

July 22, 2008

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FROM: Eric R. Oesterle, Senior Project Manager **/RA/**
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SUBJECT: TRIP REPORT – JUNE 16 AND 17, 2008, HYDROLOGY-RELATED SITE
VISIT IN SUPPORT OF GRAND GULF COMBINED LICENSE
APPLICATION

This report summarizes the results of NRC travel to Jackson, Mississippi and the Grand Gulf site near Port Gibson, Mississippi during the period of June 16 and 17, 2008 to review hydrology related portions of Entergy's final safety analysis report (FSAR) associated with the combined license application (COLA) for Grand Gulf Unit 3. On the morning of June 16, 2008, the staff met with the applicant at the Entergy offices in Jackson and then traveled to the Grand Gulf site. The staff viewed key hydrologic features of the site including the following areas: cooling tower and water clarifier for the new unit; Streams A and B; Culverts 1 and 9; Sedimentation Basins A and B; Gin and Hamilton Lakes; and intake and discharge locations along the Mississippi River for the new unit. Following the site tour the staff returned to the Entergy offices in Jackson and began discussions on the specific items on the list of data information needs that the staff had prepared in anticipation of the site audit. This list is attached as an Enclosure.

Discussions on the above issues continued on June 17, 2008, and a closure meeting was conducted at the end of the day to summarize the results of the staff's audit. Several areas of staff inquiry were addressed by applicant clarifications and commitments to make detailed data available to the staff and its contractors for follow-up audit at more proximate locations. Three topics of staff interest involved issues that were not finalized as part of the Grand Gulf Early Site Permit and are associated with site drainage, groundwater transport, and potential subsurface pathways available for radionuclide transport due to accidental releases. At the meeting closure, the staff identified unresolved data needs.

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A tabulation of the information needs developed by the staff for the hydrology audit is provided as an Enclosure and reflects augmentation by the staff to include a summary disposition of each item. Most of the items identified by the staff were *resolved* with respect to information needs for this audit. Resolved items include applicant commitments to make detailed information available to the staff and its contractors for audit in more proximate locations. Other resolved items are "linked" to the resolution of other items or were resolved as result of documentation review and applicant clarification. Finally, items requiring further action on the part of the applicant are identified as *unresolved*. Pending supplemental submittal of information in these hydrologic areas by the applicant, the staff intends to issue requests for additional information (RAIs). Review of the detailed information made available to the staff and its contractors for follow-up audit, including review of any supplemental information submittals to the COLA provided by the applicant, could result in additional RAIs if necessary for the staff to complete its review.

Docket No. 52-024

Enclosure:
Grand Gulf Nuclear Plant Unit 3 COLA: Information Needs
for Hydrology Safety Audit – June 16 -17, 2008

A tabulation of the information needs developed by the staff for the hydrology audit is provided as an Enclosure and reflects augmentation by the staff to include a summary disposition of each item. Most of the items identified by the staff were *resolved* with respect to information needs for this audit. Resolved items include applicant commitments to make detailed information available to the staff and its contractors for audit in more proximate locations. Other resolved items are "linked" to the resolution of other items or were resolved as result of documentation review and applicant clarification. Finally, items requiring further action on the part of the applicant are identified as *unresolved*. Pending supplemental submittal of information in these hydrologic areas by the applicant, the staff intends to issue requests for additional information (RAIs). Review of the detailed information made available to the staff and its contractors for follow-up audit, including review of any supplemental information submittals to the COLA provided by the applicant, could result in additional RAIs if necessary for the staff to complete its review.

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Grand Gulf Nuclear Plant Unit 3 COLA
Information Needs for the Hydrology Safety Audit – June 16-17, 2008

Serial #	FSAR Section	Discipline	Information Need
1	2.4.2	Surface Hydrology	<p>Provide an SME (subject matter expert) to discuss the process used to determine that the postulated unit hydrographs employed in the local-intense precipitation calculation are the most conservative plausible.</p> <p><i>In Figure 2.4.2-201, the labels pointing to Culvert 1 and Outfall B need to be switched.</i></p> <p>UNRESOLVED: The staff will prepare an RAI.</p>
2	2.4.2, 2.4.3	Surface Hydrology	<p>Provide for review of the calculation packages for the locally-intense precipitation and flooding assessment.</p> <p><i>Staff reviewed Calculation GCALC-019. This calculation package will be placed in the Germantown and Richland Reading Rooms.</i></p> <p>RESOLVED.</p>
3	2.4.2, 2.4.3	Surface Hydrology	<p>Provide for review of the HEC-RAS input files.</p> <p><i>Staff reviewed Calculation GCALC-019 for drainage of Basin A and Basin B. The applicant discussed stream controls, cross-sections, and the linearity assumption used in the applicant's calculations.</i></p> <p>UNRESOLVED: The staff will prepare and RAI requesting the HEC-RAS input files and a topographic map identifying the locations of the cross-section (Figures 9 and 10 from GCALC-019).</p>
4	2.4.2, 2.4.3	Surface Hydrology	<p>Provide an SME to discuss the site drainage map.</p> <p><i>Staff reviewed Calculation GCALC-020 for site drainage of locally-intense precipitation. Figure 2 of the calculation package provides the drainage area and topography of the site. Additional details of the topography are required in order for staff to complete its review.</i></p> <p>UNRESOLVED: The staff will prepare an RAI that requests figures (PDF, Auto-Cad, etc.) that contain final-grade topography, basin delineation, building delineations, and flow paths supporting GCALC-020 results.</p>
5	2.4.2, 2.4.3	Surface Hydrology	<p>Provide for review of the calculation packages for the site drainage assessment.</p> <p><i>Staff reviewed Calculation GCALC-020. This calculation package will be placed in the Germantown and Richland Reading Rooms.</i></p> <p><i>The applicant and staff discussed the recently-docketed Rev. 5 of the ESBWR DCD that includes the addition of an ancillary diesel generator building. This change may affect site drainage calculation results.</i></p> <p>RESOLVED: Staff will evaluate Rev. 0 of the COLA until the applicant notifies the NRC that the site drainage assessment results have changed due to placement of the ancillary diesel building.</p>

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6	2.4.3	Surface Hydrology	<p>Provide an SME to discuss the blockages of culverts for the PMF on local steams.</p> <p><i>Staff discussed the assumption that Culvert 1 was 50% blocked. The applicant provided justifications for this assumption, and the staff indicated that it will be reviewing these assumptions once the HEC-RAS inputs are provided.</i></p> <p>UNRESOLVED: The staff will prepare an RAI asking for justification of the assumption.</p>
7	2.4.12	Groundwater Hydrology	<p>Provide an SME to describe how that applicant determined that the postulated conceptual model of the subsurface environment is the most conservative plausible conceptual model for the site.</p> <p><i>The applicant described the process used in developing the subsurface site characterization and monitoring plans.</i></p> <p>UNRESOLVED: The staff will prepare an overarching RAI.</p>
8	2.4.12	Groundwater Hydrology	<p>Provide an SME to discuss and clarify the stratigraphic relations of the Catahoula formation and the Upland Complex, and the reclassification of strata formerly classified as Catahoula as Upland Complex (<i>cf.</i> Table 2.5.4-201, “Summary of Stratigraphic Units and Correlation to Previous Studies”.)</p> <p><i>The applicant moved Table 2.5.4-201 to 2.5.1, as stated in a letter from Entergy to the NRC dated June 13, 2008. However, no content change was made to the table. Earlier boring interpretations based on ESP data reflects an incomplete understanding of how to make the distinction between Catahoula and the Upland Complex. Later literature review and data from COLA borings (over 100 new borings) resulted in reinterpretation of earlier results and produced a high degree of confidence that the contact is appropriately located now.</i></p> <p>RESOLVED.</p>
9	2.4.12	Groundwater Hydrology	<p>Provide an SME to describe the occurrence of perched water tables in the loess, and their relevance to safety concerns.</p> <p><i>The applicant identified small localized perched aquifers that yielded water to wells. The elevation of hypothetical accidental radiological releases (2.4.13) would be directly to the Upland Complex, rather than into the loess.</i></p> <p>RESOLVED.</p>

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10	2.4.12	Groundwater Hydrology	<p>Provide maps showing the locations of the Citronelle Formation and other formations mentioned in this section, and showing their relation to the site. <i>Re</i> ESPA 2.4.12.2.1, “Present Ground Water Use”, <i>These formations are mentioned for regional background. The upland complex includes the Citronelle and other formations as described in the ESPA pg. 2.5-12.</i></p> <p>RESOLVED.</p>
11	2.4.12	Groundwater Hydrology	<p>Provide an SME to discuss locations of pumping and observation wells, boring and completion logs, pumping rates, observed water levels, and other relevant test conditions for pumping tests on the Mississippi River Alluvium, Upland Complex, and Catahoula Formation (<i>cf.</i> FSAR pp. 2-137 to 2-139). <i>These data will be placed in the Germantown and Richland Reading Rooms.</i></p> <p>RESOLVED.</p>
12	2.4.12	Groundwater Hydrology	<p>Provide an SME to discuss relevance of ESPA Section 2.4.12.2.5 to the current design of the plant, in particular the direct withdrawal of cooling water from the Mississippi River.</p> <p><i>In fact, the italicized portions of the section describe use of groundwater for service water and potable water and for cooling water at Unit 1. The last paragraph states that MS River water will be used for cooling for Unit 3. The section remains relevant.</i></p> <p>RESOLVED.</p>
13	2.4.12	Groundwater Hydrology	<p>Provide an SME to discuss the basis for constructing ESPA Figure 2.4-52 showing expected groundwater contours in the plant area during plant operation.</p> <p><i>The figure shows actual representative groundwater elevations rather than projected elevations.</i></p> <p>RESOLVED.</p>
14	2.4.12	Groundwater Hydrology	<p>Provide an SME to discuss whether groundwater in the plant area will be monitored for radionuclide releases, and if so the locations and strata to be monitored and the methods to be used for monitoring. (<i>cf.</i> FSAR Section 2.4.12.3, “Monitoring or Safeguard Requirements”).</p> <p><i>The monitoring for incidental radionuclide releases is not a focus of this section, which is concerned mainly with groundwater elevations. Staff reviewed the plant’s monitoring plan during the audit.</i></p> <p>RESOLVED.</p>

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15	2.4.13	Groundwater Hydrology	<p>FSAR Section 2.4.13.2.2 (p. 2-165) states that radionuclides are assumed to be released directly to groundwater. However, one of the basic design assumptions of RESRAD is that the source of radionuclides is in soil above the groundwater table, and that radionuclides enter groundwater by downward leaching from this soil. Provide an SME to discuss how the assumed liquid release is represented in your use of the RESRAD model to simulate radionuclide transport following a hypothetical release.</p> <p><i>The above description of the release process is correct. The wording in the FSAR might more accurately have referred to “release to the environment” rather than “release to groundwater.”</i></p> <p>UNRESOLVED: An RAI will be developed by staff to document this change.</p>
16	2.4.13	Groundwater Hydrology	<p>Provide an SME to discuss why Hamilton Lake is not believed to be directly connected to groundwater (cf. ESPA 2.4.12.2.5, p. 2.4-34; FSAR 2.4.13.2.2., p. 2-165). Provide legible copies of hydrographs and maps needed for this discussion.</p> <p><i>The basis is described in the ESP SSAR pg 2.4-34. Groundwater levels near the lake are below lake level when the MS River is low. Boring data reported in the UFSAR Unit 1 indicate low permeability materials immediately beneath the lake. These materials overlie more permeable materials. Hamilton Lake is connected to Gin Lake, and drains thru a channel at its south end when the lake level is high, but there is no outflow most of the time.</i></p> <p><i>Staff reviewed relevant portions of the UFSAR Unit 1 documents.</i></p> <p>RESOLVED.</p>
17	2.4.13	Groundwater Hydrology	<p>Provide an SME to discuss surface water outlets from Gin lake and Hamilton Lake, and the conditions under which outflow occurs.</p> <p><i>This question was resolved under Question 16 above.</i></p> <p>RESOLVED; LINKED 16.</p>

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18	2.4.13	Groundwater Hydrology	<p>Provide an SME to discuss those parameters used in the applicant's RESRAD model assessment that are not reflected in FSAR Table 2.4.13-201, "Site-Specific RESRAD-Offsite Inputs".</p> <p><i>This question was resolved under Question 22 below. All parameters are listed in calculation 23, which was reviewed by staff during the audit. This calculation package will be placed in the Germantown and Richland Reading Rooms.</i></p> <p>RESOLVED; LINKED 22.</p>
19	2.4.13	Groundwater Hydrology	<p>Provide an SME to discuss the sources of samples, and the analyses made on samples, used to establish K_d values for use in RESRAD modeling. Provide copies of reports documenting site-specific adsorption measurements.</p> <p><i>Soil samples are designated by boring number, serial number of sample, and one or two numbers designating the depth or range of depths. Staff reviewed "Distribution Coefficient (Kd) Measurements with Soil and Groundwater from the Grand Gulf Nuclear Station Site" by the Analytical Chemistry Laboratory, Argonne National Laboratory dated March 9, 2007. Boring 1012 was from the Upland Complex at 75-90'. Boring 1012 at 185' depth was from the Catahoula Formation and Boring 1033 from the loess. For RESRAD modeling, the minimum Kd value for each chemical species was used irrespective of stratigraphic formation.</i></p> <p>RESOLVED.</p>
20	2.4.13	Groundwater Hydrology	<p>Provide an SME to discuss the possible effects of low-permeability clay/silt material in the Mississippi River Alluvium east of Gin Lake and Hamilton Lake on groundwater flow paths, in particular the possibility that actual flow paths may not be straight from the hypothetical release area toward the Mississippi River but might be diverted (for example) toward small streams A and B that drain into the lakes.</p> <p><i>The applicant stated that the material east of Gin and Hamilton lakes is not so much lower in permeability as to greatly alter the flow paths. It differs from materials further west mainly in having a greater proportion of backswamp and other fine grained deposits. It has no direct effect on the RESRAD modeling because the conservative conceptual model area does not extend west as far as these materials.</i></p> <p>RESOLVED.</p>

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21	2.4.13	Groundwater Hydrology	<p>Provide an SME to describe the process the applicant used to determine that the conceptual model of the parameters, spatial configuration, and controlling physical processes of the subsurface environment that were used in the applicant's analysis of the dose consequences of an accidental release is bounding.</p> <p><i>The applicant described the process used in developing the radionuclide transport characterization.</i></p> <p>UNRESOLVED: The staff will prepare an overarching RAI to describe the process used to determine that the conceptual model used in the analysis was the most conservative plausible.</p>
22	2.4.13	Groundwater Hydrology	<p>Provide for the staff's review of the data input files used in the RESRAD model assessment of the dose consequence of an accidental release based on the requirements of 10 CFR 20 Appendix B Table 2.</p> <p><i>Staff will be requesting the RESRAD model input files.</i></p> <p>UNRESOLVED. The staff will request the RESRAD input files in an RAI.</p>

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(Revised 06/03/2008)

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