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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

**SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSSES)
DOCKET NOS. 50-445 AND 50-446
SUPPLEMENTAL INFORMATION TO LICENSE AMENDMENT
REQUEST (LAR) 02-03, REVISION TO TECHNICAL
SPECIFICATIONS 4.2, "DESIGN FEATURES" AND 5.6.5,
"CORE OPERATING LIMITS REPORT COLR)"
(TAC NOS. MB3101, MB3102, MB4740, AND MB4741)**

- REF: 1) ERX-2001-005-P, "ZIRLO™ Cladding and Boron Coating Models for TXU Electric's Loss of Coolant Accident Analysis Methodologies," TXU Electric, October, 2001.
2. TXU Energy Letter, logged TXX-02041, from C. L. Terry (TXU) to U. S. Nuclear Regulatory Commission, "License Amendment Request (LAR) 02-03, Revision to Technical Specifications (TS) TS 4.2, 'Design Features,' and 5.6.5, 'Core Operating Limits Report (COLR),'", dated April 1, 2002.
3. NRC Memorandum to Robert A. Gramm (USNRC) from David H. Jaffe (USNRC), "Forthcoming Meeting with TXU Generation Company LP Regarding the Topical Report ERX-2001-005-P, "ZIRLO™ Cladding and Boron Coating Models for TXU Electric's Loss of Coolant Accident Analysis Methodologies," dated April 29, 2002.
4. MATPRO-Version 11 (Revision 2), "A Handbook of Materials Properties for Use in The Analysis of Light Water Reactor Fuel Rod Behavior," NUREG/CR-0497, August 1981.

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Done

Gentlemen:

On May 14, 2002 (Reference 3), TXU Energy presented information clarifying the content of the topical report ERX-2001-005-P, "ZIRLO™ Cladding and Boron Coating Models for TXU Electric's Loss of Coolant Accident Analysis Methodologies" (Reference 1). Clarifying information was also presented supporting TXU Energy's License Amendment Request (LAR) 02-03 (Reference 2), which would permit the use of ZIRLO™ (ZIRLO) clad fuel assemblies. During the ensuing discussions, TXU Energy agreed to formally provide the following information to supplement the LAR 02-03.

1. Thermal Expansion: A comparison of measured thermal expansion data for Zircaloy and ZIRLO alloys against the MATPRO-11 (Reference 4) model is provided in Figure 2.8 of the TXU Energy topical report (Reference 1). ZIRLO thermal expansion data for an extended temperature range is discussed in the response to Question 5, provided in Westinghouse Report, "VANTAGE+ Fuel Assembly Reference Core Report," WCAP-12610-P-A, Addendum 1, (submitted to the NRC on February 9, 1991). Even with consideration of the additional data points, the conclusion remains valid that the difference between the thermal expansion of ZIRLO and Zircaloy is small relative to the $\pm 50\%$ uncertainty band reported for the MATPRO-11 thermal expansion model for temperatures greater than $\sim 1500^\circ\text{F}$. In addition, at these higher temperatures, the effects of thermal expansion are small relative to other effects such as the cladding burst model.
2. Thermal Conductivity: From a review of the information presented in Figure 2.5 of Reference 1 and the data points used to develop the MATPRO-11 Zircaloy thermal conductivity model, it is observed that the measured data points for the ZIRLO thermal conductivity could be from the same population. This observation is consistent with expectations derived from the physical similarities between Zircaloy and ZIRLO, which are both 98% zirconium.

If the Westinghouse-measured data points are considered separately from the MATPRO-11 data points, one possible interpretation of the data is that the thermal conductivity for ZIRLO could be as much as 10% greater than the thermal conductivity for Zircaloy. Sensitivity studies are described in Reference 1, from which it is concluded that the potential effects on the LOCA event acceptance criteria are negligible. Informal sensitivity studies were also performed for selected non-LOCA events to examine the potential effects of a 10% increase in thermal conductivity on the Departure from

Nucleate Boiling and RCS pressure event acceptance criteria. Because “rapid” transients are expected to be most affected, the locked rotor and turbine trip analyses were selected for evaluation. The limiting accident scenarios (i.e., time-in-life, reactivity feedback coefficients, etc.), selected in accordance with the TXU Energy Topical Report RXE-91-001-A, “Transient Analysis Methods for Comanche Peak Steam Electric Station Licensing Applications,” were used for these comparisons. In all cases, it was concluded that the effects of the 10% increase in thermal conductivity were negligible.

If the ZIRLO data points are extrapolated to temperatures beyond the range of test data and compared against the MATPRO-11 Zircaloy model, higher values of the thermal conductivity at temperatures greater than approximately 1300°F would be predicted with the current Zircaloy models. In the absence of contradictory evidence, the current Zircaloy models will be used to represent the thermal conductivity of ZIRLO at all temperatures. As shown in Figures 2.5 and 2.7 of Reference 1, this practice is consistent with the approach used by the fuel vendors.

3. Thermal Emissivity: As shown in Figure B-3.3 of Reference 4 (MATPRO-11), the temperature-independent mean value of the thermal emissivity is 0.8 with an expected standard error of ± 0.1 (dimensionless). Because the emissivity is a property of the oxide layer on the surface of the clad, rather than a property of the clad material itself, it is appropriate to use the same value of emissivity for both ZIRLO and Zircaloy clad materials. As noted in Reference 1, TXU Energy has been using a value of 0.9 for Zircaloy emissivity. This 0.9 value represents the mean of the thermal emissivity plus the expected standard error. Because a lower value of the thermal emissivity is more conservative, TXU Energy proposes to use a value of 0.7 for both ZIRLO and Zircaloy, which represents the mean value of the thermal emissivity less the expected standard error. The expected impact of this change is negligible based on a sensitivity study presented in Reference 1, which showed the peak clad temperature to increase by less than 2°F when the emissivity was reduced from 0.9 to 0.51.

Following NRC approval of Reference 2, TXU Energy proposes to use a value of thermal emissivity of 0.7 in all licensing-basis LOCA calculations regardless of whether the cladding material is Zircaloy or ZIRLO.

4. TXU Energy recognizes that the data base containing measurements of the physical properties of ZIRLO is not as extensive and comprehensive as is available for other zirconium-based alloys used as fuel cladding. As more data becomes available to TXU Energy, the models used in the LOCA evaluation models will be assessed, and any identified model changes will be proposed, as appropriate.

5. During discussions with the NRC concerning various aspects of Reference 1, the NRC staff identified a generic concern that potentially affects the ECCS evaluation models developed in accordance with 10CFR50, Appendix K. The specific issue is that boiling in the downcomer region of the reactor vessel could affect the ECCS flow delivered to the core, potentially causing a second or third temperature increase in the clad temperature that could exceed the calculated PCT during the blowdown and reflood phases of the large break LOCA analysis. The effect on the delivered ECCS flow could also impact the magnitude of the calculated PCT during the reflood phase.

TXU Energy has entered this issue into the CPSES corrective action program. To assess the operability of the ECCS, in accordance with the corrective action program, TXU Energy performed preliminary assessments of the effects of the downcomer boiling issue and corroborated those assessments through informal discussions with two fuel vendors. Based on these assessments, it is believed that the effect of the downcomer boiling issue on the large break LOCA peak clad temperature for each CPSES unit (large four-loop plant with large dry containment) is small and is less than 20°F. While this issue is under investigation, a temporary penalty of 20°F will be applied to the calculated PCTs. TXU Energy will continue to investigate the downcomer boiling issue in conjunction with the fuel vendors, and the temporary PCT penalty will be revised, if necessary, as new information is developed. The final resolution of this issue is expected to be identified by November of 2002.

At this point, TXU Energy does not believe the downcomer issue to be significant, as defined in 10CFR50.46(a)(3)(i). Further, the current PCTs reported in the FSAR for CPSES Units 1 and 2 are 1884°F and 1912°F, respectively; therefore, with the inclusions of the temporary penalties, the PCTs will remain less than the limit value of 2200°F. Based on the current assessment, the criteria for additional notifications in 10CFR50.46(a)(3)(ii) have not been exceeded. This issue will affect the annual report required by 10CFR50.46(a)(3)(ii) due in January of 2003.

In accordance with 10CFR50.91(b), TXU Energy is providing the State of Texas with a copy of this proposed amendment.

This communication contains the following new commitments which will be completed as noted:

<u>Commitment Number</u>	<u>Commitment</u>
27264	Following NRC approval to include ZIRLO™ Cladding and Boron Coating models in TXU Energy's Loss of Coolant Accident Analysis methodologies, TXU Energy will use a value of thermal emissivity of 0.7 in all licensing-basis LOCA calculations regardless of whether the cladding material is Zircaloy or ZIRLO.
27265	TXU Energy recognizes that the data base containing measurements of the physical properties of ZIRLO is not as extensive and comprehensive as is available for other zirconium-based alloys used as fuel cladding. As more data becomes available to TXU Energy, the models used in the LOCA evaluation models will be assessed, and any identified model changes will be proposed, as appropriate.
27266	TXU Energy will continue to investigate the downcomer boiling issue in conjunction with the fuel vendors, and the temporary PCT penalty will be revised, if necessary, as new information is developed. While this issue is under investigation, the temporary penalty of 20°F will be applied to the calculated PCTs.

Should you have any questions, please contact Mr. J. D. Seawright at (254) 897-0140.

TXX-02104
Page 6 of 6

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

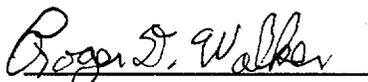
Executed on June 6, 2002

Sincerely,

TXU Generation Company LP

By: TXU Generation Management Company LLC,
Its General Partner

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JDS/js

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