Table 1. Discussion of Information Needs for Hydrology Safety Audit

Serial No. (HYDSV)	FSAR Section	Information Needs	Outcome of Discussion on Information Needs	Status of Information Need Audit
1.	General	Provide a subject matter expert to discuss source and availability of the spatially referenced data used for delineation of watersheds, representation of the basin, digital elevation, stream networks, location of the plant, land cover/land use, soil type, surficial geology and aquifers.	Luminant Generation Company, LLC (Luminant) agreed to provide the files on the docket.	This issue is an open item. As such, the U.S. Nuclear Regulatory Commission (NRC) staff issued an Request for Additional Information (RAI).
2.	General	Provide a subject matter expert to discuss the projections and datums used for the maps referenced in the Final Safety Analysis Report (FSAR). There are two vertical datums used, NGVD29 and NAVD88, while one United States Geological Service gage, 08091700, is reported to have no datum information.	Luminant will revise the FSAR and NRC will issue a RAI requesting the revision of the FSAR for datum consistency and reconciliation of conversions between datums.	This issue is an open item. As such, the NRC staff issued an RAI.
3.	2.4.1	Provide a subject matter expert to discuss the consistency of plant grade level and structures systems and components elevation values given in Sections 2.4.1 (~823ft) and Section 2.4.5 (822 ft) of the FSAR.	Luminant will clarify in the revision in the FSAR in the next Updated Tracked Revision.	This issue is an open item. As such, the NRC staff issued an RAI.
4.	2.4.1	FSAR Section 2.4.1.2, pp 2.4-4, states that the most significant portions of the Brazos River Basin are those between Possum Kingdom Lake and Lake Whitney, including Lake Granbury. Describe the basis for determining this portion of the basin as the most significant.	Luminant will provide a discussion in the FSAR.	This issue is an open item. As such, the NRC staff issued an RAI.

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5.	2.4.1	Provide a subject matter expert to discuss the consideration of proposed reservoirs both upstream and downstream of the site (pursuant to NUREG-0800 Standard Review Plan 2.4.1).	Luminant will either provide a discussion in the FSAR Section 2.4.1, and will include the proposed dams in the analysis, or provide a discussion if it believes this consideration to be of no significance in the analysis.	This issue is an open item. As such, the NRC staff issued an RAI.
6.	2.4.3	Provide a subject matter expert to discuss unit hydrograph development and verification, rainfall runoff and routing, probable maximum flood (PMF) flood flow, and water level determinations. The subject matter expert should be prepared to discuss Hydrologic Engineering Center - Hydrologic Modeling System (HEC-HMS) calculations, a rationale for use of Snyder's unit hydrograph under PMF conditions, methods used to account for nonlinear basin response as described in the FSAR Section 2.4.3.3, and the appropriateness of average precipitation losses used in the HEC-HMS modeling.	Luminant will provide the rationale in the FSAR for the nonlinearity and will discuss the applicability of Snyder's unit hydrograph and average precipitation loss assumption. Luminant will provide a calculation document for PMF analysis in the reading room and provide input files on the docket. Review of "Enercon Probable Maximum Flood Calculation for Comanche Peak Nuclear Power Plant, Units 3 and 4 – Calculation No. TXUT-001-FSAR-2.4.3 – CALC-012," Revision 0, dated August 17, 2008, reveals that the Sale Shutdown Impoundment (SSI) dam breach analysis (1980) is based on 1976 aerial photographs.	This issue is an open item. As such, the NRC staff issued an RAI.

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			Luminant's assumption that the geomorphology has not changed since then, needs to be verified. The rationale for Ct, Cp [flood analysis parameters] and other values that went into the flood analysis, using Snyder's unit hydrograph need to be provided. Luminant will either revise or provide justification. SSI dam design and breach analysis reports and the Freese and Nichols will be provided in the reading room.	
7.	2.4.3	Provide data, input, and configuration files for the flood routing calculations using HEC-RAS software. Provide an expert to explain the input data and discuss results.	Same information need as requested in Serial number HYDSV 6, for HEC-RAS.	This issue is an open item. As such, the NRC staff issued an RAI.
8.	2.4.4	Provide data, input, and configuration files for the dam-break flood routing computations using Flowmaster software. Provide an expert to explain the input data and discuss results.	Same information need as Serial number HYDSV 6. The NRC staff reviewed Enercon Brazos River Dam Failure Analysis for Comanche Peak Nuclear Power Plant, Units 3 and 4 – Calculation No. TXUT-001-FSAR-2.4.4-CALC-015, Revision 0, dated September 4, 2008.	This issue is an open item. As such, the NRC staff issued an RAI.

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9.	2.4.4	FSAR section 2.4.1 mentions the existence of 44 dams in the basin and the number of dams used in the analysis of potential dam failures is limited to Morris Shepherd and De Cordova Dams. Provide a subject matter expert to discuss the choice of dams for dam failure analysis, how the permutations were decided, and the impact of including future potential dams both upstream and downstream of the proposed plant in determining the domino failure analyses.	The NRC staff issued an RAI.	This issue is an open item. As such, the NRC staff issued an RAI.
10.	2.4.5	Provide a subject matter expert to discuss the approach used in determining seismically/atmospheric-induced seiches/resonance in the Squaw Creek Reservoir (SCR).	Luminant will provide a discussion in the FSAR or reference to the portion of the FSAR that has the information.	This issue is an open item. As such, the NRC staff issued an RAI.
11.	2.4.5	Provide a subject matter expert to discuss the relationship between the estimation of coincident waves in Section 2.4.3.6 and wave action in Section 2.4.5 in the SCR.	Luminant will clarify what each number accounts for and will incorporate in the FSAR (Section 2.4.5), as well as explain the basis for choosing the specific value used. The NRC staff reviewed Enercon Coincident Wind Wave Analysis for Comanche Peak Nuclear Power Plant, Units 3 and 4 - Calculation No. TXUT-001-FSAR-2.4.3-CALC-013, Revision 0, dated July 2, 2008.	This issue is an open item. As such, the NRC staff issued an RAI.

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12.	2.4.6	Provide a subject matter expert to discuss the potential for hill-slope failure-generated tsunami-like waves in the SCR and consistency with the findings in FSAR Section 2.5.	Luminant will provide a discussion in the FSAR or reference to the portion of the FSAR that has the information.	This issue is an open item. As such, the NRC staff issued an RAI.
13.	2.4.6	Provide a subject matter expert to discuss an assessment of landslide and slope-failure potentials on the shores of Squaw Creek Reservoir as a flood causing or tsunamigenic mechanism.	Luminant will provide a discussion in the FSAR or reference to the portion of the FSAR that has the information.	This issue is an open item. As such, the NRC staff issued an RAI.
14.	2.4.7	Section 2.4.7 states that "the maximum water surface elevation during a probable maximum flood event is at 788.9 ft mean sea level." Provide a subject matter expert to discuss the consistency of this result with Section 2.4.3.6 ("the PMF and maximum coincident wind wave activity results in a flood elevation of 809.28 ft.").	Luminant will provide a discussion in the FSAR (Section 2.4.7) describing the values and the basis used for their determination. The difference in wind wave setup calculation based on slope will be described. The Design Basis Flood will be explicitly stated in the FSAR. The NRC staff reviewed the calculation document and determined that wind wave setup was not considered for the upstream dam failures.	This issue is an open item. As such, the NRC staff issued an RAI.
15.	2.4.7	Provide a subject matter expert to discuss the effects of the accumulated freezing days in January and December and ice-induced reduction in capacity of water storage in the safety-related essential service water system's (ESWS) four wet mechanical draft cooling towers.	Luminant will provide references for the information contained in 9.4.5.3.6 and 9.2.1.3 and provide hydrometeorological data and documentation to justify the assumptions that were used to derive the conclusions.	This issue is an open item. As such, the NRC staff issued an RAI.

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			Luminant will provide a discussion in 2.4.7 as an update for the FSAR.	
16.	2.4.11	The ESWS Cooling Tower makeup flow rate is 274 gallons per minute (gpm) per unit for CPNPP, Units 3 and 4 (~ total of 2192 gpm for eight tower units – four towers per unit). Provide a subject matter expert to discuss the periodicity of the makeup flow (continuous or periodic based on basin level, etc.) and the relationship to the non-safety related cooling water system makeup and intake.	The NRC staff will review the calculation document, and check information in the environmental report (ER) and FSAR for consistency about the water flow quantities, flow rates and periodicity.	This issue is an open item. As such, the NRC staff issued an RAI.
17.	2.4.12	Provide a subject matter expert to provide and discuss site-specific profiles of geology and aquifer units beneath the CPNPP.	The NRC staff reviewed the information provided in the ER supplemental document dated April 27, 2009. There are pending questions with regard to the description of the processes followed in determining the most conservative of all plausible pathways and hydrologic processes that govern flow and subsequently transport of radionuclides. After a brief review of the ER document, the NRC staff concluded the following:	This issue is an open item. As such, the NRC staff issued an RAI.

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			• Some units/formations are not adequately represented. • The information is scattered and lacks flow and coherence. • There are no cross-sections that cross the centerline and other transects, including the reservoir. • The information does not represent future conditions.	
18.	2.4.12	Provide a subject matter expert to present and discuss a summary table of all site-specific hydraulic conductivity values from slug tests, packer tests, pumping tests, and any other relevant hydraulic testing conducted. Also explain how the values selected for the travel time calculation demonstrate conservatism.	The NRC staff reviewed information provided in the ER supplemental document dated April 27, 2009. (See items HYDSV 02, HYDSV 05, HYDSV 06 in the document). After a brief review of the document, the NRC staff concluded the following: • The tabular representation of hydraulic conductivity is acceptable. • The information lacks discussion as it is only tabular presentation. • The estimation of travel time is not the most conservative and does not account for future conditions. • Estimation of porosity is based	This issue is an open item. As such, the NRC staff issued an RAI.

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			on average values and does not necessarily demonstrate conservatism because the averaging method used is not clear. (Luminant stated that the averaging was done by arithmetic mean of published, rather than site specific, values). • Choice of hydraulic conductivity values, which are lesser than the highest values reported in the pathway analysis, does not demonstrate conservatism. • Choice of pathway should also take into consideration aquifer conservative values of properties such as hydraulic conductivity and porosity. • For analysis incorporated by reference from CPNPP, Units 1 and 2, the site specific nature of the analysis and its applicability to CPNPP, Units 3 and 4 will have to be incorporated. • See Serial number HYDSV item 24, herein.	

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19.	2.4.12	Provide a subject matter expert to discuss planned construction activities which include, the planned removal of regolith/undifferentiated fill and bedrock, the planned placement of engineered fill, the addition of engineered features (such as drainage ditches, parking lots, roads, etc.) and the impact these will have on hydrologic processes such as infiltration, surface runoff, groundwater levels, hydraulic gradients and flow paths.	Information provided in the ER supplemental document dated April 27, 2009. (See Item HYDSV 03 in the document). After a brief review of the document, the NRC staff concluded the following: • The information provided in the supporting document lacks supporting analysis. • The NRC staff requires specific details and analysis about the planned construction and the expectations for the post construction hydrologic processes.	This issue is an open item. As such, the NRC staff issued an RAI.
20.	2.4.12	Provide a subject matter expert to present and discuss hydrographs constructed, showing groundwater levels in wells screened onsite. Please include data collected through May 2008, at a scale adequate to display variations or trends.	Information is provided in the ER supplemental document dated April 27, 2009. (See Item HYDSV 12 in this document). The updated FSAR will have additional figures that show the top and bottom of screen on hydrographs and will put similar screen zones on graphs to better display seasonal trends. After a brief review of the	This issue is an open item. As such, the NRC staff issued an RAI.

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			document, the NRC staff concluded the information provided was not sufficient.	
21.	2.4.12	Provide a subject matter expert to describe the precipitation conditions at the site (i.e., wet, normal or drought conditions) during the reported monitoring of groundwater levels and discuss the effect that a change in hydroclimatic conditions will have on the post-construction groundwater system.	Luminant will provide precipitation data in the updated FSAR for the period of water level data collection and will demonstrate evidence of trends that exist. Luminant will also address the effect on water levels in times of change in precipitation, specifically, Luminant will address the impact on water levels if the measurements were taken in a dry year and there is a wet year after construction. This is connected to the US-APWR design certification groundwater level. After a brief review of the document, the NRC staff concluded that Luminant will need to provide additional precipitation data for a period longer than 1.5 years.	This issue is an open item. As such, the NRC staff issued an RAI.
22.	2.4.12	Provide a subject matter expert to discuss how groundwater levels and flow directions determined from onsite wells compare to those determined from regional wells in the	No further action is required based on the information provided so far.	This issue is closed.

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		vicinity of the site.		
23.	2.4.12	Provide a subject matter expert to discuss the four groundwater flow path and travel time scenarios, and make a map showing the start and stop location of each of the scenarios, available for reference and demonstration. Please also discuss the impact of construction related alterations to the site on these flowpaths.	(See also information need, number HYDSV 17). Some information provided in the ER supplemental document dated April 27, 2009. Items HYDSV 01 and HYDSV 04. After a brief review of the document, the NRC staff concluded that the information provided is not sufficient and Luminant needs to provide justification to support the conclusions, more specifically to the choice of pathways.	This issue is an open item. As such, the NRC staff issued an RAI.
24.	2.4.12	Provide a subject matter expert to discuss planned dewatering activities during construction.	Some information provided in the ER supplemental document dated April 27, 2009. Letter number TXNB-09008 (see items HYDSV 05, HYDSV 06 in the document). Also, this information was partially discussed in RAI responses to 2.4.13-5. After a brief review of the document, the NRC staff	This issue is an open item. As such, the NRC staff issued an RAI.

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			concluded that the information is not sufficient and the NRC staff required additional justification to demonstrate how the values are most conservative, how the values represent post-construction information and, how the values were determined (averaging).	
25.	2.4.12	Provide a subject matter expert to discuss the development and implementation of groundwater monitoring plan(s).	Some information provided in the ER supplemental document dated April 27, 2009. (see Item HYDSV 11 in the document). After a brief review of the document, the NRC staff concluded the information provided, is not sufficient for CPNPP, Units 3 and 4. Luminant will include a discussion in 2.4.12 about the planned monitoring action including a time line for proposed actions.	This issue is an open item. As such, the NRC staff issued an RAI.
26.	2.4.12 2.4.13	Provide a subject matter expert to discuss the basis for the selection of the location of soil samples which were used to determine physical and chemical parameters affecting groundwater flow and liquid radioactive effluent transport and how these locations relate to potential groundwater flowpaths.	This information was discussed in a response to RAI 2.4.13-2 and FSAR page 2.4-58. After brief review of the document, the NRC staff recommended no further action for now. The NRC staff will continue to review this information.	The NRC staff issued an RAI.

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27.	2.4.13	Provide a subject matter expert to discuss prior or potential use of chelating agents and other chemicals that have the potential to alter transport characteristics of liquid radioactive effluents at, or near the site.	Based on discussions with the NRC staff, Luminant agreed to include information on presence or absence of chelating agents and any other chemicals. This information will be incorporated in the FSAR update.	The NRC staff will monitor FSAR updates and review this information when it is provided.
28.	2.4.13	Provide a subject matter expert to discuss the potential for flow to offsite wells (displayed on Figure 2.4-205) due to construction and post-construction activities, changes in the pumping rates of the wells associated with CPNPP, Units 1 and 2, and the presence of preferential flowpaths (as described in Reference 2.4-214 from the FSAR).	After a brief review of the document, Luminant will provide additional information to rule out the vertical pathway analysis. HYDSV Information needs 28 and 30 are related to this HYDSV.	This issue is an open item. As such, the NRC staff issued an RAI.
29.	2.4.13	Provide a subject matter expert to describe the development of alternate conceptual models of the site and the process used in the selection of the most conservative and plausible pathway.	After a brief review of the document, Luminant understands the need for a clear conceptual model and will provide that information. This is also related to HYDSV Information needs number 17.	This issue is an open item. As such, the NRC staff issued an RAI.
30.	2.4.13	Provide a subject matter expert to discuss the applicability of using the calculations performed as part of the FSAR for CPNPP, Units 1 and 2, as the basis to eliminate conceptual models of vertical groundwater flow through Glen Rose to wells in the Twin Mountains Formation from CPNPP, Units 3 and 4.	After a brief review of the document, the NRC staff understands this is also related to HYDSV information needs number 29.	This issue is an open item. As such, the NRC staff issued an RAI.

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31.	2.4.13	Provide a subject matter expert to discuss the applicability of using the RATAF code to perform the accidental liquid radioactive effluent release analysis for CPNPP, Units 3 and 4 and demonstrate the conservative nature of site-specific parameters in the model input.	After a brief review of the document, the NRC staff deferred this unresolved information for a later time until issues with source term characterization are resolved with health physics reviewers.	This issue is an open item. As such, the NRC staff issued an RAI.
32.	2.4.13	Provide the input and output files from the accidental liquid radioactive effluent release analysis performed using the RATAF code.	After a brief review of the document, the NRC staff deferred this unresolved information for a later time until issues with source term characterization are resolved with health physics reviewers.	This issue is an open item. As such, the NRC staff issued an RAI.