November 2, 2007

Mr. M. R. Blevins
Senior Vice President
& Chief Nuclear Officer
Luminant Power
ATTN: Regulatory Affairs
P. O. Box 1002
Glen Rose, TX 76043

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION RELATED TO REVIEW ASSOCIATED WITH LARGE AND SMALL BREAK LOCA ANALYSES (TAC NOS. MD6212 AND MD6213)

Dear Mr. Blevins:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated July 31, 2007, TXU Generation Company LP (subsequently renamed Luminant Generation Company LLC) submitted for NRC review in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.46 the evaluation models and results of the methodologies used for analyzing the large and small break loss-of-coolant accidents for Comanche Peak Steam Electric Station, Units 1 and 2.

The NRC staff is reviewing your submittal and has determined that additional information is required to complete its review. The specific information requested is addressed in the enclosure to this letter. These questions were discussed with Mr. J. Seawright, et al., of your staff on October 24, 2007. It was agreed that you would provide a response by November 23, 2007, to this request for additional information.

The NRC staff considers that timely responses to requests for additional information help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources. If circumstances result in the need to revise the requested response date, please contact me at (301) 415-3016.

Sincerely,

/RA/

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

Docket Nos. 50-445 and 50-446

Enclosure: Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

RELATED TO REVIEW ASSOCIATED WITH

LARGE AND SMALL BREAK LOCA ANALYSES

LUMINANT GENERATION COMPANY LLC

COMANCHE PEAK STEAM ELECTRIC STATION (CPSES), UNITS 1 AND 2

DOCKET NUMBERS 50-445 AND 446

OVERALL APPLICABILITY OF WESTINGHOUSE (W) LOSS-OF-COOLANT ACCIDENT (LOCA) METHODS TO CPSES

1. In order to show that the referenced generically approved large break LOCA (LBLOCA) and small break LOCA (SBLOCA) analysis methodologies apply specifically to the CPSES plants, provide a statement that the existing interface process between the licensee and its vendor (Westinghouse) include mechanisms which assure that the ranges and values of the input parameters for the CPSES LBLOCA and SBLOCA analysis bound the ranges and values of the as-operated plant parameters. Furthermore, if the CPSES plant-specific analyses are based on the model and or analyses of any other plant, then justify that the model or analyses apply to CPSES. (For example, if the other plant has a different vessel internal design, then the model would not apply to CPSES.)

2. Were any modifications made to the emergency core cooling system (ECCS) licensing models subsequent to the latest NRC approval and applied to the CPSES SBLOCA and/or best estimate LBLOCA analyses? Please identify any changes.

APPLICABILITY OF W LOCA METHODS TO FUEL DESIGNS

3. Describe the core fuel configuration for CPSES Units 1 & 2.

4. Confirm if the licensee plans to apply W LOCA methods for the CPSES cores loaded entirely with W design fuels.

5. If the licensee plans to operate CPSES with mixed-core (fuel designs of different vendors), then provide the following additional information:

   a) Describe the core configuration, including types of vendor fuel designs, percent of each fuel types and the number of cycles exposed.

   b) Describe in detail the applicability of W LOCA methods on other vendor's fuel.

   c) In addition to W LOCA methods, will it be necessary to apply other vendor's methodologies to perform CPSES large or small break LOCA analysis in a mixed-core? If so, describe how the results will be interpreted, particularly, in determining the values of limiting plant parameters, such as peak cladding temperature (PCT).

d) Describe in detail how a mixed-core analysis using W methods (or in combination with other vendors' methods) accurately models the interactions (neutronic, thermal-hydraulic, etc.) between fuel assemblies of different designs.

[Note: If the licensee plans to operate in the future with mixed-core using the W methodology, then prior NRC approval is required.]

BEST ESTIMATE LARGE BREAK LOCA (BE-LBLOCA)

6. In Table 1 of Attachment 1 to Reference 1, reactor power used for BE-LBLOCA was indicated to be ≤ 3612 ± 0.6% Mwt (megawatts thermal). Clarify, exactly at what core power level the BE-LBLOCA analysis was performed using ASTRUM code.

7. In page E-5 of NUREG/CR-5249 (CSAU Methodology), it is stated, "These studies consider the core power peaking determined to be the worst in terms of peak clad temperature, the worst single failure, loss of off-site power and maximum initial plant power accounting for uncertainties in the plant instrumentation which measures plant power." In light of this statement, the staff believes that the maximum initial power used for the BE-LBLOCA analysis should be equal to 3612 + 0.6% Mwt. Explain.

8. Clarify if the W BE-LBLOCA results presented in Table 2 of Attachments 1 and 2 [Ref. 1] are for the case with or without offsite power.

9. Figure 19 of Attachments 1 and 2 [Ref. 1] presented BE-LBLOCA analysis axial power shape operating space envelope for CPSES Units 1 and 2. Explain how it was determined that it includes the bounding power shape.

10. Given that the major plant parameter assumptions used in the W BE-LBLOCA analysis for Units 1 and 2 were essentially identical, as shown in Table 1 of Attachments 1 and 2 [Ref. 1], list the key differences between the two units that cause the BE-LBLOCA results to be significantly different between the two units.

11. For the purpose of comparing the results of W LOCA methodology with that of the current LOCA analysis of record, please provide the following additional information:

    a) PCT, Local Maximum Oxidation (LMO) and Core Wide Oxidation (CWO) for Units 1 and 2 that was calculated for the current limiting LBLOCA and SBLOCA using the currently approved LOCA methodology.

SMALL BREAK LOCA (SBLOCA)

12. Given that the input parameters used in the SBLOCA analyses for Units 1 and 2 are same, as shown in Table 1 of Attachment 3 [Ref. 1], list the key differences between the two units that cause the SBLOCA results to be significantly different between the two units.

13. As part of Condition 1 for applicability of W SBLOCA methodology, it was stated in page 15 of Attachment 1 [Ref. 2], "To assure the validity of this application, the bubble diameter should be on the order of 10-1 to 2 cm." Clarify what is meant by 10-1 to 2 cm.

14. As part of the justification for Condition 3 for W SBLOCA, it was stated in page 16 of Attachment 1 [Ref. 2], "The LOCTA [computer] code has always accounted for axial conduction as is clearly stated in WCAP 14710, which supplements the original NOTRUMP documentation." The staff noted that the letter "A" did not appear next to the WCAP to signify NRC approval of the report. Confirm if WCAP 14710, and the addition of clad axial heat conduction was approved by NRC.

15. In page 2 of Attachment 1 to TXX-07063, it was proposed to revise CPSES TS 5.6.5b, Core Operating Limits Report (COLR), to add nine NRC approved WCAPs. The list, however, did not include WCAP 14710. Explain.

16. The last sentence of page 2.7-52 of Attachment 2 [Ref. 2] stated, "Most recently, the NRC generically approved updates to the NOTRUMP-EM to include the ability to model annular fuel pellets (WCAP-14710) in the fuel rod heatup calculations." Clarify if CPSES cores include annular fuel pellets.

17. Were time step studies performed on the limiting small break? Please explain and provide the results of the time step study.

18. The core mixture level predicted by the NOTRUMP-EM displays erratic behavior for all the SBLOCA break sizes, particularly, more so for the limiting break size of 4-inch for Unit 2 (Fig. 3B). Please provide the following additional information:

    a) Provide a physical rationale for this behavior.

    b) The core mixture level drops to a minimum level of about 6 feet below the top of core after about 200 seconds from initiation of the transient for a relatively short duration. The level recovers, and then uncovers the core again for a prolong period of about 1000 seconds before finally quenching the core. Is there a physical rationale behind this prediction? If so, explain. The response should also include why the PCT did not occur during the first core uncovery.

POST-LOCA SUBCRITICALITY CALCULATIONS

19. Section 2.7.3.3 [Ref. 2] provides post-LOCA subcriticality analysis. Describe the specific methodology and computer codes used for this calculation, and whether the methodology and the codes were approved by the NRC.

POST-LOCA LONG-TERM COOLING CALCULATIONS

20. Section 2.7.3.4 [Ref. 2] provides post-LOCA long-term cooling analysis. In page 2.7-59 [Ref. 2] it is stated, "The boric acid precipitation calculation... meets NRC guidance as presented in Reference 3 and is consistent with the interim methodology reported in Reference 4." The staff understands that as part of NRC guidance cited above,

Westinghouse-type plants should use the Beaver Valley/Ginna extended power uprate approach. Describe which approach was used for CPSES.

21. In order for the staff to perform an audit calculation to verify CPSES long-term cooling capabilities (boron precipitation), please provide the following information for the CPSES:

    a) Volume of the lower plenum, core and upper plenum below the bottom elevation of the hot leg, each identified separately.

    b) Elevations of the top of the reactor coolant pump (RCP) discharge leg, the bottom of the suction leg, and top of the core.

    c) Capacity of the condensate storage tank.

    d) Height of the downcomer below the bottom elevation of the cold leg to the inner vessel entry elevation to the lower plenum.

22. In the long-term cooling analysis for boric acid precipitation, did the calculations include the density effect of the boric acid in the mixing volume? This will delay the increase in mixing volume vs. time in the vessel and increase the boric acid concentrations during the first 2 hours following the LOCA.

23. Even though the reactor coolant system (RCS) pressure may remain above 120 pounds-force per square inch absolute as late as 24 hours, is there sufficient condensate for the steam generators to remove heat for this length of time? Please explain.

24. Have the LOCA emergency operating procedures been modified to instruct the operators to initiate a cooldown no later than one hour to assure a successful post-LOCA long-term cooling? Please note that Figure 2.7.3.4-2 does not provide a maximum time post-LOCA to initiate a cooldown. Please explain.

25. How much debris from all sources was included in the mixing volume to determine the precipitation timing? Please explain how the impact of debris was included in the assessment.

26. Placing the break on the top of the discharge leg will delay the growth of the mixing volume through the core and upper plenum and increase the concentrations early in the event. Please discuss the effect of breaks located on the top of the discharge leg in determining precipitation timing. Please discuss the growth of the mixing volume vs. time for this scenario (i.e., the two-phase mixture volume in half of the lower plenum and core). At what time in the event does the mixture volume grow sufficiently to reach the upper plenum region?

27. How long does it take to initiate residual heat removal (RHR) conditions when hot fluid is trapped in the pressurizer for the smallest break that refills and repressurizes the RCS early in the event? How does the operator reduce RCS pressure (what equipment is used and what is the timing for its use) with liquid trapped in the pressurizer that is much

hotter than the RCS loop fluid temperature? Is there sufficient condensate storage tank supply to achieve entry conditions into RHR for very small breaks since simply throttling high-pressure safety injection (HPSI) pumps will not reduce RCS pressure to the loop saturation temperature? What guidance is given to the operators to deal with this particular scenario? How are HPSI pumps throttled to achieve RCS RHR pressure conditions once temperature has been met?

28. Does the total loop pressure drop identified in the document pertain to the equivalent of all loops? If so, please provide the total loop pressure drop for a single loop only.

29. How late in the event does the entrainment of the hot side injection no longer become significant? What model is used to determine the potential for entrainment of hot side injection by the core generated steaming rate? Please explain.

References

1. Letter from F. W. Madden to NRC, TXX-07107, "Submittal of the CPSES Units 1 and 2 Large and Small break LOCA Analyses," July 31, 2007.

2. Letter from R. Flores to NRC, TXX-07126, "CPSES, Supplement to License Amendment Request (LAR) 07-003 Revision to Technical Specification 3.1, "Reactivity Control Systems," 3.2, "Power Distribution Limits," 3.3, "Instrumentation," and 5.6.5b, "Core Operating Limits Report (COLR)," August 16, 2007.

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