (<u>see, e.g.</u>, pp. 2-204, 2-227, 2-228, 2-240; SSAR at 2.5-80, 2.5-83) that geologic deposits (<u>i.e.</u> Catahoula Formation, Upland Complex of old Alluvium and new Alluvium, and loess) appear to be over- consolidated. This is the basis for assuming that the Ko for each strata should approach (and possibly exceed) 1.0. Likewise, on page 2-227, the SER notes that the Applicant concluded that the susceptibility of soil deposits to liquefaction is low (citing SSAR § 2.5.4.4).</p> <p>(C) What are the geologic mechanisms that might have caused this overconsolidation in the loess and Upland Complex/Old Alluvium and what is the evidence of this continuing to occur at the site?</p> <p>(D) How were the relative densities of loess calculated from the dry densities?</p> <p>(E) Were any moisture-density or max/min density tests performed to determine maximum density and relative potential for liquefaction?</p> <p>Response:</p> <p>(C) In this region of the US, a number of processes could be responsible for the overconsolidated state, which typically would involve erosion of soils previously deposited. The topographic description for the site indicates that the area was at one time built up to an elevation of about 150 ft and was incised by channels to elevations as low as 100 ft. In addition, the area was used as a staging and laydown area for construction of the existing plant.</p> <p>(D) Relative densities were estimated from the laboratory dry density measurements, together with standard correlations of density with SPT blow counts.</p> <p>(E) The laboratory data summarized in the various reports indicate that no laboratory measurements of maximum/minimum densities were made.</p> <p>SERI Input:</p> <p>(C) SERI suggest the following sentence be added to the end of the Staff response for clarity: The ESP site area was graded and locally lowered up to 50 feet to establish the existing plant yard grade. In addition, while SERI did not physically measure whether overconsolidation continues to occur, it notes that as a general matter, overconsolidation is an evolutionary process as a consequence of ongoing sediment loading.</p> <p>(D) There was no dry density determination from laboratory testings. Dry density was determined solely from standard correlations.</p>

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			<p>(E) SERI notes that laboratory moisture content and field density determinations were made on samples recovered from the ESP borings (see SSAR Tables 2.5-4 and 2.5-25). Maximum density testing (compaction curves) were not performed on the ESP samples.</p> <p>Board Reply: (C) It is still not clear how overconsolidation of the loess has occurred beneath the power block area. (D)&(E) Were dry densities determined from SPT or was relative density determined directly from the field tests, since no max/min testing was performed?</p>
44	2-196	2.5.4.1.1	<p>The SER notes that the Applicant will take additional borings in the fill area as part of the COL. Likewise, SSAR § 2.5.4.1 states that additional site exploration, laboratory testing, and geotechnical analyses will be performed for the COL. (A) Where will this commitment be reflected in the ESP license? (B) What QA/QC procedures have been developed to assure that the Staff will verify that this will be accomplished during the COL stage?</p> <p>Response: (A) It will be in the table of COL Action Items. (B) This commitment will be identified in the permit as a COL Action Item; therefore, any CP or COL application referencing this ESP should address it.</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: It is assumed that the response refers to COL Action Item 2.5-2; however, it is not clear whether this action item refers to existing in-place fill or new fill material to be used for ESP construction. Should not this be clarified to assure that additional borings and testing will be performed on existing fill?</p>
46	2-196	2.5.4.1.1	<p>The SER states: "In its response, the applicant stated that Figure 2.5.4-18 (SSAR Figure 2.5.4-60) shows the BE profile which is based on a visual average of the three compression and shear (P-S) suspension log surveys obtained from the ESP site borings." What does the phrase "visual average of the three" surveys mean?</p> <p>Response: As shown in SSAR Figure 2.5-60, the foundation soil shear wave velocities taken from three boring data (B-3, B-2A and B-1) were plotted against the soil depth. Based on engineering practice</p>

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			<p>experience and judgment, a straight line average (a step function of soil foundation depth) was determined by visual examination.</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: Does “visual examination” mean that the Applicant manually placed the step function by placing the line where it appeared to best represent variations in the field readings? If so, what would be the estimated error in the resulting function?</p>
47	2-196	2.5.4.1.1	<p>What geotechnical information is available to define the properties of the in-situ fill, and is there certainty that differential settlement associated with the transition from native geology to fill will not cause unacceptable differential settlements?</p> <p>Response: No information on fill requirements has been identified. However, the standard controls used for specifying acceptable in-situ fill characteristics include laboratory compaction studies, acceptable grain-size characteristics, and measurements of in-situ compaction and minimum low strain shear wave velocities. If these procedures are followed, differential settlement of well-constructed structures will not be of concern.</p> <p>SERI Input: SERI suggests that the staff response does not address the in-situ fill, and provides the following response to the inquiry. In-situ fill is present at the ESP site. COL Action Item 2.5-2 explicitly requests the COL Applicant to perform a detailed investigation of the in-situ fill. The in-situ fill was not characterized in detail for the ESP because the reactor technology and plant footprint was not known.</p> <p>Board Reply: While it is agreed that the NRC Staff’s response relates to any new fill to be used during construction, it does not necessarily follow that the in-situ fill could not be characterized at this time, because as suggested by SERI, the reactor technology and plant footprint is not known. Could not (and should not) the in-situ fill be characterized at the ESP stage, as a fundamental site condition, in order to determine what options, if any, are available to deal with this material during design?</p>
49	2-202	2.5.4.1.1	<p>SSAR § 2.5.4.1.6 (pp. 2.5-80 to -81), lists average moisture content for loess as 22.8%, and for the Upland Alluvium as 19.2%. The fourth paragraph on page 2-202, however, lists these</p>

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			<p>averages as 22% for loess and 68% for Upland Alluvium. (A) Please explain this discrepancy. (B) Given the average moisture contents of 22.8% and 19.2%, what is the approximate percentage saturation for these zones?</p> <p>Response: (A) The averages stated on SER page 2-202 are incorrect. In addition to the statement in SSAR Sections 2.5.4.1.6.1 (Page 2.5-80) and 2.5.4.1.6.2 (Page 2.5-81), the Staff also checked ER-02. Sections 10.1 and 10.2 of the report state that the average water content for Loess is 22.9% and the average water content for Upland Alluvium is 19.2%, respectively. (B) Using typical values for specific gravity, the degree of saturation is estimated to be approximately 70%.</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: With dry densities of 94.8 pcf and 106 pcf for the loess and alluvium respectively, saturation of 70% indicates a specific gravity of 3 and above. What is the basis for this high a value? With a specific gravity of 2.65, saturation would be above 80%. Would this affect any conclusions about liquefaction potential?</p>
51	2-229	2.5.4.1.5	<p>According to the SER, SSAR § 2.5.4.5 states that the new facilities will be founded on the Upland Alluvium, but also states that they will be founded upon soils that will have a Vs of 1000 fps or greater. (A) How will the verification of this parameter be achieved for design and construction? (B) How does Table 2.5.4-1 (SER p. 2-241) – “Minimum shear wave velocity of soil at plant foundation level” of 1000 fps – become incorporated into the ESP license documents: will it be a Permit Condition, COL Action Item, etc.?</p> <p>Response: (A) Since the requirement of minimum shear wave velocity of soil at plant foundation level is identified as a site characteristic (minimum design value of the soil shear wave velocity), this parameter can be verified by geophysical measurements taken before and during the design and construction of the plant. (B) As indicated in SER Table 2.5.4-1, a minimum shear wave velocity of soil at plant foundation level of 1000 ft/sec has been identified as a “site characteristic” and will be included in the Permit as such. There is no need to identify it as a “permit condition” or “COL action item.”</p>

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			<p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: During design, what spacing of information would be sufficient to assure that the shear wave velocity in the interval spacing isn't below the 1000 fps requirement? Explain in more detail how this would be achieved during COL design and construction.</p>
53	2-233	2.5.4.3.1	<p>COL Action Item 2.5-3 is a commitment to perform additional borings, laboratory testing, and a geophysical survey to define site stratigraphy.</p> <p>(A) Explain your rationale in evaluating whether there is sufficient information to evaluate potential fatal flaws for the ESP license.</p> <p>(C) Are three borings a reasonable representation of standard practice for indicating site variability to assure no fatal flaws in the acceptability of the ESP, specifically the impracticability of delineating, removing or bypassing all material with <1000 fps shear velocity?</p> <p>Response: See Attachment B.</p> <p>SERI Input: See the Attachment B for SERI comments.</p> <p>Board Reply: (A) Summarize and discuss the minimum site characteristics that have been satisfied for the Grand Gulf ESP. (C) The Applicant disputes the Staff's response that three borings are "clearly not acceptable to eliminate the potential for 'fatal flaws'" (Att. B at 23). If three borings are acceptable to eliminate the potential for fatal flaws, describe the program that should be implemented to achieve this goal, and explain why the Applicant was not required at the ESP stage to form these studies.</p>
54	2-240	2.5.4.3.7	<p>The SER states that the Applicant "does not expect to encounter any Holocene materials or relatively loose sands or silts that may be susceptible to liquefaction at the ESP site location." However, there were only three borings made in the ESP site and in each of those there were many low blow-counts obtained in the loess. As an aeolian material, wouldn't this strata be susceptible to liquefaction at the anticipated low densities actually reported for this material?</p>

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			<p>Response: The characteristics of the loess materials are relatively well known from the long period of their evaluation in this area. Due to their depositional environment, the material is typically known to be uniform over large areas. However, it is clear that the conclusions based on only three borings need to be verified by a detailed site-specific investigation program that will be required during the COL stage.</p> <p>SERI Input: SERI further suggests the following clarification to the Staff response. Not all Aeolian material is susceptible to liquefaction, as a general statement. Aeolian material at the site, despite the local areas of low blow counts, is less susceptible to liquefaction because it is not saturated, has interstitial clay (in many areas greater than 15% especially lower in the loess column where saturation would most likely occur), and cohesion. The loess also is Pleistocene in age and not Holocene. See also SERI's response to Inquiry No. 53(C).</p> <p>Board Reply: In response to SERI's input: Is not the loess close to saturation (values calculated for Board SER Inquiry No. 49 yielded a high degree of saturation indicative of only isolated bubbles), and what data is available to quantify the clay content in the loess?</p>
56	2-242	2.5.5.1	<p>Statements of site stability seem to be contradicted by the observed slough in the loess.</p> <p>(A) Why are the slope movements on the bluff called a postulated slump instead of just a slump?</p> <p>(B) To support this ESP, what field studies have been made to investigate the stability of the bluff and creep characteristics of the loess?</p> <p>(C) Why isn't the existing scarp (i.e. slough) indicative of recent movements and potential bluff instabilities?</p> <p>(D) The SER states that the plant will likely be setback 100' from the bluff, but the SSAR (p. 2.5-84) notes a 150' setback. How does the safety factor for stability change for the variation in these distances, and what is considered an adequate safety factor?</p> <p>(E) Would the static safety factor be influenced by blast induced pressure waves and aggravated by potential liquefaction?</p> <p>Response: See Attachment B.</p> <p>SERI Input: See the Attachment B for SERI comments.</p>

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			<p>Board Reply:</p> <p>(A) The NRC Staff's response and SERI's input both appear to support the need to investigate the potential for slope movements along the bluff as a fundamental part of an ESP application. Why was the potential for slope movement, including creep characteristics of the loess and potential for retrogressive deformations, not performed at the ESP stage?</p> <p>(B) Isn't it important to quantify the stability of the slope at the ESP stage so as to assure no impact on the lateral support for building foundations and pipelines?</p> <p>(C) What site monitoring data has been collected to verify that no movements have occurred since the initial plant was constructed?</p> <p>(D) What are the actual safety factors in considering the various setback distances?</p> <p>(E) Is the conclusion that blast impacts would be of too short a duration to realistically cause liquefaction consistent with conclusions from reported literature associated with blast induced liquefaction of military facilities?</p>
58	2-243	2.5.5.3	<p>Why isn't quantitative stability and deformation analyses of bluff – incorporating retrogressive failures with erosion – part of the ESP analyses?</p> <p>Response: The Applicant did not perform quantitative stability and deformation analyses. Based on simplified checks of slope stability by the Staff, the potential impact of the slopes – on overall stability of a plant located at least 100' from the bluff on the stiff material at depths of the planned foundation level – is small.</p> <p>SERI Input: SERI clarifies that it did not perform quantitative stability and deformation analyses of the bluff because the selection of the facility has not been finalized by the Applicant, and therefore, detailed evaluations of the impact of bluff stability on plant design cannot be made. This issue is properly considered a COL Action Item 2.5-6.</p> <p>Board Reply: Please provide the minimum safety factor for static stability, and explain why slope deformations would not have the potential to impact lateral resistance for building foundations and pipelines. In regards to SERI's input, why would the finalized</p>

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			selection of the plant be required to evaluate the stability of the site conditions?
60	General	11	<p>(A) How do the algorithms from GASPAR relate to those used in RESRAD? (B) What was the rationale for selection of GASPAR to model gaseous effluent exposures?</p> <p>Response: (A) There is no relationship between GASPAR and RESRAD for the evaluation of normal gaseous effluents from a nuclear power reactor. RESRAD is a computer model designed to estimate radiation doses and risks from residual radioactive materials. It is primarily used for evaluating the radiological impact from radionuclides in soil. (B) GASPAR was used because it is the NRC standard code for evaluating the dose impact from normal radioactive gaseous effluents. The NRC issued a technical reference and users guide in March 1987, NUREG/CR-4653, "GASPAR II - Technical Reference and User Guide." The code uses the equations and parameters contained in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I."</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: In this response (and repeated elsewhere), the NRC Staff refers to studies, work, and/or conclusions performed by their contractors. Please verify that the NRC Staff has intimately supervised all aspects of the their work and that they stand by and support all of their contractor's conclusions as if they had performed the work themselves. Can the Board assume that any contractor's work can be considered a Staff position and, for this proceeding, ignore the fact that the Staff may have reached their conclusion on some items using guidance from outside sources?</p>
68	General	13	<p>The ESP application incorporates the current state and local emergency plans. During the limited appearance session held in Port Gibson on August 28, 2006, certain local officials indicated that their emergency plans required updating. Will the Staff be requiring the Applicant to update the emergency plans, or work with the communities surrounding the Grand Gulf site to update the plans, as part of the COL process? Particularly, will the Staff require the Applicant to incorporate lessons learned from Hurricane Katrina?</p>

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			<p>Response: As indicated in the response to Inquiry No. 67 above, the scope of the major features application and review focused on a “description” of various aspects of proposed emergency plans against the selected and modified emergency planning standards and evaluation criteria as cited in Section III of Supplement 2 to NUREG-0654/FEMA-REP-1, rather than final plan implementation. The Staff will review complete and integrated emergency plans submitted in a COL or OL application, in consultation with the Department of Homeland Security (DHS), to determine whether they comply fully with the requirements of 10 CFR 50.47 and Appendix E to 10 CFR Part 50. These complete and integrated emergency plans, when submitted, will need to be up-to-date.</p> <p>The emergency preparedness information provided by the Applicant and the Staff’s review guidance were both developed prior to Hurricane Katrina, which occurred in August 2005, and the Staff’s review of the application was substantially completed prior to August 2005. As such, the lessons learned from Hurricane Katrina were not considered in the development of the SER. However, the Staff has contracted with Sandia National Laboratory to conduct a study to assess emergency response planning and implementation in the aftermath of Hurricanes Katrina and Rita. The results of the study will be considered in future rulemaking actions or the revision of applicable regulatory guidance.</p> <p>SERI Input: SERI has an established relationship with communities and government agencies with emergency management responsibilities for the existing Grand Gulf Nuclear Station Unit 1. Plans developed by the States of Mississippi and Louisiana, Claiborne County, and Tensas Parish have been in use since Unit 1 commenced operations. These plans have been periodically updated over the years to improve their overall effectiveness. The State and local agencies responsible for maintaining these plans update these plans, as needed, to address valid concerns and issues.</p> <p>COL application emergency plans will be developed in accordance with applicable regulations. To the extent regulations or applicable guidance are amended to incorporate lessons learned from hurricanes Katrina and Rita, emergency plans would be expected to be revised as necessary.</p> <p>Board Reply: See Board Reply to SER Inquiry No. 76.</p>
72	13-27	13.3.3.3.3	<p>The SER states that the Staff agrees with the Applicant – in its response to RAI 13.3-16 and 13.3-17 – that “LOAs with private sector organizations are outside the scope of the 10 CFR 52.17(b)(3) requirement and will be provided at the COL stage.”</p>

Inquiry No.	SER Page	SER Section	Inquiry
			<p>(A) Why is this not a COL Action Item? (B) Has the Staff evaluated the capability of these facilities to provide the expanded support needed for the additional ESP facility? Did the Staff evaluate the adequacy of the proposed training described in section 3.15 of the Applicant's ESP application?</p> <p>Response: See Attachment B.</p> <p>SERI Input: See Attachment B for SERI additional comments.</p> <p>Board Reply: SERI's input is confusing: Major Feature L is discussed in SER § 13.3.3.13. Section 13.3.3.14 references Major Feature O, and neither K nor L, as stated in SERI's input. Staff conclusions quoted by SERI's input are also from Section 13.3.3.13 (Major Feature L). SERI should be prepared to clarify its input to this Inquiry.</p>
76	13-52 to 13-53	13.3.3.9.3	<p>Open Item 13.3-3 describes the need for additional information regarding OSC, TSC, & EOF. The Staff states that there is insufficient description of the emergency facilities and related equipment for the TSC, OSC, & EO and, therefore, concludes that proposed major feature H is unacceptable. How has this been resolved?</p> <p>Response: In its response to RAI 13.3-34, the Applicant stated that it had not made an evaluation or decision as to whether the existing Unit 1 OSC and EOF facilities could or would be shared, and that Part 52 design certification, which establishes the TSC design criteria, would need to be incorporated based on the plant design when selected. As such, in its submittal dated June 21, 2005, the Applicant stated that it considered the remaining open questions regarding the OSC, TSC, and EOF (Open Item 13.3-3) to be more appropriately addressed in the context of complete and integrated emergency plans, which would be submitted with a COL application, rather than in the ESP application. The capabilities of the Applicant's OSC, TSC and EOF will be reviewed by the Staff in accordance with NUREG-0696 as part of complete and integrated emergency plans submitted in a COL or OL application, to determine whether they comply with the guidance and meet the standards of 10 CFR 50.47 and the requirements of Appendix E to 10 CFR Part 50.</p> <p>SERI Input: SERI will provide descriptions of the TSC, OSC, and EOF in the COL application emergency plan.</p>

Inquiry No.	SER Page	SER Section	Inquiry
			<p>Board Reply: The NRC Staff's response does not change the position stated in the SER that Major Feature H is unacceptable. Unless this position has changed, is this not grounds for denial of the ESP application?</p>
78	13-90 to 13-91	13.3.3.11.3	<p>Open items 13.3-1c, g, h, and i are noted in the SER as "resolved," however, they appear to be pending for the COL stage since "arrangements would need to be expanded to incorporate relevant aspects of a proposed - new reactor design in a COL . . . application." As such, shouldn't these be replaced as COL Action Items?</p> <p>Response: No. Notwithstanding any Staff approval of a proposed major feature in this SER, all features of the emergency plans requiring a description pursuant to Appendix E to 10 CFR Part 50, but that are not described in the ESP application, will be reviewed in the context of a COL or OL application. The Staff will review complete and integrated emergency plans submitted in a COL or OL application to determine whether they comply with such requirements, as well as with the requirements of 10 CFR 50.47. As such, the Staff does not believe that a COL action item is necessary.</p> <p>SERI Input: See SERI's comments in response to Inquiry No. 75.</p> <p>Board Reply: In their input to this Inquiry, SERI referenced their response to Inquiry No. 75; however, SERI had no additional comment to Inquiry No. 75. Is this correct?</p>
83	15-2	15.1	<p>The SER cites Regulatory Guide 1.183. Section 4.1.5 of the Guide states that "[t]he maximum two-hour TEDE should be determined by calculating the postulated dose for a series of small time increments and performing a 'sliding' sum over the increments for successive two-hour periods. The maximum TEDE obtained is submitted. <u>The time increments should appropriately reflect the progression of the accident to capture the peak dose interval between the start of the event and the end of radioactivity release.</u>" (emphasis added). What time increments were used by the Staff in determining the maximum 2-hour dose, and what was the basis for the choice?</p> <p>Response: The Applicant's dose assessments were directly extracted from design certification documentation previously submitted to and reviewed by the NRC in connection with the design certification applications.</p>

Inquiry No.	SER Page	SER Section	Inquiry
			<p>The ABWR analysis was based on the source term described in TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites," and was a "first two-hour" analysis. The ABWR design certification predated NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants," and RG 1.183.</p> <p>The AP1000 EAB dose analysis was based on the source term described in NUREG-1465 and was an "any two-hour" or "worst two-hour" or "maximum two-hour" analysis. In performing the analysis for the design certification, the Staff used its radiological consequence computer code, "RADTRAD: Simplified Model for RADionuclide Transport and Removal And Dose Estimation," described in NUREG/CR-6604. The RADTRAD code estimates transport and removal of radionuclides and radiological consequence doses at selected receptors every 0.3 hour and then interpolates the doses for 0.1 hour (6 minute) increments to determine the maximum 2 hour EAB dose over the DBA. From NUREG-1465, the LOCA DBA includes the "gap" and "early in-vessel" release phases and, for a PWR, the release of the fission products is assumed to terminate at 1.8 hours from the initiation of the postulated accident. In addition to the EAB analysis, the LOCA dose is tabulated for the entire duration of the postulated accident (assumed to be 30 days) at the low population zone distance.</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: See Board's Reply to Inquiry No. 3, regarding inclusion of RADTRAD and provision of the requested information.</p>
92	A-2	App. A.1	<p>Permit Condition No. 2 requires that an Applicant referencing this ESP to "design any new unit's radwaste system with features to preclude any and all accidental releases of radionuclides into any potential liquid pathway."</p> <p>(A) What is the existing groundwater quality? (B) What monitoring is proposed to verify groundwater compliance? (C) If present, how will the existing impacts be separated from any potential new impacts from an additional plant? (D) Does this Permit Condition not say that any level of detected radionuclides would automatically be a license violation? (E) When would the monitoring plan and action plans to address detected levels be developed, and are there any reasons not to address these plans at the ESP stage?</p> <p>Response: (A) Assuming that the Board's question is in reference to</p>

Inquiry No.	SER Page	SER Section	Inquiry
			<p>radiological contaminants, the Staff concluded, in proposing Permit Condition 2, that the existing groundwater quality did not require further review. If there is no possibility of accidental release from the ESP facility, any contamination in the existing groundwater would not be caused by accidental releases from the ESP facility. The Applicant will need to demonstrate at the COL stage that the specific design would preclude any and all accidental releases. However, this proposed permit condition would not preclude normal releases, which are not considered in SER Section 2.4.13.</p> <p>SERI Input: SERI has no additional comment.</p> <p>(B) The Applicant provided information on its existing radiological environmental monitoring program (REMP). The REMP will be used for any new facility built. The REMP does not include any provision for monitoring onsite ground water. The REMP does include two drinking water sampling locations; one near the site and one approximately five miles away. This item will be evaluated at the COL stage.</p> <p>SERI Input: The REMP for the existing GGNS Unit is discussed in EIS Section 5.6.3 at 5-61 and 5-62.</p> <p>(C) This level of plant information is not required at the ESP stage.</p> <p>SERI Input: SERI has no additional comment.</p> <p>(D) Yes, the Permit Condition proposed for inclusion by the Staff would require the Applicant to design a radwaste system with features to preclude any and all accidental releases of radionuclides into any potential liquid pathway.</p> <p>SERI Input: SERI notes that this is an ESP Permit Condition, not a license condition on a COL, and that SERI may request a variance from the Permit Condition should it become necessary at COL. Additionally, should any radioactivity be detected in a ground water or surface water pathway following construction and operation of a new facility, the data would be evaluated as to its source and nature of the contamination, considering a number of factors in the determination as to whether the license has been violated.</p> <p>(E) Development of monitoring plans for accidental releases requires a specific design. The properties of the subsurface environment will be disturbed during excavation and fill. The subgrade portion of the plant will represent a hydraulic barrier. Any monitoring system design would require detailed information not available at the ESP stage. The Staff expects that this</p>

Inquiry No.	SER Page	SER Section	Inquiry
			<p>information will be provided at the COL stage.</p> <p>SERI Input: SERI has no additional comment.</p> <p>Board Reply: (A) How could an ESP plant at the Grand Gulf site be monitored so as to determine if it meets Permit Condition 2 without defining the existing baseline water quality, since it may have been impacted from the existing plant? Isn't this water quality data a fundamental ESP site condition that could preclude the effectiveness of Permit Condition 2? (B) How does the Applicant propose to assure Permit Condition 2 is met without groundwater monitoring? Is EIS § 5.9.6 the correct EIS section, instead of section 5.6.3 referenced in SERI's input? (C) Is it not possible for this site analysis to result in a condition where it might be impossible to separate out the influences of the existing plant from any new plant(s), thereby potentially yielding the site unsuitable to meet the NRC Staff's stated conditions? (D) Isn't a design to preclude any and all accidental releases an unrealistically high standard? Of what use is this condition if the Applicant is already discussing the potential for a variance from this condition? (E) Could not a plan be developed at this time using the bounding values of the PPE so as to assure that the practicality of this monitoring is flushed out at the ESP stage?</p>
94	A-6	App. A.2	<p>COL Action Item 2.4-9: Why hasn't the detailed characterization of the ground water been performed at the ESP stage? Isn't it needed to assure site suitability?</p> <p>Response: Please see Staff's responses to Inquiries 21, 22, 26, 28, and 29.</p> <p>SERI Input: In addition, SERI also references the response to Inquiry No. 27.</p> <p>Board Reply: See Board's Reply to Inquiries No. 26 and 92.</p>

ATTACHMENT B

Grand Gulf ESP FEIS Inquiries – Mandatory Hearing

Inquiry No.	EIS Page	EIS Section	Inquiry
1	General	General	<p>1. Given the Staff's experience with other EISs for ESPs, of what use will this permit, if approved, be to the Applicant (SERI), in light of the number of unresolved issues and the number of items deferred to the COL stage?</p> <p>2. In order for the Board to have a better perspective of what is finalized by this EIS, please list and discuss the specific environmental impacts that the Staff believes have been resolved at the ESP stage and, accordingly, need not be addressed at the COL stage.</p> <p>Response:</p> <p>1. The only other EIS for an ESP that has been completed to date is for the Exelon (Clinton) site. Just as with the Grand Gulf ESP EIS, the Staff had sufficient information to resolve the alternative site issue for Clinton, but certain issues at the proposed site, which required more than reconnaissance-level information, were unresolved for Clinton as well. A COL applicant referencing an ESP must determine whether there is any significant new information for resolved issues; however, if there is not any significant new information relating to such issues, further evaluation is not needed. Therefore, resolution of environmental issues prior to the preparation of a COL application reduces an applicant's financial risk.</p> <p>2. See Attachment B.</p> <p>SERI Input:</p> <p>1. SERI acknowledges that there are certain unresolved environmental issues pertaining to construction and operation of a GGNS ESP facility. As described in SERI's October 23, 2006 brief on environmental issues, however, the number of unresolved issues is limited and only constitutes a small fraction of the total environmental issues considered and resolved in the ER and EIS. Further, for each discrete issue, the Staff made reasonable and supportable assumptions regarding the associated impact levels sufficient to support its conclusions and sufficient for the Board to conduct its NEPA review, including a comparison of impacts. The use of bounding assumptions complies fully with NEPA and is consistent with Council on Environmental Quality regulations. Also, as described in SERI's response to Board Inquiry No. 3 below, a COL applicant that references the GGNS ESP must establish, as part of the Part 52 COL application process, that construction and operation of the selected nuclear plant design is bounded by any assumptions made with respect to these unresolved issues and also provide information on any deferred issues. In addition, the Staff will conduct an independent review of these issues as part of its review of the COL application. Therefore, unless the Board finds</p>

Inquiry No.	EIS Page	EIS Section	Inquiry
			<p>that the Staff's assumptions with regard to these matters are unreasonable or unsupported, the environmental review conducted by the Staff is sufficient and meets the requirements of NEPA.</p> <p>Further, SERI concurs with the Staff that the numerous environmental issues identified in Attachment B to the Staff's response (which is attached herein with SERI's comments) have been resolved by this ESP. These resolved issues will not be reconsidered at the COL stage unless there is significant new information that was not previously evaluated in the ESP. (See SERI response to Board Inquiry No. 3 below for a further discussion of the COL application process.) Accordingly, SERI believes that the benefits of the ESP process have largely been achieved in this application, even with the limited unresolved items. These benefits include the following :</p> <ul style="list-style-type: none"> • Early resolution of siting issues prior to large investments of financial capital and human resources in new plant design and construction; • Early resolution of issues on the environmental impacts of construction and operation of reactors that fall within the plant parameters; • The ability to bank sites on which nuclear plants may be located; and • The facilitation of future decisions on whether to construct new nuclear power generation facilities. EIS, at 8-2. <p>2. SERI has reviewed Attachment B. As noted in the Staff's response to Board Inquiry No. 86, an examination of the EIS reveals that only certain particular "sub-issues" under a given general resource area remain unresolved. SERI's suggested revisions to this list are included in Attachment B herewith; items added are in "Italics" font.</p> <p>Board Reply:</p> <p>1. How will NRC Staff assumptions be documented and incorporated into the ESP license? SERI suggested that additional sub-categories be added to the list of unresolved issues. Does the Staff agree with SERI's additions?</p> <p>2. The following items need further clarification:</p> <p>(i) <u>Construction impacts on air quality</u> (EIS p. 4-6): How will SERI's mitigation identified in the ER be incorporated into the ESP license?</p> <p>(ii) <u>Construction impacts on Water</u> (EIS p. 4-8): SERI recommends that additional sub-categories be added to the list of unresolved issues, including construction dewatering, erosion of sediment, dredging and shoreline construction. What site data (<u>e.g.</u> aquifer parameters, erosion potential, sediment characterization, etc.) were used to reach these conclusions?</p> <p>(iii) <u>Operation Impacts on hydrological alterations</u> (EIS</p>

Inquiry No.	EIS Page	EIS Section	Inquiry
			<p>p. 5-7): SERI recommends that additional sub-categories be added to the list of unresolved issues, including Mississippi River water use, Stream A & B water use, Holocene alluvial aquifer, and thermal plume on river. What data are available to quantify the impervious area that may affect runoff to the adjacent streams? What aquifer parameters have been measured to define the operational impact on the Holocene alluvial aquifer, and did the projections of the thermal plume include the effects from both plants?</p> <p>(iv) <u>Operational Impacts on Radiological Monitoring</u> (EIS p. 5-62): SERI suggests that current operational monitoring is adequate to establish the radiological baseline. What monitoring wells have been used at the site to define historic groundwater quality and current groundwater quality, and are these sufficient to quantify parameters concentrations across the site?</p> <p>(v) <u>Operational Impacts on Uranium fuel cycle for light water reactors</u> (EIS p. 6-15): Please list the assumptions that will be verified for their validity during the COL stage.</p>

Inquiry No.	EIS Page	EIS Section	Inquiry
3	General	General	<p>There are numerous items in the EIS that are either characterized as unresolved and/or deferred to the COL stage.</p> <ol style="list-style-type: none"> 1. What criteria was used to delineate an item as a license condition, COL action item, or merely one deferred to the COL stage? 2. Is there a comprehensive list of all of these items? If yes, please provide a copy. 3. If no list has been compiled, please explain how the Staff intends to: <ol style="list-style-type: none"> (A) ensure that each item is in fact performed at the COL stage; (B) ensure that a COL Applicant will not be able to improperly claim that a particular item was resolved at the ESP stage when in fact it was not. 4. Are there any license and/or regulatory processes in place to assure that all these items are in fact performed at the COL stage? <p>Response:</p> <ol style="list-style-type: none"> 1. The Staff would have recommended permit conditions if the Staff had determined that some future action by the holder of the ESP (or COL applicant referencing it) was <i>necessary to ensure compliance</i> with NRC regulations. By contrast, Staff identified COL Action Items in the Grand Gulf SER for specific matters that the Staff concluded that a future COL applicant <i>should address</i> in a facility Final Safety Analysis Report. In contrast, the FEIS does not identify any COL Action Items. The criteria for issues that were deferred in the Grand Gulf FEIS included whether the ESP application did not address the issue (e.g., the benefits assessment) or whether the issue could not be resolved because <ol style="list-style-type: none"> 1) the ESP application did not provide sufficient information or 2) other information was not then available (without undue speculation) to allow the Staff to reach a conclusion on the impacts. 2. The Staff did not find it necessary to recommend any permit conditions relating to 10 CFR Part 51 compliance and it did not specify COL Action Items for the issues addressed in the FEIS because the proposed action did not include direct site modification (e.g., ground disturbing) activities or other indirect environmental impacts. Although there is no comprehensive list of environmental issues that will be deferred, Tables 4-3 and 5-17 of the FEIS list the construction and operational impacts that remain unresolved. 3. and 4. See response to Inquiry No. 20.

Inquiry No.	EIS Page	EIS Section	Inquiry
			<p>SERI Input:</p> <ol style="list-style-type: none"> 1. SERI has no additional comments or input. 2. SERI has no additional comments or input. 3. See response to Board Inquiry No. 4. below. 4. The following supplemental discussion is provided regarding regulations and administrative processes relevant to management and control, at the COL stage, of various environmental issues identified in the ESP EIS. <ol style="list-style-type: none"> a. Overall, pursuant to <i>proposed</i> 10 CFR 52.80, the COL application must contain a complete environmental report per § 51.50(c). Specifically, <i>proposed</i> § 51.50(c)(1) defines ER information requirements for a COL application referencing an ESP. <ul style="list-style-type: none"> • The demonstration required by <i>proposed</i> § 51.50(c)(1)(i) will compare the selected design with the surrogate design defined by the PPE parameters listed in the ESP application ER Chapter 3 (also shown in EIS Appendix I). This comparison will be provided in the COL application ER for NRC Staff review. • Pursuant to <i>proposed</i> § 51.50(c)(1)(ii) and (iii), the COL application ER must contain information to address those issues not resolved at ESP as well as any new, significant information related to those issues resolved at ESP. As a practical matter, “not resolved” would include those issues deferred (e.g., need for power, EIS Section 1.1.3) and those issues explicitly identified in the ESP EIS as “not resolved” (e.g., transmission corridor related impacts, EIS Section 4.1.2). • As required by <i>proposed</i> §51.50(c)(1)(iv), the COL application ER will describe the process used to identify new and significant information that would impact NRC conclusions in the ESP EIS. Pursuant to <i>proposed</i> § 51.50(c)(1)(v), the COL application ER would demonstrate that all environmental terms and conditions that have been included in the ESP will be satisfied by the date of issuance of the combined license. b. Appropriate processes, including implementing administrative controls, will be established by the COL applicant to ensure that the COL application ER contains the necessary information, as discussed above. The development of this information would include consideration and review, as appropriate, of the ESP EIS for those issues that are resolved and not resolved. <ul style="list-style-type: none"> • As indicated in SERI comment to Board Inquiry on the SER, No. 6 B(1), a draft of the proposed Grand Gulf Early Site Permit has not been made available to SERI for review. However, any conditions described in the Permit would be included in the administrative processes developed to ensure a complete COLA ER, as appropriate. • As a part of a COL application development process, it is expected that the ESP EIS (including Appendix J, Tables J-1 and J-2) would be reviewed for assumptions to be considered in the review for significant new information. • Also, during the COL application development process, the ER and EIS will be reviewed for commitments to future actions.

Inquiry No.	EIS Page	EIS Section	Inquiry
			<p>These commitments will be considered for impact to the COL ER, as well as incorporated into a commitment management system. The system would be developed at an appropriate time during the COL process. (See also SERI Input to Board SER Inquiry No. 6(B)(1) regarding management of commitments in the ESP application.)</p> <ul style="list-style-type: none">• The ESP ER and EIS, along with other appropriate sources, would be considered in the development of State, local, and federal permits, licenses, or other approvals required to support the construction and operation of the proposed new facility at the ESP site. <p>Board Reply: While this will likely be discussed further as one of the oral hearing issues, the NRC Staff states that no COL action items relating to Part 51 were recommended because the proposed action did not include direct site modifications or other direct impacts. Is it not true, however, that an EIS for an ESP must consider the potential impacts from future construction, in order to have any meaning at all and in order to achieve the goals of "banking a site"?</p>

Inquiry No.	EIS Page	EIS Section	Inquiry
4	General	General	<p>The EIS states that it “used its experience and judgment to adapt the review guidance in the ESRP and to develop assumptions necessary to evaluate impacts to certain environmental resources to account for . . . missing information [from the SERI ESP application]” (EIS at 3-4).</p> <ol style="list-style-type: none"> 1. Has the Staff prepared a comprehensive list of all the assumptions it has made with respect to either site characteristics or with respect to future actions by the Applicant? 2. Given the fact that depending on how these assumptions are ultimately resolved, there could be significant impacts to the environment, how does the Staff intend to assure that its assumptions are properly tracked, verified, incorporated, and corrected (as needed), during the COL process? <p>Response:</p> <ol style="list-style-type: none"> 1. The Staff has not prepared a comprehensive list of <i>all</i> the assumptions it has made with respect to either site characteristics or with respect to future actions by the Applicant. However, Table J-2 of Appendix J lists key assumptions used by the Staff in assessing the environmental impacts at the Grand Gulf ESP site. See the response to Inquiry No. 8 for a definition of “key assumption.” 2. During its review of a COL application referencing an ESP, the Staff will use NEPA tiering principles and incorporation by reference to consider whether there is any significant new information regarding issues that were resolved in the ESP proceeding, including any significant new information related to an assumption. Where assumptions (<i>e.g.</i>, those enumerated in Appendix J) need to be verified, the Staff would conduct the verification at the COL stage in a manner similar to that employed during the review of the ESP application, <i>i.e.</i>, the Staff would review information provided by the applicant in its ER and during the Staff’s audit, and perform an independent review of these matters, including obtaining and reviewing information from local, State, Tribal, and Federal authorities. <p>SERI Input:</p> <ol style="list-style-type: none"> 1. SERI has no additional comments or input. 2. Regarding treatment of assumptions listed in the ESP EIS, see SERI comments in response to Board Inquiry No. 3(4). <p>Board Reply: To be discussed further as one of the oral hearing issues.</p>
5	General	General	<p>Please identify the parameters and environmental impacts for which the combined effects of GGNS Unit 1 and the GGESP facility are/will be considered.</p> <p>Response: The Staff considered the combined effects of GGNS Unit 1 and</p>

Inquiry No.	EIS Page	EIS Section	Inquiry
			<p>the proposed GG ESP facility for all relevant parameters and environmental impacts. For example, cumulative impacts of severe accidents were considered by comparing the risks of severe accidents for new units at the site with the risk of a severe accident at the existing unit. The Staff determined that the risks associated with severe accidents at the units would be small compared to the risks associated with the existing unit. On the other hand, cumulative impacts of design basis accidents were not considered because: 1) the purpose of the design basis accident analysis is to compare predicted consequences (doses) with regulatory limits and guidance that pertain to individual reactors, and 2) the likelihood of simultaneous design accidents is small.</p> <p>SERI Input: As discussed in Chapter 7 of the EIS (EIS at 7-1) the impacts of the proposed action, as described in [EIS] Chapters 4 and 5, are combined with other past, present, and reasonably foreseeable future actions in the vicinity of the Grand Gulf ESP site that would affect the same resources impacted by the current GGNS regardless of what agency (Federal or non-Federal) or person undertakes such other actions. These combined impacts are defined as "cumulative" in Title 40 of the Code of Federal Regulations (CFR) 1508.7 and include individually minor but collectively significant actions taking place over a period of time.</p> <p>Thus, the combined effects of GGNS Unit 1 and the GGNS ESP facility are considered. Cumulative impacts, which include the combined effects of the proposed action and those of the existing GGNS facility where appropriate, were considered for issues such as air quality, water use and quality, terrestrial ecosystem, aquatic ecosystem, socioeconomic, historic and cultural resources, environmental justice, nonradiological health, and radiological impacts of normal operations.</p> <p>Additionally, combined impacts are discussed in the SERI response to Board Inquiry Nos. 22 and 52 for effluent discharges and maximum individual dose, respectively. Also monitoring programs, such as the REMP, would be common for all operating units on the site.</p> <p>Board Reply: Please list "all relevant" parameters and environmental impacts for which the combined effects of the existing and proposed unit(s) were considered. SERI noted that monitoring programs would be common for all operating units; however, wouldn't the monitoring program need to be designed to delineate and separate out impacts from the various existing and proposed units to assure that the responsible facility is identified and that corrective actions are focused to the appropriate plant?</p>

Inquiry No.	EIS Page	EIS Section	Inquiry
11	2-19	2.5	<p>1. Does the monitoring of water for radiologic constituents include both surface and groundwater? If so, what are the temporal background, construction, and operational results to date?</p> <p>2. Is there sufficient background data to quantify pre-development groundwater quality (prior to any site development), and existing operational groundwater quality data that might be representative of the "baseline" conditions for the ESP site?</p> <p>Response:</p> <p>1. Yes. Both surface and groundwater are monitored under the Radiological Environmental Monitoring Program (REMP). The REMP includes 3 samples of surface water, 1 upstream, 1 downstream, and 1 downstream during a liquid radwaste discharge. These samples are submitted for a gamma isotopic and tritium analyses. Two samples of groundwater are taken at two different wells on an annual basis. These samples have both gamma isotopic and tritium analyses conducted on them. This monitoring is an operational program, and the results are reported annually in the Grand Gulf Nuclear Station Annual Radiological Environmental Monitoring Program Summary. The Staff reviewed the REMP reports for 2001, 2002, and 2003. See ADAMS Accession Nos. ML021200537, ML031120162, and ML041260549, respectively.</p> <p>2. For the purposes of the ESP analysis, the Staff determined that the REMP for the operation of Unit 1 was also adequate for determining the baseline for comparison with the expected impacts to the environment related to construction and operation of the proposed new unit(s).</p> <p>SERI Input:</p> <p>1) and 2): Refer to ER 6.3.1 for a detailed discussion of past and ongoing water quality programs for the existing GGNS plant and the site, as well as monitoring at various surrounding locations. Ground water sampling is done in the alluvial aquifer at the river, and potable water is sampled per Mississippi Department of Health requirements.</p> <p>Board Reply: To be discussed further as one of the oral hearing issues.</p>
12	2-24	2.6.1.2	<p>1. Is the Catahoula formation an unconfined or confined aquifer?</p> <p>Response:</p> <p>1. For the purposes of this EIS, the Staff assumed that the Catahoula formation was an unconfined aquifer. In the Applicant's ER, the description of aquifers underlying the site is more complete and better supported by data with regard to the Holocene Mississippi River alluvium and the Pleistocene terrace deposits than with regard to the Catahoula Formation of the</p>

Inquiry No.	EIS Page	EIS Section	Inquiry
			<p>Miocene series. For example, data on the total porosity, effective porosity, bulk density, storage coefficient, longitudinal dispersion coefficient and distribution coefficients for select analytes are reported in Table 2.3-15 of the ER for two alluvium materials and the terrace deposits. In contrast, no data on these aquifer material properties are presented for the Catahoula Formation. Permeability data on the Catahoula Formation are dominated by laboratory consolidation test results and not field scale aquifer test results. While a single figure (Figure 2.3-22) showing potentiometric level in the Catahoula is described as presenting "the potentiometric level of the confined aquifer within the Catahoula Formation," there is no discussion of core evidence or field study results demonstrating the presence of a confining structure. Indeed, the ER states that "Water-bearing zones within the Catahoula receive recharge from percolation through overlying terrace of alluvium" implying the potentially permeable character of the upper Catahoula Formation in the immediate vicinity of the site.</p> <p>The USGS's Groundwater Atlas of the United States, (Segment 5, Arkansas, Louisiana, Mississippi, Hydrologic Investigations Atlas 730-F, U.S. Geological Survey, Reston, Virginia, 1998.) describes the coastal lowlands aquifer system that underlies southern Mississippi and Louisiana (including the Grand Gulf site) and extends to and into the Gulf of Mexico. Confining units that separate the Catahoula Formation from overlying aquifers are described as existing in that portion of the coastal lowlands aquifer system that lies "off shore from southwestern Louisiana..." The USGS noted that confining units generally are found to separate aquifers that contain saline water or brine and that these confining strata pinch out, or grade by facies change to more permeable strata as they extend updip into the shallower subsurface. The Grand Gulf site lies at the very most updip extent of the coastal lowlands aquifer system. The USGS notes that there is a general absence of widespread confining units. Therefore, without benefit of field studies to the contrary, the Staff conservatively assumed that the Catahoula Formation in the vicinity of the Grand Gulf site is unconfined, albeit less permeable at its interface with the terrace deposits than at depth.</p> <p>The Staff concludes in the EIS that the characterization of the Catahoula Formation presented by the Applicant is inadequate to resolve the impacts to groundwater water-use and groundwater water-quality. In addition to other hydraulic properties, aquifer tests will establish the degree of confinement of the Catahoula Formation prior to issuance of any COL.</p> <p>SERI Input: SERI has no additional comments or input.</p>

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			<p>Board Reply: 1. Table 2.3-15 in the ER has parameter coefficients for the terrace deposits, clay-silt alluvium, and sand-gravel alluvium. How do these relate to the old and young alluvium of the Upland Complex?</p>
16	2-31	2.7.1	<p>Explain how the Army Corps of Engineers attempted to stabilize the eastern bank of the Mississippi in the Grand Gulf area and why the Staff believes that this will be successful?</p> <p>Response: The Army Corps of Engineers attempted to stabilize the eastern bank of the Mississippi in the Grand Gulf area by emplacement of revetments, as stated on page 2-31 of the FEIS. The emplacement of revetments is referenced to the ER in the FEIS, and the revetments were also observed by the Staff during the site audit, although the latter is not stated in the FEIS. The Staff believes that bank stabilization will be successful because revetments are a common and well-recognized method of performing successful bank stabilization along river and stream banks worldwide.</p> <p>SERI Input: As noted in the Staff response, a description of the revetments in the vicinity of GGNS is provided in ER section 2.3.1.1.1. In summary, the Corps of Engineers completed revetments along the east and west river banks, including the east bank that borders the GGNS site, to maintain the river channel. The Grand Gulf revetments in the two sections from approximately river mile 400.5 to 405.0 and 408.5 to 409.6 were completed in the 1960s and 1970s. The intervening section, which includes the river stretch near the GGNS site, was left unprotected to undergo erosion until it attained an acceptable alignment. The section on the east bank along the GGNS site boundary was completed in stages from the mid-1970s to the early 1980s, with a small gap at the existing GGNS barge slip. . . . The Corps of Engineers continues to evaluate the need for additional shoreline work, and would be expected to make improvements as considered appropriate.</p> <p>SERI will be required to comply with federal and state regulations during the design and construction of an embayment and intake structure, as discussed in the ER (Section 2.3.1.1.1, Page 2.3-3). It will be required to coordinate with the Corps of Engineers and/or other appropriate regulatory agencies and obtain permits for construction of the embayment and intake structure when the final design of the intake structure and its exact location are defined. The design and placement of the embayment and intake structure will be in accordance with the Corps guidance, MDEQ and EPA requirements, as well as good engineering practice.</p>

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			<p>Board Reply: Please provide a map showing the location of the revetments supported river bank in the vicinity of the GGNS.</p>
19	3-1	3.0	<p>The EIS states that "SERI's application encompasses construction and operation of one or more new nuclear units generating as much as 8600 MW(t) or 3000 MW(e) output." Please clarify how this comports with the SER, which identifies a thermal limit of 4300 MW(t) or 2000 MW(e). The PPE also identifies a limit of only 4300 MW(e).</p> <p>Response: The Applicant and the Staff statements are consistent. In SAR Section 1.3.1.4, Grand Gulf Site Specific "Bounding Plant," SERI indicated that the site capacity "target" of 2000 MW(e) was only an initial step in PPE development, meaning that no less than an additional 2000 MW(e) was being considered for the Grand Gulf ESP site. Because the reactor types considered by SERI ranged up to 1500 MW(e), the Staff doubled the bounding number for each PPE value, where appropriate. In its SAR Table 1.3-1 and again in its ER Table 3.0-1, SERI represented that the "Composite Value" generally reflects the values corresponding to a plant that is twice the vendor's specified "standard size plant" and that the PPE bounding values were "driven" by a multiple of reactor units representing a total generation capacity that was either equivalent to or, in some cases, much greater than 2000 MW(e). Therefore, in some cases, the values were designated as unit specific (US) values that had to be doubled for the site; consequently, the value of 4300 MW(t) per unit was doubled to 8600 MW(t) for the site, so that the approximately 1500 MW(e) was doubled to about 3000 MW(e) to exceed the floor of 2000 MW(e) for the site.</p> <p>As a general matter, differences may exist between the Staff's EIS and its SER, or between the Staff's EIS and the applicant's ER. Differences between the Staff's safety and environmental reviews may result from the statutory and regulatory requirements for each review. The Staff's safety review is performed under the Atomic Energy Act and in accordance with the regulations in 10 CFR Part 52. The environmental review is performed under the National Environmental Policy Act (NEPA) as implemented in NRC regulations at 10 CFR Part 51. Whereas the safety review is focused primarily on protecting the health and safety of the public, the environmental review considers a much broader range of impacts to the environment as a whole. The differences between the Staff's EIS and an applicant's ER may result from the Staff's independent assessment or from reliance on data, assumptions, or methods different from those presented by the applicant.</p>

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			<p>SERI Input: As noted in the above Staff response, PPE parameter 17.3 in ER Table 3.0-1 is 4300 Megawatts Thermal (not MWe as noted in the Board Inquiry). This value is the bounding unitspecific thermal power output for all the reactor designs considered in the PPE and is associated with the ABWR. Reactor plant electric output (MWe) was used as a tool in the development of the PPE and used, as well, in the comparison of alternative energy sources. (See SERI input to Board Inquiry No. 67.) However, MWe is not a PPE listed parameter.</p> <p>As a matter of completeness, SERI provided the following clarifications on this topic in its responses to the Board's SER Inquiries Nos. 8 and 9:</p> <p>ASLB SER Inquiry No. 8(C): PPE values listed in SSAR Table 1.3-1 are based on the PPE development process described in SSAR Section 1.3.1.3. SSAR Table 1.3-1 lists those parameters relevant to the safety analyses. For each parameter, the most limiting value was selected. As described in the Staff response, the 2000 MWe value is a "target site capacity" and is discussed in detail in SSAR Section 1.3.1.4. The establishment of this value was an "initial step in PPE development" (SSAR, page 1.3-4).</p> <p>ASLB SER Inquiry No. 9: (A) SSAR Section 1.3.1.3 lists those designs considered in the development of the PPE. The ABWR is described as a reactor plant with power ratings of "4300 MWt plant, 1500 MWe." The 8600 MWt value is not explicitly stated in the SSAR. (B) Footnote 3 (SSAR page 1.3-5) indicates the largest LWR considered in the PPE "has a capacity rating of 1500 MWe per unit; thus, to meet the target site capacity of 2000 MWe, two units are required, resulting in a total site electrical capacity of 3000 MWe." While the 8600 MWt value was not explicitly stated in the SSAR, two ABWR units represent the largest MWt possible (of the plant types considered for the ESP) that would satisfy the target site capacity. This is consistent with the Staff Response to 9(B).</p> <p>As discussed above, if the selected facility does not fall within this value, then a COL application referencing the ESBWR design shall include a request for variance. Thus, if the COL referenced a design having with greater than 4300 MWt per unit or 8600 MWt for twin units, a variance would be required.</p> <p>Board Reply: If, as stated in SERI's input, the COL references a design having greater than 4300 MWt per unit, wouldn't the safety and environmental analyses performed for this ESP need to be redone (where applicable) for the new thermal output rather than just</p>

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			seeking a variance?
21	3-7	3.2.1.2	<p>1. Why do the sources of water for the proposed facility include both a new well and the new intake on the Mississippi River? Wouldn't the intake serve all water needs?</p> <p>2. What is the characterization of the sediments expected to be filtered from the Mississippi River, and is there any possibility that the sediments would require special handling and disposal?</p> <p>Response:</p> <p>1. The Staff believes that there is adequate water supply in the Mississippi River to satisfy both demands. However, the Staff did not review the Applicant's motivation for proposing the design with reference to two separate water sources. Without a specific design, the potential need for two independent water sources cannot be evaluated.</p> <p>2. The exact design of the water treatment facility is not specified at the ESP stage. Sediment filtration requirements would be dependent on the specific plant design (notably the cooling system design). Sediment returned in the discharge would be regulated by MDEQ through the NPDES permit process.</p> <p>SERI Input:</p> <p>(1) SERI offers the following clarifications to Board Inquiry No. 1 above. This information also was provided in SERI's responses to the Board's SER Inquiries Nos. 20 and No. 27.</p> <p>(A) Makeup water requirements for the new facility are indicated in the ER, Figure 2.3-29 (see SER at 2-68), and in the SER Appendix A.4. The normal heat sink maximum makeup requirement (blowdown and evaporation losses) is 39,000 gpm per unit, or a total of 78,000 gpm. Additionally, as shown in Figure 2.3-29 of the ER, an ultimate heat sink with cooling tower would require a maximum makeup of 1,700 gpm per unit, or 3,400 gpm total for the UHS for the site. Other (maximum) makeup requirements indicated on the ER Figure 2.3-29, and in Appendix A.4 of the SER, include 1890 gpm for fire protection, 1440 gpm for demineralized water makeup and 240 gpm for potable water. These miscellaneous water uses, plus the UHS makeup, together with the NHS makeup of 78,000 gpm total, equal approximately 85,000 gpm.</p> <p>From the application SSAR Section 2.4.12.1.3.1: "Makeup (cooling tower makeup and other raw water needs) and normal service water for a new facility would be supplied from the Mississippi River via an intake located on the east bank of the river on the north side of the existing barge slip (see Section 2.4.11 and Figure 2.1-1). <u>Ground water would likely be utilized</u> for general plant water uses including potable, sanitary, fire protection, demineralized water, and landscape maintenance. The expected average consumption of ground water for these uses is approximately 1,310 gpm (Table 1.3-1). The expected</p>

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			<p>maximum consumption of ground water for these uses is approximately 3,570 gpm (Table 1.3-1). Since the existing GGNS Unit 1 facility ground water wells would not have adequate capacity for a new facility, the installation of additional wells (likely in the Catahoula formation) for these purposes would be necessary, <u>if ground water is the desired source.</u> [emphasis added]" As noted in the above quote ground water could be used as a source of some of the makeup; however, should the aquifer not be capable of supporting the needs for the new plant and the existing plant, other sources could be used; <i>i.e.</i>, the river intake.</p> <p>(2) As noted in ER 3.3.2.1, clarifiers, or other filtration equipment, would remove suspended solids from the Mississippi River water. Waste sludge or solids from the treatment process would be disposed of according to current regulations in effect at the time of operation of the new facility.</p> <p>The final disposition of the wastes sludge has not been specified at this time. Possible disposal methods include release of the material back to the Mississippi River, or disposal in a land fill either on or off site. A final decision on waste sludge disposition will require coordination with MDEQ at the COL stage.</p> <p>Sediment sampling, other than for radiological parameters routinely conducted as part of the existing radiological environmental monitoring program for Unit 1, is not conducted.</p> <p>Board Reply:</p> <p>(1) In response to SERI's Input: Where is the 3,570 gpm for maximum consumption of ground water in Table 1.3-1?</p> <p>(2) SERI emphasizes that <u>ground water would likely be utilized</u> for miscellaneous uses totaling about 1,310 gpm, What is the significance of underlined phrase, given that the Board must assume ground water would be used if the Applicant still wishes to have this option? Asking this another way, aren't all the "woulds" and "coulds" in SERI's response meaningless since the Board still has to evaluate this option if it is being considered?</p> <p>(3) In regards to river sediment, could not the rate of sediment uptake and disposal costs make this option unfeasible to the point of precluding the river as a source of makeup water? With out some characterization data, how can this be evaluated to assure it is a suitable site?</p>
22	3-10	3.2.2.2	<p>The EIS states that "Effluent from the Grand Gulf ESP facility (including blowdown, excess service water, sanitary waste, filter process waste, radwaste effluent, and miscellaneous drain effluent) would be combined with the existing discharges from GGNS Unit 1 facility downstream from the embayment and intake." In the same section it states that "the maximum discharge from all sources would be 2630 L/s (41,700 gpm)."</p>

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			<p>1. It appears that the maximum discharge number is for the ESP facility only. Shouldn't the combined flow from GGNS Unit 1 and the ESP facility be considered?</p> <p>2. Why is the maximum discharge (and its maximum temperature) not a PPE parameter?</p> <p>Response:</p> <p>1. The combined flows from the ESP plant and the GGNS were considered in the CORMIX analysis. The maximum ESP discharges provided in the PPE for all sources were combined with the monthly average blowdown of 11,200 gpm reported in the GGNS UFSAR. In the CORMIX analysis, all discharges were conservatively assumed to enter the river at the PPE value for the maximum blowdown temperature.</p> <p>2. Appendix I of the EIS provides the PPE values for:</p> <p>2.4.4 Blowdown Flow Rate 12,800 gpm expected (39,000 gpm max)</p> <p>2.4.5 Blowdown Temperature 100 F</p> <p>SERI Input:</p> <p>1. The PPE only applies to the new facility as it relates to the bounding design parameters against which the environmental impacts to the site are evaluated. As noted in the Staff response above, the combined flows were considered in the analysis for thermal plume in the Mississippi River. As stated in the ER section 5.3.2.1, an analysis of thermal plumes resulting from plant effluent discharges was performed for conditions of summer mean, summer mean low, summer extreme, summer extreme low, winter mean, winter mean low, winter extreme and winter extreme low (see Figures 5.3-4 through 5.3-11). For this evaluation, it was assumed that the effluent from the existing GGNS Unit 1 discharge is combined with that of a new facility into a common discharge. The effluent flow rate was assumed constant at approximately 52,900 gpm (3.3 m³/s). This flow represents the total of the maximum expected cooling tower blowdown, plus other miscellaneous effluents, from the new facility of about 41,700 gpm (See ER Figure 2.3-29), plus the normal cooling tower blowdown flow for the existing GGNS Unit 1 plant of about 11,200 gpm.</p> <p>2. Blowdown for the NHS is a PPE parameter as indicated in the Staff response above. The PPE presents design parameters applicable to the new facility only, and it does represent the "maximum discharge" for the new facility.</p> <p>Board Reply: Did the NRC Staff evaluate 41,700 gpm as the maximum effluent rate as they stated, or did they evaluate the 52,900 gpm value as stated by SERI?</p>
24	4-2	4.1.1	Why have the Mississippi River sediments not been

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			<p>characterized to indicate potential handling problems with either the water treatment sludge or dredged material?</p> <p>Response: The Applicant did not address the potential impacts of dredging, except to acknowledge the possible increases in turbidity. However the Staff, in its evaluation of potential land use impacts of dredging, did identify that there were potential impacts related to disposition of dredge spoils (FEIS at page 4-2 and 4-3). The Staff also recognized that the Applicant did not provide sufficient information to permit resolution of those issues. Consequently, the Staff concluded that the significance of land use issues was unresolved, in part because of the lack of information related to dredging and the disposition of spoils. More detailed information would be required should an application for a limited work authorization, CP, or COL be submitted.</p> <p>SERI Input: See response to Board Inquiry No. 21(2), above, regarding characterization of Mississippi River water quality.</p> <p>Board Reply: Why isn't this a fundamental site characteristic that could potentially dictate the acceptability of the site for an new plant(s)?</p>
26	4-5	4.1.2	<p>Why doesn't the Staff consider the impacts from a new or wider transmission line rights-of-way a fundamental site condition that should be characterized as a basic part of an ESP application?</p> <p>Response: The Staff considers the characterization of impacts related to new or wider transmission line rights-of-way to be important. However, the ER at page 1.1-1 indicates that the Applicant's general intention is that a new facility be operated as a merchant plant. Therefore, at FEIS page 3-13, the Staff assumes that the new facility would be a merchant plant. The process for connecting a merchant plant to the grid, including determination of the point of interconnection and transmission line routes, is set forth in the FERC standard interconnection procedures and agreement described in 18 CFR 35.28(f). These procedures are lengthy and are likely to be expensive. The Applicant has not initiated this process; therefore, the Applicant is not in a position to specify transmission line routing or rights-of-way widths. As a result, the Staff has not resolved issues associated with transmission line rights-of-way (e.g., FEIS Section 4.1.2 at page 4-5, FEIS Section 4.4.1.5 at page 4-18).</p> <p>SERI Input: SERI has no additional comments or input.</p>

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			<p>Board Reply:</p> <p>(1) Where will it be made clear that the ESP only applies to a “merchant plant,” if that was all that the NRC Staff evaluated (based upon SERI’s representation that it is its “general intention” to operate it as a “merchant plant”)?</p> <p>(2) The ability to transmit the power offsite seems like a fundamental site characteristic, the feasibility of which should be determined at the ESP stage. How did the NRC Staff determine that this potential fatal flaw need not be addressed at the ESP stage?</p>
27	4-8	4.3.2	<p>1. Why did the Staff not require additional hydraulic testing of the aquifer as a fundamental site parameter that needs to be quantified for an ESP?</p> <p>2. If the transmissivity of the aquifer is extremely low, couldn’t the impacts be LARGE, and not small or moderate as indicated in the EIS?</p> <p>3. Is there any data to show that there is even minimal withdrawal capacity at the ESP site, so as to assure that this characteristic is not a fatal flaw in selection of the site?</p> <p>Response:</p> <p>1. Activities during construction would include excavation, installing impermeable subsurface structures, and installation of fill. These activities would alter the subsurface environment. The Staff concluded that characterization of the subsurface would be incomplete prior to a detailed design including: specific locations, depths, and fill properties of structures; details of possible dewatering systems; and specific details of surface drainage systems.</p> <p>2. The Staff concluded that extremely low transmissivities would be self limiting. Drawdown in a pumping well is limited by the depth of the well and the depth of the formation. Of greater concern was that even modest drawdowns might result in water quality impacts to a sole source aquifer. In Section 4.3.3 of the EIS, the Staff concluded that the impacts could be LARGE “if the proposed withdrawal were to induce degradation of water quality of the sole source aquifer.”</p> <p>3. Based on the Staff’s review of limited piezometer data in the Catahoula, the Staff was unable to state that the Catahoula could not support the additional withdrawal associated with operation of the ESP plant. However, the GGNS plant currently operates three wells that pump water from the Catahoula. The Staff reviewed groundwater use data for 2001 and 2003 provided by SERI to MDEQ. The groundwater withdrawals reported in 2001 averaged 118 gpm annually. However, in the ER the Applicant reports that during refueling outages two of the three wells operate at near full capacity. Each of the three wells is rated near 500 gpm. In the ER, 1310 gpm is stated as the expected</p>

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			<p>average groundwater use of the ESP plant. Although this data is insufficient to resolve the Catahoula water withdrawal capacity, this data suggests that there is minimal withdrawal capacity at the ESP site, so as to assure that this characteristic is not a fatal flaw in selection of the site.</p> <p>SERI Input:</p> <ol style="list-style-type: none"> 1. SERI has no additional comments or input. 2. See SERI input on Board Inquiry No. 41 below. Regulatory safeguards are in place, with which SERI must comply, to protect the aquifer. 3. SERI has no additional comments or input. <p>Board Reply:</p> <ol style="list-style-type: none"> 1. Haven't the excavation limits been bound in the PPE to the extent that this could be evaluated for reasonable conditions? 2. In addition to water quality impacts, why couldn't reasonably realistic transmissivity values result in a LARGE impact to water use impacts, as discussed in EIS § 4.3.2? 3. What is the basis for the 500 gpm rating for the wells? What were the actual flows from the wells when operating at full capacity? What was the associated drawdown? Even with this data, should not the 1,310 gpm required by the ESP plant(s) be added to the existing usage (<i>i.e.</i> a max of ~1,500 gpm for the three wells at 500 gpm each) to evaluate water-use impacts?
28	4-10	4.3.3	<ol style="list-style-type: none"> 2. Why was the Applicant not required to perform additional water quality testing of the aquifer as a fundamental site parameter that needs to be quantified for an ESP? 3. If the induced water quality is of such poor nature that the aquifer would be irreparably harmed with additional pumping that is required for the ESP plant, couldn't the impact be LARGE? <p>Response:</p> <ol style="list-style-type: none"> 2. The Staff concluded that until a specific design is presented by a COL applicant, additional water quality testing at the site would not adequately resolve the impacts of groundwater use and quality. Therefore, the Staff will review the adequacy of the data on subsurface hydrologic characterization, including groundwater quality, at the COL stage. 3. Yes. In Section 4.3.3 of the EIS, the Staff concluded that the impacts could be LARGE "if the proposed withdrawal were to induce degradation of water quality of the sole source aquifer." <p>SERI Input:</p> <ol style="list-style-type: none"> 1. and 2: SERI has no additional comments or input.

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			<p>3. See SERI Input to Board Inquiry No. 41.</p> <p>Board Reply:</p> <p>2. Given the withdrawal rates stated in the ESP application, what other specific design is needed to evaluate aquifer impacts that could be evaluated if the aquifer was characterized?</p> <p>3. Couldn't the impacts be LARGE even with only a slight impact on the Catahoula Formation if the existing water quality is currently poor?</p>
29	4-15	4.4.1.3	<p>Because temporary construction areas in forest habitat would be restored, the Staff assumes that the impacts would be temporary and would therefore be SMALL. What is the basis for this assumption?</p> <p>Response: Temporary construction areas (e.g., material lay down areas), estimated to require 109 ha (270 ac), would be located in previously disturbed areas and upland fields where possible, and only as a last resort in forested/wetland areas. Reforestation/restoration of any forests/wetlands impacted by use as temporary construction areas would be undertaken as soon as possible following termination of use, which could feasibly last from months to several years. Reforested/restored forests/wetlands would likely be recolonized by the species that were displaced during temporary use. Such impacts are considered SMALL relative to permanent habitat loss, which precludes future use by wildlife. For example, permanent loss of 109 ha (270 ac) of forest/wetland habitat would be considered a MODERATE impact.</p> <p>SERI Input: SERI has no additional comments or input.</p> <p>Board Reply: Where is SERI's commitment to re-colonize forest and wetland areas that are used for temporary construction areas?</p>
30	4-17 to 4-18	4.4.1.4	<p>1. What procedures are in place to assure that the Applicant will perform the botanical survey prior to disturbing any upland or bottom land on the ESP site?</p> <p>2. Why isn't this classified as a COL action item or a proposed license condition?</p> <p>Response:</p> <p>1. The plant species of concern that could potentially occur on the Grand Gulf site and along the existing transmission line</p>

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			<p>rights-of-way are state-listed species (identified in section 2.1.1.1). There are no state statutes (e.g., comparable to the federal Endangered Species Act) or regulations that would necessitate a botanical survey to locate and avoid potential impacts to the species. However, the NRC has recommended that areas to be disturbed undergo a botanical survey. Because this is a suggestion based solely on good resource management and is not required by statute or regulation, there are no procedures in place to ensure performance of a botanical survey. A botanical survey would be conducted solely at the discretion of the licensee.</p> <p>2. As noted in the above in the response to Inquiry 30(1), performance of a botanical survey is only a suggestion based solely on good resource management and is not required by statute or regulation. A botanical survey would be conducted solely at the discretion of the Applicant, and, therefore, is not appropriately designated as either a permit condition or COL Action Item.</p> <p>SERI Input: Entergy has established procedures, applicable to all of their nuclear sites, for completing an environmental review and evaluation prior to starting any new construction or ground disturbance activities. The checklist includes, but is not limited to, potential impacts on wetlands, federal or state protected species, archaeological resources, air emissions, etc.</p> <p>Board Reply: 1. One of the key assumptions that the NRC Staff made in assessing environmental impacts (as listed in Appendix J, Table J-2) is that a botanical survey would be performed of all upland and bottomland areas disturbed by construction. (i) How can the impacts to plant species be ascertained if there is no commitment to perform a botanical survey, and further, doesn't the lack of authority to require this survey render those portions of the EIS that rely on this survey of dubious use in the preparation of the EIS? (ii) How can any meaningful assessment of potential botanical impacts be performed at the COL stage without either (a) some indication at the ESP stage of the affected plant species, or (b) the NRC Staff assuring that a botanical survey be performed at the COL stage and impacts mitigated before construction? 2. Isn't the statement in the EIS more of a requirement to assure no plant impact than just a recommendation?</p> <p>In response to SERI's Input: Where are these commitments reflected in the ESP application and how can</p>

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			they be incorporated into the ESP license?
31	4-18	4.4.2	<p>2. If this has not been estimated, why not? Shouldn't this be considered a fundamental site parameter that needs to be quantified for an ESP?</p> <p>Response: 2. The acreage of benthic macroinvertebrates and shoreline habitat is not considered to be a fundamental site parameter that has to be quantified further than the qualitative information provided by the Applicant and reviewed literature. This is in accordance with 10 CFR § 51.71(d). As with most construction impacts, the Staff considered that the impacts to the aquatic ecosystem would be localized and temporary and found that many could be mitigated. Further detail on the analysis is provided in the Staff's response to Inquiry No. 32.</p> <p>SERI Input: SERI has no additional comments or input.</p> <p>Board Reply: 2. Please clarify where 10 CFR § 51.71(d) states that the acreage of benthic and shoreline habitat does not have to be quantified beyond the qualitative information.</p>
32	4-18 to 4-20	4.4.2	<p>1. How can the impact to aquatic ecosystems be designated without first quantifying to some degree the acreage of aquatic impact?</p> <p>3. The EIS states that the Staff expects SERI will develop and implement plans for the possible widening of the transmission rights-of-way that will have minimal impact on Bayou Pierre and the crystal darter (EIS at 4-20). What is the basis for this expectation, and how will it be enforced at the COL stage?</p> <p>Response: 1. While the exact acreage of impacted area was not provided by the Applicant, the Applicant did provide information that could be used to estimate an impact, and more information will be acquired during the CP or COL phase that will further quantify the impact. The Staff's finding that the overall impacts to aquatic resources from construction would be small is based on its determination that: 1) the proposed construction area is an area that has been disturbed by on-going activities and erosion control (including activities in the existing barge slip, riprap and articulated concrete maps); 2) when the area was last surveyed, the shoreline and river substrate were not considered to be high quality habitat for macroinvertebrates; 3) impacts to these areas from the construction can be minimized using best management practices; and 4) during the CP or COL phase, the process for acquiring a dredging permit and complying with the Endangered</p>

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			<p>Species Act would ensure a construction process that would further minimize impacts to the aquatic resources.</p> <p>3. The crystal darter is a state-listed species, and as with the botanical survey addressed in response to Inquiry No. 30, these activities will be conducted solely at the discretion of the Applicant.</p> <p>SERI Input: SERI has no additional comments or input.</p> <p>Board Reply: 1. Won't dredging extend further into the Mississippi River than ever done before? If the exact acreage was not provided, what is the approximate acreage and what specifically is the substrate that is not considered high quality habitat? 3. Wouldn't the NRC Staff's conclusion be different if the Applicant chose not to expend any effort to assure protection of the habitat and/or species?</p>
33	4-21 to 4-22	4.4.3.1	<p>1. What procedures are in place to assure that the Applicant will survey the Mississippi River for potential nest trees, bald cypress, and nesting eagles during the reproductive season?</p> <p>Response: 1. The surveys for potential nest trees/nesting eagles are based on inclusion of the species in the U.S. Fish and Wildlife Service (FWS) consultation letter to NRC (FEIS pages 4-21 & 4-22, 4-67 (reference FWS 2004a). The NRC will reinitiate consultation with FWS at the CP or COL stage (FEIS section 4.4.3.3). The outcome of that consultation will determine whether or not the surveys recommended as part of the ESP review should be performed.</p> <p>SERI Input: SERI has no additional comments or input.</p> <p>Board Reply: 1. What assurances are in place that consultation with FWS will be re-initiated at the COL stage.</p>
34	4-23	4.4.3.1	<p>If the Franklin transmission line right-of-way is expanded, what procedures are in place to assure that the USFS Homochitto National Forest is in fact contacted prior to any forest clearing, so that it could ascertain the proximity of the red-cockaded woodpecker.</p> <p>Response:</p>

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			<p>As stated above in the response to Inquiry No. 33, the NRC will initiate consultation with the FWS at the CP or COL stage (FEIS section 4.4.3.3). The outcome of that consultation will determine whether or not the USFS Homochitto National Forest should be contacted.</p> <p>SERI Input: SERI has no additional comments or input.</p> <p>Board Reply: See Board Reply to Inquiry No. 33.</p>
35	4-25	4.4.3.1	<p>2. Given the potential prohibition on construction, shouldn't the potential for denning bears be ascertained to some degree at the ESP stage?</p> <p>Response: 2. No. No construction would be authorized pursuant to the proposed ESP. Thus, no potential threat to bears would arise unless and until construction activities commence under a CP or COL. Whether or not an applicant will pursue the project and, if so, when construction would commence (up to 20 years after issuance of the ESP), are both unknowns. Given this uncertainty and because bear use of an area may vary in time (<i>i.e.</i>, if they are using the area now, they may not be using it when construction begins, and vice versa), it would be of limited utility to begin to ascertain use at the ESP stage.</p> <p>SERI Input: 2. SERI has no additional comments or input.</p> <p>Board Reply: 2. In order to meet the goals of and ESP (<i>i.e.</i>, banking a site), doesn't the EIS for an ESP have to evaluate site impacts even though no construction is taking place.</p>
36	4-26 to 4-27	4.4.3.1	<p>What procedures are in place to assure that:</p> <ol style="list-style-type: none"> 1. If the Franklin transmission line right-of-way needs widening, SERI will work with the appropriate Federal and State agencies and the transmission line owner to develop plans to mitigate impacts to the bayou darter; and 2. SERI will survey intake and discharge structure locations for fat pocketbook mussels, and relocate any species found? <p>Response: 1. Assuming that a new facility at the Grand Gulf ESP site would be a merchant generator, if the Franklin transmission line right-of-way were to be widened, then the specific actions needed to accomplish that task would involve SERI, the transmission line owner, the NRC and State and Federal agencies (including FERC, as discussed in Section 3.3 of the FEIS). FERC and NRC</p>

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			<p>would prepare an EIS and both would consult with FWS in compliance with the Endangered Species Act to determine if the specifics of the action before them (in the case of FERC, to widen the right-of-way; in the case of NRC, authorization for construction and operation of one or more new nuclear facilities on the Grand Gulf ESP site) would impact a threatened or endangered species, such as the bayou darter. This process would involve either informal or formal consultations between NRC and FERC (perhaps separately or perhaps as cooperating agencies) and FWS, based on the specific actions before each agency. If formal consultations were determined to be required, NRC and FERC would prepare a biological assessment(s) of the potential impacts of each of the actions on the bayou darter. FWS would prepare a biological opinion(s) and determine what actions are necessary to address potential impacts. Then NRC would work with SERI, and FERC would work with the transmission line owner, to implement any of those actions.</p> <p>2. SERI has not surveyed for the fat pocketbook mussel. This species was added by FWS after the ER was prepared and in response to a letter by NRC. As discussed in Section 2.7.2.2 of the FEIS, the mussel has been found both upstream and downstream of the ESP site. Therefore, the mussel is probably along the shoreline of the site. At the CP or COL phase, NRC will consult with FWS in compliance with the Endangered Species Act to determine if the changes at the site for the intake and discharge structure will impact the mussel. The procedure will be similar to that mentioned above in response to inquiry 36 part 1 for the bayou darter. The most likely action would be to look for the mussel at the time when shoreline construction takes place, and any mussels that are found in the area could be picked up and relocated to an area that would not have construction activity.</p> <p>SERI Input:</p> <ol style="list-style-type: none"> 1. SERI has no additional comments or input. 2. SERI would like to clarify a statement in Staff Response 2 above. SERI did not survey the GGNS site for the fat pocketbook mussel for the purposes of the ESP. If SERI decides to submit a COL application, then informal consultation with the FWS will take place. At that time, SERI would survey for the mussel to determine if it is present in the area to be disturbed by construction in the river, as appropriate. Relocation of specimens of the mussel is one of several potential mitigation measures; however, any proposed mitigation measure must be approved by the FWS. <p>Board Reply: See Board Reply to Inquiry No. 33.</p>
37	4-28	4.4.3.3	<p>While the impact of construction on federally listed species would be small, and additional mitigation would not be warranted beyond that identified in the EIS, how will the many mitigation</p>

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			<p>requirements be identified in the ESP license and tracked at the COL stage?</p> <p>Response: It is not necessary to incorporate mitigation requirements for federally listed species into the ESP license, since there would be no construction under the ESP, and hence no need for mitigation. As stated above in the responses to Inquiry Nos. 33, 34, and 35, the NRC will initiate consultation with the FWS at the CP or COL stage (FEIS section 4.4.3.3). The outcome of that consultation will determine the actual mitigation requirements to be implemented, and these would be embodied in a FWS Biological Opinion, which could be referenced in the COL.</p> <p>SERI Input: Commitments to future actions, including commitments to implement mitigation measures, would be identified in SERI's reviews of the ESP ER and EIS as part of the COL application preparation process. See SERI comments in response to Board Inquiry No. 3(4). See also SERI response to Board Inquiry No. 35 regarding consultation with the FWS at COL.</p> <p>Board Reply: See Board Reply to Inquiry No. 33.</p>
39	4-32	4.5.1.5	<p>The Staff concludes that "the overall physical impacts of construction on workers and the local public, buildings, roads, and aesthetics would be SMALL as long as the mitigative actions, such as noise, dust, and traffic control . . . identified by SERI are undertaken." It appears that SERI has not yet drafted these control plans, and has only identified the issues.</p> <ol style="list-style-type: none"> 1. If that is correct, what is the basis for the Staff's conclusion that these plans will be adequate? 2. Once plans are drafted by SERI, how will the commitments noted above be captured at the COL stage? <p>Response:</p> <ol style="list-style-type: none"> 1. Since SERI has not selected a facility design or a construction plan for the proposed facility the Staff chose to rely on SERI's identification of potential physical impacts, as well as on its statements in the Application that relevant regulations applicable to dust, noise, and pollution would be adhered to, and that control plans would be put in place. The Staff relied on these representations and assumed that a COL applicant would adhere to these commitments. 2. Table J-1 of Appendix J lists several statements that Staff relied in reaching its conclusion regarding the overall physical impacts of construction. During its review of a COL application referencing a Grand Gulf ESP, the Staff would consider whether

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			<p>there is any significant new information regarding these statements that would impact this conclusion.</p> <p>SERI Input:</p> <ol style="list-style-type: none"> 1. SERI would like to add the following information in response to this inquiry. It is our understanding that SERI is not required to have control plans in place at the ESP stage for noise, dust, and traffic control impacts that may occur during construction of the reactor. SERI would also like to point out that the construction of a nuclear plant is similar to other large construction projects, in that Best Management Practices, widely accepted by the construction industry, can adequately control noise, fugitive dust, and pollution. These practices are not dependent on the facility design. 2. See SERI comment in response to Board Inquiry No. 3(4). <p>Board Reply:</p> <p>In response to SERI's input: While it is understood that BMPs are widely accepted by the construction industry, doesn't granting an ESP license require more assurances that there is a commitment by the Applicant to follow BMP's before the environmental benefits from using these practices can be considered in the EIS?</p>
40	4-41	4.5.4.4	<p>Please clarify if there is sufficient wastewater treatment capacity to handle the large construction force. If not, how this will be handled?</p> <p>Response:</p> <p>Whether there is sufficient wastewater treatment capacity to "handle the large construction workforce" depends on where construction workers decide to live. First, as reported in section 4.5.4.4 of the EIS, the new facility, like GGNS Unit 1, would use an independent onsite water supply and water and sewer treatment facilities, so Port Gibson water and sewer services would not be directly burdened by construction of a new facility at the Grand Gulf ESP site. Second, it is expected that the short-term influx of construction-related population would not over-burden local sewer and water utilities in surrounding communities because the construction workforce would be spread over a large geographic area. The construction workforce likely would concentrate in larger population centers such as Vicksburg, Natchez, and Clinton/Jackson because of the services available in these developed, more populous areas, and these areas have adequate wastewater treatment facilities and plans for continuing expansion.</p> <p>However, if the construction workforce distributed itself geographically in the same way as the operations workforce at the existing GGNS, then Port Gibson would gain 918 additional</p>

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			<p>residents. The existing wastewater treatment system in Port Gibson has a capacity of 275,000 gpd and serves 95% of the residents (1748 people). It is at about 90% of capacity (247,500 gpd), so usage is about 142 gallons/day/capita. The addition of 918 new residents at this usage rate would more than exhaust existing spare capacity in the treatment system, so it would be necessary to add system capacity at an earlier date than would otherwise be expected.</p> <p>SERI Input: SERI notes that costs incurred by local utilities for increased water usage and sewer treatment supplies would be offset by revenues paid by the new users, increased commercial retail demand, property sales, and income tax revenues generated by the in-migration of construction workers (ER Section 4.4.2.3.5).</p> <p>At Claiborne County's current average property tax rate of 65.01 mills and an assessment ratio of 15 percent of true market value for non-residential property (SERI 2004a), the tax yield would be about \$29 million per year; a large beneficial impact. During the assumed construction period of 5 years, about \$6 million in tax yield would be added to the base each year. If the new facility were not exempt, then this tax base would instead go to the State. However, based on the current law, at least \$7.8 million per year of the tax yield would be returned to the county, which also would be a large beneficial impact. (EIS 4.5.3.2 at 4-36)</p> <p>Board Reply: Is there sufficient "on-site" capacity for the large construction force, and if not, how will it be handled?</p>
41	4-41	4.5.4.4	<p>How will the Staff ensure that the Catahoula formation will not be impacted by the withdrawal of too much water?</p> <p>Response: The Catahoula aquifer beneath the Grand Gulf site has been designated by the EPA as a sole source aquifer. Projects that receive federal financial assistance and have the potential to contaminate a designated sole source aquifer are subject to EPA review. Additionally, prior to issuance of a COL for the site, the Staff would recommend conditioning the license on the COL applicant obtaining a Section 401 certification from the MDEQ to ensure that the project does not conflict with any state water management programs. However, at the ESP stage the issue of water use and water quality remains unresolved. An applicant for a CP or COL referencing an ESP for the Grand Gulf ESP site would need to provide additional information on the ability of the Catahoula aquifer to sustain the proposed withdrawals in order for the Staff to make a significance determination with respect to</p>

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			<p>this resource.</p> <p>SERI Input: As noted in the response to Board Inquiry No. 21(1), the source of water can be from the Mississippi River should an adequate supply not be available from the ground water aquifers on the site, or if excess pumpage from the ground water would create an adverse impact on water quality.</p> <p>SERI would like to add that all new wells to be installed in Mississippi, thus on the Grand Gulf site, regardless of the aquifer, must be permitted by the MDEQ. As part of this permitting process, the MDEQ looks at the overall impact to the target aquifer of the additional withdrawal as well as the potential effects on other users of the aquifer. In addition, SERI is required to perform an annual water use survey, for all existing wells, for the MDEQ. (ER Sections 4.2.2.2 and 5.2.3 provide a discussion of agencies regulating groundwater withdrawal: the MDEQ issues withdrawal permits; the EPA has delegated review of sole source aquifer issues to the USDA Rural Development Mississippi office.)</p> <p>Board Reply: In response to SERI's input: What treatment is needed if the Mississippi River is to be used as a water supply for the volume now proposed to be provided by on-site wells and what are the potential environmental impacts of this treatment?</p>
44	4-59	Table 4-3	<p>The construction impacts on land use, water use, water quality, and terrestrial ecosystems are all listed as "unresolved" but given an "estimated" impact.</p> <ol style="list-style-type: none"> 1. Discuss in greater detail how each of these impacts were estimated and the validity of these estimates. 2. Summarize what specific site studies would resolve any of these items, and explain why the Applicant was not asked to perform some or all of these site studies as part of the ESP application. <p>Response:</p> <ol style="list-style-type: none"> 1. The Staff estimated a SMALL impact for water use based on the abundance of water in the Mississippi River. While the capacity of the Catahoula aquifer may be limited, an abundance of water exists in the vicinity. While this issue remains unresolved due to the limited information on the Catahoula, Staff concluded that if the impact to the Catahoula would be significant, the water the Applicant proposed to obtain from the Catahoula could be obtained from other local sources such as the Mississippi River. In that case, the water withdrawn from the Mississippi River would be trivial compared to the minimum river flows.

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			<p>The Staff estimated a SMALL impact for water quality based on the current state of water treatment technology, the requirement for a NPDES permit, and the special consideration of the Catahoula aquifer. As stated above, the Staff concluded that if investigations at the COL stage to resolve impacts to the Catahoula determine that the Catahoula is unable to support the required volume of withdrawals, the local abundance of water would ensure alternative sources. Experience at existing nuclear power plants and other industrial facilities led the Staff to conclude that current water quality treatment technologies are adequate to protect the water bodies, including the Mississippi, receiving effluents from the plant. The Mississippi Department of Environmental Quality would regulate the discharges from the plant through administration of the NPDES permit program. Processing water for use at the plant would result in a small amount of solid waste that could be disposed of on site or in an offsite disposal facility with little environmental impact.</p> <p>The Staff estimated a MODERATE impact for terrestrial ecosystems based on its consideration of the most reasonable of three hypothetical scenarios for the possible location of new rights-of-way associated with transmission system upgrades. These three scenarios are described in EIS section 4.4.1.2. The most likely of the three scenarios that would be implemented to accommodate the proposed new generating capacity, was widening the existing rights-of-way (<i>i.e.</i>, creating new, adjacent rights-of-way), which would result in a MODERATE impact. The other two scenarios, 1) emplacing upgrades solely within the existing rights-of-way (<i>i.e.</i>, no new rights-of-way), or 2) creating new rights-of-way with routings different from existing lines, appeared less likely, as follows. First, the Staff considered it to be less likely that transmission system upgrades could be restricted to within the existing rights-of-way without encroaching on and affecting adjacent areas. Second, the Staff considered creation of new rights-of-way with different routings to be less likely because it would be undesirable in terms of acquiring easements (where feasible, new transmission corridors are often sited next to adjacent, existing corridors).</p> <p>2. In general, the Staff did not request specific studies unless it concluded that such studies would completely resolve a specific unresolved issue. For water use/water quality, the Staff concluded that additional studies were not justified because complete resolution would not be possible without a specific detailed design.</p> <p>For terrestrial ecosystems, the Staff did not request that the Applicant perform studies to resolve the issue of impacts due to transmission system upgrades because the resolution of the issue is outside the Applicant's purview and is the responsibility of the transmission system distribution owner and operator. The transmission system distribution owner and operator would perform the scoping, feasibility, and facility studies under 18 CFR</p>

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			<p>Part 35 that are described in EIS section 3.3. These studies would be done prior to or during the CP or COL stage and the results would identify the location and physical modifications required to upgrade the transmission system to accommodate the new generating capacity.</p> <p>In its ESP application, an applicant has the option to provide as much or as little information regarding the impacts of constructing and operating the proposed unit(s) provided, however, that the environmental report must address all environmental effects of construction and operation necessary to determine whether there is any obviously superior alternative to the site proposed. Although the results of the site studies discussed above would have given the Staff further insight into these issues, the Staff concluded that it had sufficient information in these impact areas to allow it to determine whether any of the alternative sites was environmentally preferable to the proposed site. At the completion of the Staff's review of an ESP application, this is the minimum determination that must be made.</p> <p>In contrast, for a COL application the Staff will have to determine and reveal the environmental impacts of the construction and operation of the proposed plant. In order to make this determination, the COL applicant will be required to provide sufficient information to resolve any significant environmental issue not considered in the ESP proceeding and any significant new information regarding issues that were resolved in the ESP proceeding.</p> <p>SERI Input: SERI has no additional comments or input.</p> <p>Board Reply:</p> <ol style="list-style-type: none"> 1. Isn't there a potential that the quality of the sludge from treating the Mississippi River water for the miscellaneous uses listed, could be of such poor quality to preclude reasonable handling and disposal of this material, rendering this option unfeasible? 2. Given the Applicant's desire to pump no more than ~3,570 gpm from ground water, what additional design details are needed to determine impacts on the Catahoula Formation?
46	5-7	5.3.1	<p>The EIS supports its conclusion regarding the impact on the groundwater flow pattern "based on the character of the shallow groundwater system." Please summarize the data used to characterize the shallow groundwater system.</p>

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			<p>Response: Based on information identified in the ER and the site audit, the Staff concluded that the shallow groundwater system is unconfined with numerous perched aquifer systems. The aquifer is primarily recharged through surface infiltration and the piezometric surface is at least partially defined by the surface topography. Relatively high storage coefficients for the terrace deposits and alluvium reported in the ER support the Staff's assumption of unconfined conditions.</p> <p>SERI Input: SERI has no additional comments or input.</p> <p>Board Reply: List the storage coefficients for the terrace deposits and alluvium reported in the Applicant's ER, that the NRC Staff used in its evaluation of the site aquifers, and indicate the method that the Applicant used to derive these parameters.</p>
47	5-7 to 5-9	5.3.2	<p>What is the feasibility of treating Mississippi River water that is pumped directly from the river, with regards to treatment costs, materials handling, and waste sediment disposal?</p> <p>Response: Water treatment technologies are sufficiently mature that relatively poor quality waters can be treated to obtain water of the quality needed for a nuclear power plant. Standard water treatment methods could reduce total suspended solids in Mississippi River water to provide an abundant water supply with water quality generally equal to that of groundwater. The Staff did not consider the costs of treatment in its assessment. However, if some portion of the sediment is returned to the Mississippi River through the blowdown discharge, it would be regulated by MDEQ through its NPDES permitting authority.</p> <p>SERI Input: Refer to SERI response to Board Inquiry No. 21(2).</p> <p>Board Reply: See Board Reply to Inquiry No. 44(1)</p>
50	5-12	5.3.3.2	<p>Why did SERI not provide the bounds of concentrations of chemical effluents to be discharged in Streams A and B?</p> <p>Response: Any statement by the Staff as to SERI's motivation for not providing bounds on concentrations of chemical effluents to be discharged into Streams A and B would be speculative.</p>

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			<p>SERI Input: As stated in ER 3.3.2, the actual designs of the water supply systems and the cooling water systems are not finalized at this point in the licensing process. Because of this, exact methods of water treatment and the quantities of chemicals required cannot be specified.</p> <p>ER 2.4.2.1.4 indicates Stream A extends west from the GGNS sanitary waste water treatment facility. Currently, this drainage [stream] receives continual flow from plant storm water drains and process discharge from the [GGNS Unit 1] waste treatment plant. Stream B extends west from the cooling towers on the south side of the Heavy Haul Road. Flow into the [Stream B] drainage channel derives from storm water runoff.</p> <p>In ER 5.2.1.4, SERI assumes that discharges to Stream A and Stream B from a new facility likely would be similar to the existing GGNS facility, and may include increased discharge of treated effluent from the waste water treatment plant, building drains from support buildings, and storm water, depending on the design of any new waste water treatment facilities. Discharges to these streams would be controlled in accordance with future NPDES permit requirements.</p> <p>ER 5.5.1.2.1 states that chemicals utilized in general operations and water treatment at the GGNS site are subject to review and approval by the Mississippi Department of Environmental Quality (MDEQ), the agency authorized to administer the NPDES program for the State of Mississippi. Therefore, waste discharges from a new facility at GGNS would be subject to limits established by the MDEQ through the NPDES permitting process.</p> <p>As noted in the above discussions, the majority of water discharged via Streams A and B is storm water runoff, with Stream A possibly accepting additional waste water from a new facility's waste water treatment plant. Concentrations of chemicals in any effluent would be controlled by the NPDES permit.</p> <p>Board Reply: In response to SERI's input: While the concentrations are controlled by NPDES, how was the potential impact to Stream A evaluated without defining the limiting parameter concentrations in some fashion?</p>
56	5-82 to 5-84	Table 5-17	<p>The operational impacts on water use and water quality are listed as unresolved but given an "estimated" impact of SMALL.</p> <ol style="list-style-type: none"> 1. Discuss in more detail how each of these impacts were estimated and the validity of these estimates. 2. Summarize what specific site studies would resolve any of these items, and explain why the Applicant was not asked to perform some or all of these basic site studies as part of the ESP application.

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			<p>3. Does any inaccuracy in these estimates make alternative analyses virtually meaningless?</p> <p>Response:</p> <p>1. The Staff estimated a SMALL impact for water use based on the abundance of water in the Mississippi River. While the capacity of the Catahoula aquifer may be limited, an abundance of water exists in the vicinity. While this issue remains unresolved due to the limited information on the Catahoula, Staff concluded that, if the impact to the Catahoula would be significant, the water Applicant proposed to obtain from the Catahoula could be obtained from other local sources such as the Mississippi River. In that case, the water withdrawn from the Mississippi River would be trivial compared to the minimum river flows.</p> <p>A SMALL impact for water quality was estimated based on the current state of water treatment technology, the requirement for a NPDES permit, and the special consideration of the Catahoula aquifer. As stated above, the Staff concluded that if investigations at the COL stage to resolve impacts to the Catahoula determine that the Catahoula is unable to support the required volume of withdrawals, the local abundance of water would ensure alternative sources. Experience at existing nuclear power plants and other industrial facilities led the Staff to conclude that current water quality treatment technologies are adequate to protect the water bodies, including the Mississippi, receiving effluents from the plant. The MDEQ would regulate the discharges from the plant through administration of the NPDES permit program. Processing water for use at the plant would result in a small amount of solid waste that can be disposed of on site or in an offsite disposal facility with little environmental impact.</p> <p>2. Unless the Staff concluded that specific studies would completely resolve a specific unresolved issue, such studies were not requested. Staff concluded that unless a specific design was proposed, additional studies were not justified since complete resolution would not be possible without a specific detailed design.</p> <p>The second part of this question is the same as the second part of Inquiry 44.2. See the response to that question for the details of the Staff's response. But in summary, although the results of the site studies discussed above would have given the Staff further insight into these issues, the Staff concluded that it had sufficient information in these impact areas to allow it to determine whether any of the alternative sites was environmentally preferable to the proposed site.</p> <p>3. See the Staff's response to Inquiry 44.3.</p> <p>SERI Input: SERI has no additional comments or input.</p>

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			Board Reply: See Board Reply to Inquiry No. 44.
57	6-2	6.1.1	<p>The EIS states that it is using the PPE power rating of 8600 MW(t) with a net electrical output of 3000 MW(e). A review of the PPE in Appendix I indicates a power rating of 4300 MW(t). SSAR § 1.3.1.4 indicates that the site target value for electrical output is 2000 MW(e). A brief review of other ESPs indicates a correspondence between the PPE values and the values utilized in their EIS analyses.</p> <p>Please clarify this apparent discrepancy.</p> <p>Response: As the Staff outlined in its response to Inquiry No. 19, there is no discrepancy. In SAR Section 1.3.1.4, Grand Gulf Site Specific "Bounding Plant," SERI indicated that the site capacity "target" of 2000 MW(e) was only an initial step in PPE development, meaning that no less than an additional 2000 MW(e) was being considered for the Grand Gulf ESP site. Because the reactor types considered by SERI ranged from 160 MW(e) to 1500 MW(e), it doubled the bounding number for each PPE value, where appropriate. In its SAR Table 1.3-1 and again in its ER Table 3.0-1, SERI represented that the "Composite Value" generally reflects the values corresponding to a plant that is twice the vendor's specified "standard size plant" and that the PPE bounding values were "driven" by a multiple of reactor units representing a total generation capacity that was either equivalent to or, in some cases, much greater than 2000 MW(e). Therefore, in some cases, the values were designated as unit specific (US) values that had to be doubled for the site; consequently, 4300 MW(t) per unit was doubled to 8600 MW(t) for the site so that the approximately 1500 MW(e) was doubled to about 3000 MW(e) to exceed the floor of 2000 MW(e) for the site.</p> <p>SERI Input: SERI offers the following clarifications with regard to the target electrical output parameter of 2000 MWe and the reactor power of 8600 MWt, taken from SERI's responses to the Board's inquiries on the SER: SERI's Input to SER Inquiry No. 8: (A) In addition to the Staff response, SERI notes that the PPE bounding value for "Megawatts Thermal" (Item 17.3, SSAR PPE Table 1.3-1) is utilized for other considerations in evaluation of environmental impacts. For example, megawatts thermal would be a consideration in the evaluation of environmental impacts related to normal and accident dose consequences, transportation of radioactive materials, and uranium fuel cycle impacts. (B) The PPE value for megawatts thermal (4300 MWt) listed in SSAR Table 1.3-1 represents the postulated design parameter. If the selected facility (in this example the thermal design power</p>

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			<p>level for the ESBWR in its DCD) does not fall within this value, a COL application referencing the ESBWR design shall include a request for variance that complies with §§ 52.39 and 52.93. (C) PPE values listed in SSAR Table 1.3-1 are based on the PPE development process described in SSAR Section 1.3.1.3. SSAR Table 1.3-1 lists those parameters relevant to the safety analyses. For each parameter, the most limiting value was selected. As described in the Staff response, the 2000 MWe value is a "target site capacity" and is discussed in detail in SSAR Section 1.3.1.4. The establishment of this value was an "initial step in PPE development" (SSAR, page 1.3-4).</p> <p>Board Reply: Please clarify the response above, by addressing the following hypothetical situation: if an applicant was proposing a new single plant that operated at 5000 MWt, would the plant fall within the PPE?</p>
62	7-3	7.3	<p>The EIS states that groundwater considerations reflected steady-state drawdown. How could the shape of the drawdown curve be established without aquifer characterization?</p> <p>Response: The EIS states that the process to be used by the Staff to consider cumulative impacts would rely on a steady state analysis. However, since groundwater use and groundwater quality impacts remain unresolved at the ESP stage, no actual drawdown calculations were performed. However, at COL stage the cumulative impacts will be estimated based on steady state assumptions.</p> <p>SERI Input: SERI has no additional comments or input.</p> <p>Board Reply: Explain how the steady-state assumptions were reflected in groundwater considerations reflected in the EIS.</p>
72	8-30	8.3.2.4	<p>How can an ESP application be considered sufficient without an assessment of the practicality of treating the water directly pulled from the Mississippi River? Isn't it possible for the treatment costs and effluent (<i>i.e.</i>, sediment sludge) disposal to be high enough to make this option infeasible?</p> <p>Response: The Staff did not perform a cost-benefit analysis for the Grand Gulf EIS. In preparing its EIS, the Staff used the technical</p>

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			<p>approach taken by the Applicant within the bounds of the PPE. Accordingly, the Staff did not consider the cost of treating water withdrawn from the Mississippi River. Specifically, there is no consideration by the Staff in the FEIS of the cost of water treatment or the cost of the safe disposal of sediment sludge. Rather, without considering costs, the Staff concluded that based on current water treatment technology, it is not unreasonable to assume that water from the Mississippi River could be withdrawn and treated sufficiently to meet the cooling water needs of a new nuclear plant sited at the Grand Gulf ESP site. See response to Inquiry No. 47.</p> <p>SERI Input: Refer to SERI responses to Board Inquiry Nos. 21(2) and 66.</p> <p>Board Reply: See Board Reply to Inquiry No. 44(1).</p>
74	8-33	8.4.2.1	<p>Please explain the basis for Entergy's conclusion that the Waterford-3 and Arkansas Nuclear sites are less suitable than Grand Gulf, and how the Staff analyzed that representation.</p> <p>Response: Table 2 in Section 1 of the Applicant's 2001 "Early Site Permit Selection Committee Notebook" contains the Applicant's results for screening six sites (after exclusion of Indian Point) to four. The sites ranked as shown on p. 8-33 of the FEIS. The Applicant eliminated Waterford-3 and ANO from further consideration even though they scored higher than the Pilgrim site. The Applicant's 2001 Notebook states in Section 1 that "Waterford and ANO were challenged by various avoidance criteria (<i>i.e.</i>, wetlands, threats from industrial and other plants, thermal discharge limits, etc.) or transmission and market constraints. Both of these sites are viable for new nuclear plants, but were analyzed as less suitable than other southern sites." In a 2004 response to an RAI, the Applicant also stated that it eliminated the Waterford-3 and ANO sites from further consideration because it wished "to gain ESP experience in a variety of technical and public acceptance environments, as well as to capitalize on two separate power markets" (p. 8-33 of the FEIS). The Staff's evaluation of the Applicant's decision to eliminate the Waterford-3 and ANO sites is on the bottom of p. 8-34 of the FEIS.</p> <p>SERI Input: SERI would like to clarify the statement in the Staff response: "The Applicant eliminated Waterford-3 and ANO from further consideration . . ." As stated in the Staff response, the proposed action, which formed the objectives for the siting study reported in the Notebook, was to identify one potential ESP site in each of Entergy's northern and southern operating areas. In order to accomplish this objective, Waterford and ANO-1 were compared</p>

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			<p>to Grand Gulf and River Bend to identify a southern site and were <u>deferred</u> from further consideration for the purposes of this ESP application (not <u>eliminated</u> as the Staff states) in favor of these sites for the southern ESP location.</p> <p>Board Reply: SERI Input: Please clarify the difference between deferring the two sites from further consideration and eliminating the sites from consideration.</p>
83	8-100	8.5.4.5	<p>What is the basis for the Staff's conclusion that treated water from the surface water sources could be used if groundwater impacts were significant?</p> <p>Response: Water treatment technologies are sufficiently mature that relatively poor quality waters can be treated to meet water quality requirements likely to be experienced at a nuclear power plant. Standard water treatment methods could reduce total suspended solids in Mississippi River water to provide an abundant water supply with water quality generally equal to groundwater.</p> <p>SERI Input: See SERI response to Board Inquiry No. 21(1). Also, ESP ER Section 5.2.3 indicates that the Corps of Engineers and the state do not restrict the quantity of water that can be withdrawn from the Mississippi River.</p> <p>Board Reply: See Board Reply to Inquiry No. 44(1).</p>
84	8-102 to 8-103	Tables 8-13 & 8-14	<p>1. The two tables list water use and water quality impacts as SMALL, yet in text the Staff justifies these impacts as equal to the ESP site, which the Staff states are unresolved. Please clarify this inconsistency.</p> <p>2. While BMPs and the large size of the water body supports the generic impact assessment for surface water, can the same be said for the potential impact on aquifer levels?</p> <p>Response: 1. As the Staff states in Section 9.1 (page 9-2), for the unresolved issues "the Staff indicated a likely impact level for these unresolved issues based on professional judgment, experience, and consideration of controls likely to be imposed under required Federal, State, or local permits that would not be acquired until an application for a construction permit or combined license is underway. These considerations and assumptions were similarly applied at each of the alternative sites to provide a common basis for comparison. These impact levels are, therefore, best estimates of impacts that the Staff used for its "obviously superior" determination."</p>

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			<p>2. Given the status of the Catahoula Formation as a sole source aquifer, the Staff concluded that Federal controls (administered by EPA) are likely adequate to protect the site from adverse aquifer drawdowns. Additionally, any necessary mitigation of declines in aquifer levels would be technically feasible by obtaining water from the Mississippi River instead of from groundwater wells.</p> <p>SERI Input: In addition, with respect to Board Inquiry No. 2, SERI notes that ESP ER Section 5.2.3 indicates that the Corps of Engineers and the state do not restrict the quantity of water that can be withdrawn from the Mississippi River.</p> <p>Board Reply: See Board Reply to Inquiry No. 44(1).</p>
87	9-8	9.4	<p>Hasn't the conclusion that "no significant environmental impacts would be avoided by the no action alternative" been predetermined to some degree, due to the many assumptions made by the Staff, as a result of the paucity of site specific characterization data available for this analysis?</p> <p>Response: No. The Staff's conclusion is based on two facts, namely: (1) The Grand Gulf ESP application does not include a site redress plan, and (2) an ESP does not authorize construction or operation of a new plant. Since the Applicant did not propose a site redress plan, it would not be authorized to perform any site preparation and preliminary work activities pursuant to 10 C.F.R. § 52.25(a) if the application were granted. Accordingly, since an ESP does not otherwise authorize plant construction or operation, the granting of an ESP for the Grand Gulf ESP site does not involve any significant environmental impacts. This conclusion is not related to the impacts of construction and operation of a plant on the ESP site or a lack of information as to such impacts, nor is that conclusion related to the assumptions on which the Staff's evaluation rests, or whether such issues remain unresolved.</p> <p>The FEIS discusses the impacts of construction and operation for two purposes: (1) to allow the comparisons necessary to determine whether an alternative site is obviously superior to the proposed site and (2) to allow early resolution of environmental issues (i.e., prior to a COL application). While not stated in the FEIS, an EIS on a construction permit (CP) or combined license (COL) application referencing the Grand Gulf ESP (if granted), would consider the impacts of construction and operation, as compared to the no-action alternative of denying the CP or COL.</p> <p>SERI Input: SERI does not agree that there is a paucity of site-specific characterization data. As documented throughout the ER and</p>

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			<p>EIS, the GGNS ESP site is adjacent to an operating nuclear power plant and, as a result, there is substantial available site-specific data, including data on hydrology, geology, seismology, and meteorology, upon which the ER and EIS are based. See also SERI responses to Board Inquiry Nos. 1, 65, 66, and 70.</p> <p>Board Reply: Regardless of whether any site redress plan is proposed, doesn't the no-action alternative need to be compared to site impacts from the proposed plant construction and operations in order to have any meaning, and to meet the goals of an ESP (<u>i.e.</u>, banking a site)?</p>
88	10-5	Table 10-1	<p>Table 10-1 implies that it lists all of the unavoidable adverse environmental impacts from construction.</p> <ol style="list-style-type: none"> 1. How is this possible since land use, hydrological/water use/quality, and ecological/terrestrial issues are all unresolved? 2. What is the Staff's basis for stating that groundwater impacts will be localized and temporary since it is an unresolved issue? <p>Response:</p> <ol style="list-style-type: none"> 1. While the impacts of construction on land use, water use and quality, and terrestrial ecosystems were not resolved, it is clear that there will be impacts in these areas. In some cases (<i>e.g.</i>, land use for the site and vicinity) the Staff had information that addressed most of the impacts, with only some portions (<i>e.g.</i>, disposition of spoils) indeterminate. So, while the level of impacts may be indeterminate, the types of impacts and, in general, the forms of mitigation, are known and understood. This is the basis for the entries in Table 10-1. 2. Although the characterization of the subsurface environment at the site is inadequate to resolve the impact of construction for all feasible construction practices, the Staff still was able to conclude that specific construction practices and specific mitigation measures are likely to be feasible and would limit any adverse impacts. For instance, groundwater withdrawals from the Catahoula aquifer could be replaced with surface water withdrawals from the Mississippi River, or dewatering wells could be supplemented with sheet pile to limit the zone of influence of the dewatering system. Since costs were not considered in the ESP review, only technical (and not economic) feasibility was considered by the Staff. Given the designation of the Catahoula aquifer as a sole source aquifer, the EPA has oversight to ensure that such actions at the site would not impair this aquifer. <p>SERI Input: SERI has no additional comments or input.</p> <p>Board Reply:</p> <ol style="list-style-type: none"> 1. Shouldn't Table 10-1 be entitled as a preliminary list or

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			interim list to assure that one does not mistake this as a complete list of unavoidable impacts? 2. See Board Reply to Inquiry No. 44(1).
89	10-6	Table 10-2	<p>Table 10-2 implies that it lists all of the unavoidable adverse environmental impacts from operations. How is this possible since hydrological/water use/quality issues are unresolved?</p> <p>Response: See the response to Inquiry 88. The same logic applies to this inquiry.</p> <p>SERI Input: SERI has no additional comments or input.</p> <p>Board Reply: See Board Reply to Inquiry No. 87(1).</p>

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)
)
SYSTEM ENERGY RESOURCES, INC.) Docket No. 52-009-ESP
)
)
(Early Site Permit for Grand Gulf ESP Site))

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing LB ORDER (REQUESTING SPECIFIC SUMMARY EXHIBITS AND SUPPLEMENTAL BRIEFS) (IDENTIFYING HEARING ISSUES AND REQUESTING EVIDENTIARY PRESENTATIONS ON SPECIFIC ISSUES) have been served upon the following persons by U.S. mail, first class, or through NRC internal distribution.

Office of Commission Appellate
Adjudication
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Administrative Judge
Lawrence G. McDade, Chair
Atomic Safety and Licensing Board Panel
Mail Stop - T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Administrative Judge
Nicholas G. Trikouros
Atomic Safety and Licensing Board Panel
Mail Stop - T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Administrative Judge
Richard E. Wardwell
Atomic Safety and Licensing Board Panel
Mail Stop - T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

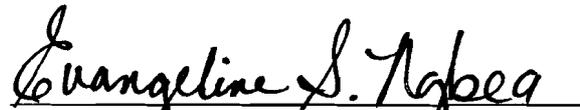
Robert M. Weisman, Esq.
Ann P. Hodgdon, Esq.
Patrick A. Moulding, Esq.
Jonathan M. Rund, Esq.
Office of the General Counsel
Mail Stop - O-15 D21
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Diane Curran, Esq.
Harmon, Curran, Spielberg
& Eisenberg, L.L.P.
1726 M Street, NW, Suite 600
Washington, DC 20036

Docket No. 52-009-ESP
LB ORDER (REQUESTING SPECIFIC SUMMARY EXHIBITS
AND SUPPLEMENTAL BRIEFS) (IDENTIFYING HEARING
ISSUES AND REQUESTING EVIDENTIARY PRESENTATIONS
ON SPECIFIC ISSUES)

Kathryn M. Sutton, Esq.
Paul M. Bessette, Esq.
Morgan, Lewis & Bockius, LLP
1111 Pennsylvania Avenue, NW
Washington, DC 20004

Pat Gallagher, Esq.
Director of Environmental Law
Sierra Club
85 Second Street, 2nd Floor
San Francisco, CA 94105


Office of the Secretary of the Commission

Dated at Rockville, Maryland,
this 6th day of November 2006