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U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555
ATTN: David B. Matthews, Director
Division of New Reactor Licensing

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 3 AND 4
DOCKET NUMBERS 52-034 AND 52-035
SUPPLEMENTAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NO. 3729 (SECTION 19)

Dear Sir:

As a result of feedback from the NRC staff, Luminant Generation Company LLC (Luminant) submits herein supplemental information for the response to RAI No. 3729 (CP RAI #93) for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. The supplemental information addresses the site-specific seismic margin analysis (SMA).

In letter TXNB-11013 submitted on March 14, 2011 (ML110750041), Luminant consolidated four Regulatory Commitments (#6481, #6491, #6631 and #6641) into a single Regulatory Commitment #8256 to complete the site-specific SMA and update Final Safety Analysis Report Chapter 19 accordingly. Regulatory Commitment #8256 is completed by the attached supplemental response.

Should you have any questions regarding this supplemental information, please contact Don Woodlan (254-897-6887, Donald.Woodlan@luminant.com) or me.

There are no new commitments in this letter.

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

Executed on October 27, 2011.

Sincerely,

Luminant Generation Company LLC

Rafael Flores

Attachment: Supplemental Response to Request for Additional Information No. 3729 (CP RAI #93)

DD90

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SUPPLEMENTAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak, Units 3 and 4
Luminant Generation Company LLC
Docket Nos. 52-034 and 52-035

RAI NO.: 3729 (CP RAI #93)

SRP SECTION: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation

QUESTIONS for Structural Engineering Branch 1 (AP1000/EPR Projects) (SEB1)

DATE OF RAI ISSUE: 9/29/2009

QUESTION NO.: 19-8

To have confidence that the applicant's probabilistic risk assessment (PRA) and severe accident evaluation results and insights are adequate, the NRC staff must determine that the scope, level of detail, and technical adequacy of the design-specific and plant-specific PRA are appropriate for the combined license application (COLA), as well as for any identified uses of risk information and proposed risk-informed applications.

In Section 19.1.5.1.1 of the combined license application (COLA) FSAR it is stated, "Seismic fragility will be re-evaluated considering the site-specific designs before the first fuel load. Seismic fragilities of the structures are developed using the methodology in [EPRI TR-103959, 'Methodology for Developing Seismic Fragilities']."

Site-specific design considerations should be addressed at the time of COL application. Re-evaluation is appropriate (after construction and prior to initial fuel loading) to confirm that the as-built condition is consistent with the licensed design.

In order for the NRC staff to draw any conclusion related to the application of the seismic margin analysis (SMA) methodology, as applicable to the site-specific features of the COLA, please provide the following information:

1. The reference cited in the FSAR was published in 1994. More recent guidance has been issued (e.g., EPRI TR-1002988, "Seismic Fragility Application Guide," and EPRI TR-1002989, "Seismic Probabilistic Risk Assessment Implementation Guide"). Please indicate whether you intend to revise the FSAR to incorporate references that are more recent.
2. The most important site-specific safety-related structure consists of mechanical draft cooling towers (CWT) for each proposed unit. The CWTs provide the ultimate heat sink as well as provide cooling for normal plant operation. The CWTs need make-up water, which is supplied through a long pipe tunnel that potentially introduces a non-seismic interface. Consequently, these factors can affect seismic capacity of the CWTs and associated pumping equipment and control systems. Please supplement the FSAR to provide relevant discussion of these conditions.

3. The CWTs have backfill on the side opposite to the nuclear island. The backfill slopes down to a retaining wall which is non-seismic. However, a seismic failure of the retaining wall can affect the seismic capacity of the CWTs. The NRC staff requests the applicant describe (in the FSAR) the extent to which seismically driven common failure of the CWTs (the non-seismic intake pipes could be severed and create a large leak path, or the pumping equipment or the cooling fans may fail) are considered in the assessment of seismic capacity.

SUPPLEMENTAL INFORMATION:

During a phone conversation with the NRC staff on September 29, 2011, Luminant stated that the FSAR would be revised to include COL Action Item 19.3(5) identified in the response to DCD RAI No. 761-5804 submitted to the NRC by Mitsubishi Heavy Industries on June 28, 2011 (ML11181A006). The DCD RAI response also addressed the use of the appropriate EPRI reference identified in Item 1 of CP RAI #93. Luminant also stated that the FSAR would be revised to include the site-specific SMA description provided in the response to CP RAI #93.

Luminant included two commitments in the original response to this RAI. The first commitment reads as follows:

With regard to the application of more recent guidance for probabilistic risk assessment-based SMA methodology as applicable to the site-specific features of the COLA, Luminant plans to revise the COLA to incorporate EPRI TR-1002988, "Seismic Fragility Application Guide" in response to the draft Interim Staff Guidance (ISG-20), which is expected to prescribe detailed items that should be included in the FSAR. EPRI TR-1002989, "Seismic Probabilistic Risk Assessment Implementation Guide" may also be incorporated into the FSAR.

This commitment is completed with the addition of EPRI TR-1002988 to the FSAR as Reference 19.1-204. EPRI TR-1002989 is not referenced in ISG-20 and has not been added to the FSAR.

The second commitment reads as follows:

Luminant will revise the FSAR to include description of the site-specific SMA results, including seismically-driven common failure mode considerations of the ultimate heat sink mechanical draft cooling towers, in response to ISG-20.

This commitment is completed with the text inserted in FSAR Subsection 19.1.5.1.2 in the attached marked-up FSAR pages. Based on the inserted text, it can be concluded that seismically-driven common mode failures are not significant in the CPNPP Units 3 and 4 SMA.

The FSAR now includes the appropriate descriptions of the site-specific SMA and HCLPF values. The completion of the inspections and analyses to verify that as-built SSCs are bounded by conditions used in the SMA and that HCLPF values are equal to or greater than the review level earthquake is addressed by ITAAC 10, as listed in COLA Part 10, Table A.3-1.

Impact on R-COLA

See attached marked-up of FSAR Revision 2 pages 1.8-79, 19.1-10, 19.1-11, 19.1-13, 19.1-81, 19.1-82 and 19.3-1.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

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Table 1.8-201 (Sheet 68 of 69)

Resolution of Combined License Items for Chapters 1 - 19

CP COL 1.8(2)

COL Item No.	COL Item	FSAR Location	Resolution Category
COL 19.3(4)	The Probabilistic Risk Assessment and Severe Accident Evaluation is updated as necessary to assess specific site information and associated site-specific external events (high winds and tornadoes, external floods, transportation, and nearby facility accidents).	19.1.1.2.1 19.1.4.1.2 19.1.4.2.2 19.1.5 19.1.5.2.2 19.1.5.3.2 19.1.6.2 19.2.6.1 19.2.6.1.1 19.2.6.2 19.2.6.4 19.2.6.5 19.2.6.6 Table 19.1-201 Table 19.1-202 Table 19.1-203 Table 19.2-9R Figure 19.1-201	3a
COL 19.3(5)	Deleted from the DCD. <u>The COL Applicant will identify a milestone for completing a comparison of the as-built SSC HCLPFs to those assumed in DCD Subsection 19.1.5.1. Deviations from the HCLPF values or other assumptions in the seismic margins evaluation shall be analyzed to determine if any new vulnerability has been introduced.</u>	<u>19.1.5.1.1</u> <u>19.1.5.1.2</u> <u>Table 19.1-206</u>	4

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19.1.5.1.1 Descriptions of the Seismic Risk Evaluation

CP COL 19.3(4) Replace the last sentence of the first paragraph after the first bullet "Selection of review level earthquake" in DCD Subsection 19.1.5.1.1 with the following.

The seismic margin analysis of the DCD is incorporated by reference although the RLE of CPNPP is less than the DCD RLE of 0.5g, which is 1.67 times the SSE (0.3g).

CP COL 19.3(5) Add the following paragraph after the description of the bullet item "Fragility analysis."

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There are no site specific deviations from the HCLPF values or other assumptions in the seismic margins evaluation provided in the DCD Subsection 19.1.5.1. Seismic fragility will be re-evaluated considering the site-specific designs before the first fuel load. Seismic fragilities of the structures are developed using the methodology in Reference 19.1-204

19.1.5.1.2 Results from the Seismic Risk Evaluation

CP COL 19.3(5) Add the following text at the beginning of DCD Subsection 19.1.5.1.2.

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The site-specific design that has potential effect on seismic risk is the site-specific UHS.

The UHS is designed with sufficient inventory to provide cooling for at least 30 days following the most limiting design basis accident without makeup water in accordance with the guidance of RG 1.27. No credit is taken for the availability of makeup water during the design basis accident. Therefore, the possibility of loss of CWT function caused by seismic failure of makeup water is negligible.

The design of the UHS consists of reinforced concrete structures that are directly founded on the Glen Rose Formation limestone Layer C, and does not include any earth embankments for side wall support. Additionally, the layout design of the site-specific seismic Category I SSCs ensures that there are no adjacent non-seismic Category I structures that may adversely affect site-specific seismic Category I SSCs including the UHS structures. Accordingly, seismic Category I SSCs are not exposed to the possible impact of a failure or collapse of non-seismic Category I SSCs. Therefore, the presence of the subject retaining wall and adjacent backfill slopes do not have any adverse effect on the UHS structures.

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The intake (makeup) piping layout precludes draining of cooling tower basin water from failed non-seismic intake piping. The pumping equipment and cooling fans are higher than the elevation of the basin wall and the ground elevation, and are enclosed by a concrete wall as is shown in Figures 3.8-208 and 3.8-209. The pumping equipment and cooling fans are protected from flooding due to the failure of the non-seismic intake piping to the UHS.

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Based on these design features, seismically driven common failures are not significant in the CPNPP Units 3 and 4 SMA.

CP COL 19.3(4) Add a paragraph after the last paragraph in DCD Subsection 19.1.5.1.2 with the following.

The plant-specific HCLPFs of CPNPP Units 3 and 4 that are not less than 1.67 times SSE will be confirmed using the design specific in-structure response and the results of the stress analysis of the US-APWR standard design.

19.1.5.2.2 Results from the Internal Fires Risk Evaluation

STD COL 19.3(4) Add the following text at the beginning of DCD Subsection 19.1.5.2.2.

The only site-specific design that has potential effect on internal fires risk is the site-specific UHS.

Four-train separation is maintained in the site-specific UHS design. Modeling of the site-specific UHS shows a small effect on the reliability of CCWS for internal fire events. As was the case with the results of the Level 1 PRA for operations at power (Subsection 19.1.4.1.2), it has been determined that consideration of the site-specific UHS would have no discernible effect on the fire PRA results that are based on the standard US-APWR design. Therefore, the results described below are considered sufficient and applicable.

19.1.5.3.2 Results from the Internal Flooding Risk Evaluation

STD COL 19.3(4) Add the following text at the beginning of DCD Subsection 19.1.5.3.2.

The only site-specific design that has potential effect on internal flooding risk is the site-specific UHS.

Four-train separation is maintained in the site-specific UHS design. Modeling of the site-specific UHS shows a small effect on the reliability of CCWS for internal flooding events. As was the case with the results of the Level 1 PRA for

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CP COL 19.3(4) Add the following references after the last reference in DCD Subsection 19.1.9.

19.1-201 *Risk-Informed Method for Control of Surveillance Frequencies*, NEI 04-10, Rev. 1, Nuclear Energy Institute, Washington DC, April 2007.

19.1-202 *Climatology Models for Extreme Hurricane Winds Near the United States*, Thomas H. Jagger and James B. Elsner, January 19, 2006.

19.1-203 *A Simple Empirical Model for Predicting the Decay of Tropical Cyclone Winds after Landfall*, John Kaplan and Mark Demaria, JOURNAL OF APPLIED METEOROLOGY, Volume 34, November, 1995.

CP COL 19.3(5) 19.1-204 *Seismic Fragility Application Guide*, EPRI TR-1002988, Electric Power Research Institute, Palo Alto, CA, 2002

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CP COL 19.3(4)
CP COL 19.3(5)

**Table 19.1-206 (Sheet 1 of 2)
Site-specific Key Assumptions**

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Key Insights and Assumptions	Disposition
Site-Specific Design Features and Assumptions	
Design features and assumptions that contribute to high reliability of continuous operation after the 24 hour mission time are the followings.	
- The normal makeup water to the UHS inventory is from Lake Granbury via the circulating water system.	FSAR 9.2.5.2.2
- UHS transfer pumps and the ESW pumps located in each basin are powered by the different Class 1 E buses. UHS transfer pump operates to permit the use of three of the four basin water volumes.	FSAR 9.2.5.2.2, 9.2.5.3
- The transfer line is a high integrity line, regularly tested and inspected for corrosion.	FSAR 9.2.1.2.1, 9.2.5.4
- There are adequate low-level and high-level alarms to provide rapid control room annunciation of a level problem and to allow adequate time to confirm the level and take effective action to address it.	FSAR 9.2.5.5
- Two basins contain enough water to supply water to remove decay heat for at least 24 hours after plant trip.	FSAR 9.2.5.1
Overfill protection will be provided to prevent overflowing the basin and failing the pump(s). This feature is important to prevent degradation of the ESWS when the basin is overfilled due to failure in the transfer pump or circulation system.	FSAR 13.5 Prepare operational procedures to monitor the water level of basin at main control room.
Plant specific SSCs that potentially impact plant safety are seismically designed and thus will not impact the plant HCLPF. HCLPF values for the plant specific SSCs, such as cooling towers, will be confirmed with calculation using EPRI TR-103959-1002988 methodology after completion of seismic design and stress analysis of the SSCs.	DCD 19.1.2.4 FSAR 19.1.5.1.1
<u>The UHS is designed with sufficient inventory to provide cooling for at least 30 days following the most limiting design basis accident without makeup water. The possibility of loss of CWT function caused by seismic failure of makeup water is negligible.</u>	DCD Tier 1 ITAAC #24 FSAR 9.2.5
<u>The design of the UHS consists of reinforced concrete structures that are directly founded on the Glen Rose Formation limestone Layer C, and does not include any earth embankments for side wall support.</u>	FSAR 2.5.5
<u>The layout design of the site-specific seismic Category I SSCs ensures that there are no adjacent non-seismic Category I structures that may adversely affect site-specific seismic Category I SSCs including the UHS structures. The presence of the subject retaining wall and adjacent backfill slopes do not have any adverse effect on the UHS structures.</u>	FSAR 3.7.2.8

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CP COL 19.3(4)
CP COL 19.3(5)

**Table 19.1-206 (Sheet 2 of 2)
Site-specific Key Assumptions**

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Key Insights and Assumptions	Disposition
<p><u>The elevation of pumping equipment and cooling fans are higher than the elevation of the basin wall and the ground elevation, and are enclosed by a concrete wall. The pumping equipment and cooling fans are protected from flooding due to the failure of the non-seismic intake piping to the UHS.</u></p> <p>NFPA 1144 minimum setback distance in the Owner Controlled Area will be procedurally maintained. Also, the Owner Controlled Area adjacent to the isolation zone will be cleared of any concentration of vegetation for security reasons.</p> <p>Administrative control will be in place to ensure that the truck bay entrance of the reactor building is closed when a tornado is nearby or source of high wind is forecast for the immediate area.</p>	<p><u>FSAR 3.8.4.1.3.2</u></p> <p>FSAR 9.5 NFPA 1144 minimum setback distance will be procedurally maintained</p> <p>FSAR 13.5</p>

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19.3 OPEN, CONFIRMATORY, AND COL ACTION ITEMS IDENTIFIED AS UNRESOLVED

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

19.3.3 Resolution of COL Action Items

Replace the content of DCD Subsection 19.3.3 with the following.

CP COL 19.3(1) **19.3(1)** *Update of PRA and SA evaluation for input to RMTS and peer review*

This COL item is addressed in Subsection 19.1.7.6.

19.3(2) *Deleted from the DCD.*

19.3(3) *Deleted from the DCD.*

CP COL 19.3(4) **19.3(4)** *Update of PRA and SA evaluation based on site-specific information*
STD COL 19.3(4)

This COL item is addressed in Subsections 19.1.1.2.1, 19.1.4.1.2, 19.1.4.2.2, 19.1.5, 19.1.5.2.2, 19.1.5.3.2, 19.1.6.2, 19.1.7.1, 19.2.6.1, 19.2.6.1.1, 19.2.6.2, 19.2.6.4, 19.2.6.5 and 19.2.6.6, Tables 19.1-201, 19.1-202, 19.1-203, 19.1-204, 19.1-205, 19.1-206 and 19.2-9R, and Figures 19.1-201 and 19.1-2R.

CP COL 19.3(5) **19.3(5)** ~~*Deleted from the DCD-SSC fragilities*~~
STD COL 19.3(5)

This COL item is addressed in Subsections 19.1.5.1.1, 19.1.5.1.2 and Table 19.1-206.

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STD COL 19.3(6) **19.3(6)** *Accident management program*
CP COL 19.3(6)

This COL item is addressed in Subsections 19.2.5 and Table 19.1-119R.