UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 19, 2013

Mr. Rafael Flores
Senior Vice President and
Chief Nuclear Officer
Attention: Regulatory Affairs
Luminant Generation Company LLC
P.O. Box 1002
Glen Rose, TX 76043

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2 – REQUEST FOR ADDITIONAL INFORMATION REGARDING REVISED TECHNICAL SPECIFICATIONS 3.7.16, "FUEL STORAGE POOL BORON CONCENTRATION," 3.7.17, "SPENT FUEL ASSEMBLY STORAGE," 4.3, "FUEL STORAGE," AND 5.5, "PROGRAMS AND MANUALS" (TAC NOS. MF1365 AND MF1366)

Dear Mr. Flores:

By letter dated March 28, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML130950023), as supplemented by letters dated July 16 and October 22, 2013 (ADAMS Accession Nos. ML13205A056 and ML13309A026, respectively), Luminant Generation Company LLC (the licensee) submitted a license amendment request for revision to the Facility Operating License Nos. NPF-87 and NPF-89 for Comanche Peak Nuclear Power Plant (CPNPP), Units 1 and 2, respectively. The amendment also seeks revision of the CPNPP, Units 1 and 2, Technical Specifications based on an updated criticality analysis methodology for the spent fuel pool.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided in your application and determined that additional information is required in order to complete its review. A draft copy of the enclosed request for additional information (RAI) was provided to Mr. Jimmy Seawright of your staff via e-mail on October 9, 2013. RAI clarification calls were held on October 24 and 29, 2013. The licensee agreed to provide the RAI response within 30 days from the date of this letter. Enclosures 1 and 2 to this letter are the proprietary and non-proprietary versions of the RAIs, respectively.

Please note that the RAIs developed by Steam Generator Integrity and Chemical Engineering Branch have already been transmitted by letter dated November 5, 2013 (ADAMS Accession No. ML13301A645).

Enclosure 1 transmitted herewith contains Proprietary information. When separated from Enclosure 1, this document is decontrolled.

If you have any questions, please contact me at 301-415-3016 or balwant.singal@nrc.gov.

Sincerely,

Balwant K. Singal, Senior Project Manager
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-445 and 50-446

Enclosures:
1. RAI (proprietary)
2. RAI (non-proprietary)

cc w/Encl 2: Distribution via Listserv

ENCLOSURE 2 (NON-PROPRIETARY)

REQUEST FOR ADDITIONAL INFORMATION REGARDING

REVISED TO TECHNICAL SPECIFICATIONS 3.7.16, "FUEL STORAGE POOL BORON CONCENTRATION," 3.7.17, "SPENT FUEL ASSEMBLY STORAGE," 4.3, "FUEL STORAGE," AND 5.5, "PROGRAMS AND MANUALS"

LUMINANT GENERATION COMPANY LLC

COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-445 AND 50-446

REQUEST FOR ADDITIONAL INFORMATION REGARDING

REVISED TECHNICAL SPECIFICATIONS 3.7.16, "FUEL STORAGE POOL BORON CONCENTRATION," 3.7.17, "SPENT FUEL ASSEMBLY STORAGE," 4.3, "FUEL STORAGE," AND 5.5, "PROGRAMS AND MANUALS"

LUMINANT GENERATION COMPANY LLC

COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-445 AND 50-446

By letter dated March 28, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML130950023), as supplemented by letters dated July 16 and October 22, 2013 (ADAMS Accession Nos. ML13205A056 and ML13309A026, respectively), Luminant Generation Company LLC (the licensee) submitted a license amendment request for revision to the Facility Operating License Nos. NPF-87 and NPF-89 for Comanche Peak Nuclear Power Plant (CPNPP), Units 1 and 2, respectively. The amendment also seeks revision of the CPNPP, Units 1 and 2, Technical Specifications based on an updated criticality analysis methodology for the spent fuel pool (SFP).

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided in your application and determined that the following additional information is required in order to complete its review.

1. For the limiting Group F2 fuel assembly selection, the only design that does not include axial blankets was not included. The licensee stated that "the combination of this fuel type's [[ ]] it to be bounded by [[ ]]." Please list the parameters that caused this assembly to not be considered.

2. In the selection of the limiting Group F2 assembly, the licensee explained that the combination of Wet Annular Burnable Absorber (WABA) and Integral Fuel Burnable Absorber (IFBA) conservatively bounds the other designs that only use one or the other (i.e., WABA or IFBA). Please provide the results of the analysis that demonstrates this is true.

3. WCAP-17728-P, "Comanche Peak Nuclear Power Plant Units 1 and 2 Spent Fuel Pool Criticality Safety Analysis" (proprietary, not publicly available) (Enclosure 2 to letter dated March 28, 2013), Section 4.2.1, states that [[ ]]. Please explain if this is considered to be conservative because [[ ]].

4. WCAP-17728-P, Section 4.2.3.2, discusses axial moderator temperature profile selection, but does not discuss how PARAGON treats the moderator density. Please

explain if this is the bounding moderator density profile used in the same manner as the bounding moderator temperature profile.

5. To compensate for a lack of critical experiments containing fission products, **[[ ]]** as described in WCAP-17728-P, Section 5.3.2.1.4, and is assessed based on preliminary research performed by Oak Ridge National Laboratory (ORNL). More recent research performed by ORNL in NUREG/CR-7109, "An Approach for Validating Actinide and Fission Product Burnup Credit Criticality Safety Analyses – Criticality (k_{eff}) Predictions," April 2012 (ADAMS Accession No. ML12116A128), shows that 1.5 percent of the minor actinide and fission product worth (treated as a bias) is acceptable to account for the lack of a sufficient number of applicable critical experiments containing minor actinides and fission products. Applying the NUREG/CR-7109 recommendations for determining uncertainty attributed to fission product and minor actinide validation gaps, the NRC staff estimates that the licensees approach would produce a non-conservative uncertainty estimate by approximately 100 to 200 percent millihro (pcm), but the actual value could be larger. **[[ ]]** please provide a justification for not including the minor actinides and for not applying the results of the more recent research in the manner recommended.

6. For the minimum margin case in the accident analysis, which occurs with a multiple assembly misload, there is approximately 100 pcm to the regulatory k_{eff} limit of 0.95. Since the margin for the limiting accident case is minimal, please confirm that there is no increase in the total bias and uncertainty term due to not considering the presence of soluble boron when determining the combined bias and uncertainty term for this minimum margin case. The NRC staff notes that WCAP-17483-P, "Westinghouse Methodology for Spent Fuel Pool Rack Criticality Analysis," December 2011 (proprietary, not publicly available), which WCAP-17728-P is based on, recommends using a 500 pcm bias to account for any potential increase.

7. A publication titled, "Atomic Weights of the Elements: Review 2000," from the Journal of Pure and Applied Chemistry, Volume 75, Number 6, pp. 683-800, from 2003 shows that the B-10 isotopic fraction can be as low as 0.192 in general for naturally occurring terrestrial samples, with one study showing samples with a B-10 isotopic fraction as low as 0.1893. Since the margin for the limiting accident case is minimal, please justify the B-10 isotopic fraction of **[[ ]]**.

8. Please provide clarification for the following items related to fuel handling:

   a. The last paragraph in WCAP-17728-P, Section 5.5.5, says that the inspection cells can only ever contain one fuel assembly at a time. However in WCAP-17728-P, Section 5.5.2, it states that up to two assemblies can be placed together in the sipping equipment. This appears to be conflicting information. Please provide clarification.

b. If two assemblies are allowed in the inspection cells, please explain the physical means that ensure that at least one assembly pitch is always maintained between assemblies.

c. Please explain the physical means that ensure that one assembly pitch is always maintained between the inspection cell and the storage racks.

d. There is a requirement for Region II that no fuel be placed in the interfacing row of the inspection cell. Please explain why the same requirement does not exist for Region I (CPNPP, Units 1 and 2, SFPs interface with Region I).

e. Please explain the meanting of the last sentence in Section 5.5.2, which states, "Note that it is also acceptable to perform these tasks with the section of the assembly that is being manipulated above the storage racks."

9. For Array II-A, depicted in WCAP-17728-P, Section 5.2, **[[**

]] It was not obvious to the NRC staff that the unconsidered misload scenario for Array II-A would be non-limiting for the misload analysis. Since this misload scenario is credible, please demonstrate that a fresh assembly misload in Array II-A is non-limiting.

10. Please explain if the misplacement of a fuel assembly is only possible in what is shown in WCAP-17728-P, Figures 3-1 and 3-2, as the inspection cell regions. If other regions, other than the inspection cell area, are open to the misplacement of fuel assemblies, please identify them.

11. There appears to be a typo in Section 5.7.4, which states, "...provides 0.05 Δk of reactivity suppression." It appears that this value should be corrected to 0.005 Δk.

12. In Region I, the rack modules are designed with a flux trap, but WCAP-17728-P does not discuss credit of the flux trap gap during a seismic event due to structural considerations. Since it is possible for the flux trap gap size to change during seismic activity, please explain why full credit of the Region I rack module flux trap gap during a seismic event is appropriate.

13. Please provide details on how B-10 areal density manufacturing variation, absorber thickness variation, and degradation of BORAL absorption ability over time is accounted for in the criticality analyses. As a minimum, please provide answers to the following clarification questions:

a. Is the **[[** **]]** areal density the adjusted neutron absorber loading accounting only for the absorber thickness tolerance (i.e. **[[** **]]**)?

b. Please explain why the neutron absorber thickness tolerance is not listed in Tables 3-8 or 5-3 even though it was accounted for by adjusting the neutron absorber areal density. What is this tolerance based on?

c. Please explain if the B_4C density bias is applied in Tables 5-8 and 5-13 based on a tolerance perturbation for B-10 areal densities of [[ ]] and [[ ]] as suggested by Table 5-3, Note 1.

d. The values in Table 5-3 imply B-10 areal density values, but Tables 5-8 and 5-13 list a B_4C density bias. Please explain if the B_4C density values were adjusted in the KENO models to match the target B-10 areal densities given in Table 5-3. Please provide the KENO material specifications used to model Boral.

e. Is [[ ]] the minimum certified B-10 areal density?

f. Section 5.1.2.4, "Impact of Potential BORAL Blistering," paragraph 3 states that the areal density is adjusted from [[ ]] to [[ ]] to account for [[ ]] – this adds additional confusion as Table 5-3 does not mention [[ ]] Please explain how is this adjustment accounted for in the criticality safety analysis?

14. In WCAP-17728-P, Section 5.3.2.1.2, it is stated that the burnup measurement uncertainty is taken to be "the reactivity change associated with a [[ ]] change in burnup," however it is not explained why a value of [[ ]] is appropriate for this uncertainty term. Please provide justification for use of a [[ ]] change in burnup for the burnup measurement uncertainty.

15. The revised Bases for TS 3.7.16 states that "the effect of B-10 depletion on the boron concentration for maintaining k_{eff} less than or equal to 0.95 is accounted for in [[ ]]," however, B-10 depletion is not discussed in WCAP-17728-P. Please explain how is it accounted for.

16. If the [[ ]] is included in the area of applicability (AOA) analysis, please explain why Boral minimum areal density is not included.

17. WCAP-17728-P, Section 6.1, contains tables with various coefficients to be used with an equation relating the initial fuel enrichment to the minimum burnup for fuel assembly loading into the various storage arrays (i.e., these tables define, by curve fit, the various burnup and enrichment loading curves). The methodology for curve fitting is not explained. It is not clear if the curves are designed to pass directly through the explicit burnup and enrichment points or if they are somehow bounded. Please provide additional details on how the burnup and enrichment equations are developed based on the above considerations.

18. WCAP-17728-P, Section 6.2.1, states that outlier assemblies can be stored in arrays that do not require burnup credit without performing an analysis, but must be below the maximum fresh fuel enrichment. This general allowance is potentially problematic. For example, if a future fuel design incorporated higher enrichment blankets, this would allow more reactive fuel to be stored in both Region I and II without any re-analysis.

    This issue is also described in letter dated July 16, 2013 (supplemental information submitted by the licensee in response to NRC staff letter dated June 27, 2013, Item 4 (ADAMS Accession No. ML13175A225)), indicating that a new analysis would have to be performed before fuel can be loaded in the SFP if the fuel assembly in question cannot be categorized as Group F1 or F2. The response stated that only the first 5 parameters of WCAP-17728-P, Table 6-16 should be evaluated, however parameters 6 and 7 – **[[** **]]** – should also be evaluated as they are also based on the fuel design **[[** **]]** Please explain why parameters 6 and 7 have been excluded.

19. It is evident that significant rodded operation is not anticipated by virtue of the imposed 0.1 GWd/MTU max rodded operation limit in the AOA analysis; additionally it is stated that rods were not inserted into the core more than 20 cm at any given time. Consequently, past and current fuel cycles appear to be reasonably covered by the as-defined AOA; however, this has not been demonstrated for future fuel cycles that do not fall within the AOA.

    WCAP-17728-P, Section 6.2.1, regarding future rodded operation not covered by the CPNPP AOA, states that **[[**

    ]]

    However, in the supplemental information provided by letter dated July 16, 2013 (Item 4), the licensee stated the following with respect to depletion parameters of future fuel assemblies that fall outside of the defined AOA:

    > If the parameter only impacts the fuel depletion assumptions of WCAP-17728-P and the fuel needs to be stored in the SFP, it shall be placed in either Region I or in Array II-E in Region II.

    This statement is not consistent with the methodology presented in WCAP-17728-P, Section 6.2.1 mentioned above and specifically imposes a requirement for a burned fuel assembly outside of the AOA based on depletion characteristics to be stored in either Region I or in Region II (i.e., the 1 out of 4 storage array configuration) as if it were fresh. Based on the conflicting information above, please provide clarification for how outlier fuel assemblies that do not meet the fuel depletion criteria in the AOA defined by Table 6-16 in WCAP-17728-P will be stored for CPNPP.

20. Please explain why the axial burnup profile evaluated in the AOA is not defined by Table 6-16.

If you have any questions, please contact me at 301-415-3016 or balwant.singal@nrc.gov.

Sincerely,

/RA/

Balwant K. Singal, Senior Project Manager
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-445 and 50-446

Enclosures:
1. RAI (proprietary)
2. RAI (non-proprietary)

cc w/Encl 2: Distribution via Listserv

DISTRIBUTION:
PUBLIC
LPL4-1 r/f
RidsAcrsAcnw_MailCTR Resource
RidsNrrDorlLpl4-1 Resource
RidsNrrDssSrxb Resource
RidsNrrPMComanchePeak Resource
RidsNrrLAJBurkhardt Resource
RidsRgn4MailCenter Resource
APatel, NRR/DSS/SRXB

ADAMS Accession Nos.: Proprietary ML13317B694; Redacted Ltr + Encl 2 ML13317B703

OFFICE	NRR/DORL/LPL4-1/PM	NRR/DORL/LPL4-1/LA	N/A
NAME	BSingal	JBurkhardt	
DATE	11/14/13	11/14/13	
OFFICE	NRR/DSS/SRXB/BC	NRR/DORL/LPL4-1/BC	NRR/DORL/LPL4-1/PM
NAME	CJackson	MMarkley	BSingal
DATE	11/18/13	11/19/13	11/19/13

OFFICIAL RECORD COPY