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Ref: 10CFR50.90

CPSES-200101748
Log # TXX-01130
File # 10010, 236

August 2, 2001

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION ON LICENSE AMENDMENT REQUEST 01-05 (TAC NOS. MB1625 and MB1626)

REF: 1) TXU Electric Letter, logged TXX-01042, from C. L. Terry to the NRC dated April 5, 2001.

2) TXU Electric Letter, logged TXX-01109, from C. L. Terry to the NRC dated June 22, 2001.

Gentlemen:

In the referenced letter (Reference 1), TXU Electric submitted a request to amend the CPSES Unit 1 Operating License (NPF-87) and CPSES Unit 2 Operating License (NPF-89) by incorporating changes into the CPSES Units 1 and 2 Technical Specifications and the CPSES Unit 2 Operating License to increase the licensed power for operation of CPSES Units 1 and 2 to 3458 MWt.

TXU Electric provided additional information regarding License Amendment Request 01-05 per Reference 2. Attachments 2 and 3 supplement the information provided in Reference 2. Attachment 4 provides a Non-proprietary version of Attachment 3. Attachment 1 is the TXU Electric affidavit supporting this information.

Enclosure 1 is the Westinghouse authorization letter, CAW-01-1463 and accompanying Affidavit, Proprietary Information Notice, and Copyright Notice. As

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the information in Attachment 3 contains proprietary information to Westinghouse, LLC, it is supported by an Affidavit signed by Westinghouse, the owner of their respective information. The Affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.790 of the Commission's regulations.

Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10CFR Section 2.790 of the Commission's regulations. Correspondence with respect to the copyright or proprietary aspects of the Westinghouse items listed above or the supporting Affidavit should reference CAW-01-1463 and should be addressed to Henry A. Sepp, Manager of Regulatory and Licensing Engineering, Westinghouse Electric Company, LLC, P. O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

In addition to the attached information, the following new commitments which will be completed as noted:

Commitment Number	Commitment
27243	TXU Electric letter logged TXX-01109, dates June 22, 2001, (Reference 2) identifies a limited scope for the Unit 1 Main Steam, Feedwater, Steam Generator Blowdown, and Auxiliary Feedwater systems with analyses which require completion of a confirmatory review of supporting calculations. The confirmatory review of these calculations will be completed prior to Unit 1 implementation of the uprate to 3458 MWt. Should any plant modifications be required as a result of these reviews, these modifications will be completed and a description of the modifications will be provided to the NRC prior to Unit 1 implementation of the uprate to 3458 MWt.
27242	Cycle specific assessments are performed for the control room and offsite dose consequences presented in the FSAR as part of each reload design to confirm that the radiological analyses remain bounding. The cycle specific assessments will be performed at the licensed power level plus an additional allowance for power calorimetric uncertainty.

If you have any questions regarding the attached information, please contact Mr. J. D. Seawright at (254) 897-0140.

Sincerely,

C. L. Terry

By: Roger D. Walker
Roger D. Walker
Regulatory Affairs Manager

JDS/js

Attachments:
1. Affidavit
2. Revised response to Question EEIB1 regarding Plant Specific Power Calorimetric Measurement
3. CPSES Unit 1: CUFs (Cumulative Usage Factors) and Maximum Calculated Stresses for Steam Generator Components (Proprietary Version)
4. CPSES Unit 1: CUFs (Cumulative Usage Factors) and Maximum Calculated Stresses for Steam Generator Components (Non-Proprietary Version)

Enclosure
1. Westinghouse Letter CAW-01-1463, "Application for Withholding Proprietary Information from Public Disclosure," with Affidavit, Proprietary Notice, and Copyright Notice

c - E. W. Merschoff, Region IV
J. A. Clark, Region IV
D. H. Jaffe, NRR
Resident Inspectors, CPSES

Mr. Aurthur C. Tate
Bureau of Radiation Control
Texas Department of Public Health
1100 West 49th Street
Austin, Texas 78704

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
TXU Electric	)	Docket Nos. 50-445
	)	50-446
(Comanche Peak Steam Electric	)	License Nos. NPF-87
Station, Units 1 & 2)	)	NPF-89

AFFIDAVIT

Roger D. Walker, Jr. being duly sworn, hereby deposes and says that he is the Regulatory Affairs Manager of TXU Electric, the licensee herein; that he is duly authorized to sign and file with the Nuclear Regulatory Commission this Additional Information regarding License Amendment Request 01-05; that he is familiar with the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge, information and belief.

Roger D. Walker
Roger D. Walker
Regulatory Affairs Manager

STATE OF TEXAS)
)
COUNTY OF Dallas)

Subscribed and sworn to before me, on this 2ND day of AUGUST, 2001.

Donald R. Woodlan
Notary Public

Donald R. Woodlan
Notary Public, State of Texas
My Comm. Expires 04/30/02

ATTACHMENT 2 TO TXX-01130

Revised response to Question EEIB1 regarding Plant Specific Power Calorimetric Measurement

Question: (EEIB1) **.....Please submit a plant specific power calorimetric measurement uncertainty calculation, using an approved methodology, to establish the stated value of the uncertainty in thermal power measurement.....**

CPSES Response:

The CPSES-specific uncertainty analyses associated with the measurement of the core thermal power is based on the square root of the sum of the squares methodology summarized in "Westinghouse Setpoint Methodology for Protection Systems Comanche Peak Unit 1, Revision 1, " WCAP-12123, Revision 2, April, 1989. The Westinghouse statistical setpoint methodology was used for all setpoints presented in the plant Technical Specifications when CPSES Unit 1 was originally licensed. This methodology was licensed by TXU Electric from Westinghouse and applied to all RPS and ESFAS-related Technical Specification setpoints for the original licensing of CPSES Unit 2 and in all subsequent applications to either unit. References to this methodology may be found in the Bases to Technical Specification 3.3.1 and 3.3.2.

Similarly, the current power calorimetric uncertainty calculation is consistent with the 1990-vintage Westinghouse methods with which CPSES was originally licensed. Although specific input values have changed, the methodology has not been revised since the plant was initially licensed. This specific methodology was used to support the recent 1% power uprate to CPSES Unit 2.

In the current CPSES-specific application of this methodology to the core power measurement uncertainty when using the LEFM✓ as the source for the feedwater mass flow rate, the benefits attainable through the use of multiple channels are not pursued. In other words, the calculation is a single-loop uncertainty and overstates the actual uncertainty associated with the core power measurement. As noted in the "Response to NRC Request for Additional Information On License Amendment Request 98-010," (TXX-99105, April 23, 1999), from the previous 1% uprate documents for Unit 2, this approach is consistent with ASME PTC 19.1 - 1985, "Measurement Uncertainty."

The general methodology for determining the core power is summarized below:

$$Q_{core} = Q_{ss} - NPHA$$

where: Q_{core} = the core thermal power (BTU/hr)

Q_{ss} = the heat removal through the secondary side of the plant

$$= W_f \cdot \{h_{stm}(P_{stm}, x) - h_{fw}(P_{fw}, T_{fw})\} - W_{bldn} \cdot \{h_{stm} - h_{bldn}\}$$

where W_f = Feedwater mass flow rate

h_{stm} = steam generator outlet steam enthalpy as a function of steam pressure and quality

h_{fw} = main feedwater enthalpy as a function of feedwater pressure and temperature

W_{bldn} = steam generator blow down mass flow rate

h_{bldn} = steam generator blowdown enthalpy

NPHA = the net pump heat adder, which is the sum of the heat addition added to the reactor coolant by the reactor coolant pumps less system heat losses, primarily attributed to the charging and letdown flows, less an allowance for the ambient heat loss attributed to conduction and convection from the RCS metal masses.

The uncertainty associated with the feedwater mass flow rate is extracted from the NRC-approved report by the LEFM✓ supplier, Caldon, Inc. ("Improving Thermal Power Accuracy and Plant Safety While Increasing Operating Power Level Using the LEFM✓ System," ER-80P, Revision 0, March 1997).

The uncertainties associated with the remainder of the secondary-side heat removal calculation are determined by calculating the uncertainty associated with each process measurement (e.g., steam pressure) and then relating that uncertainty to an equivalent uncertainty associated with the secondary-side heat removal calculation through the use of sensitivity factors. Unless otherwise noted below, the sensitivity factors were developed by individually varying the measured parameters (feedwater pressure, feedwater temperature, main steam pressure, and feedwater mass flow rate) and allowances for other plant parameters (e.g., steam moisture content) in the above equation from nominal, full power values and assessing the effect of the change on the calculated core power. The individual parameters are varied over a range in excess of their expected values at full power operation, including allowances for measurement uncertainties. The results of these sensitivity analyses are presented in Table 1.

Effects of the Feedwater Flow Indication

The LEFM✓ system allows for a very precise determination of the feedwater mass flow rate. The LEFM✓ actually measures the fluid velocity. Based on precise measurements of the feedwater pipe diameter, a volumetric flow rate is digitally calculated. Given reasonably accurate feedwater pressure indications, the LEFM✓ digitally calculates a feedwater mass flow rate. As described in Reference 5, the LEFM✓ can measure/calculate the mass flow rate to within ±0.48% of the nominal (or rated) feedwater flow. As may be observed in the preceding equation, there is a direct, one-to-one relationship between the feedwater flow indication and the core thermal power indication.

Effects of Steam Generator Blowdown

To obtain the most "accurate" core thermal power measurement, steam generator blowdown should be isolated. However, recognizing that blowdown isolation is not always practical, an evaluation of the accuracy associated with the effects of blowdown on the secondary power uncertainty is appropriate.

When performing calorimetric measurements when steam generator blowdown is not isolated, an explicit calculation of the blowdown heat removal rate is performed. This calculation is based on the blowdown flow rate, pressures, and temperatures, and assumes an uncertainty allowance of ±10% of the steam generator blowdown heat removal. The "inlet" enthalpy for the blowdown heat balance is based on the feedwater pressure and final temperature. For the "exit" enthalpy, feedwater pressure is again assumed and the temperature is approximately 500°F. Although typically operated at much lower flow rates, the maximum blowdown flow rate can be as high as approximately 310,000 lbm/hr. Based on these conditions, the blowdown can remove approximately 6.26 MWt (total, from all four steam generators). The nominal NSSS thermal power is 3458 MWt plus the net RCP heat. Thus, blowdown accounts for a maximum of approximately 0.2% of the total heat removal through the secondary system. A ±10% uncertainty in the blowdown heat removal rate would affect the total NSSS calorimetric measurement by ±10% of 0.2%, or 0.02% RTP.

Effects of the Net Pump Heat Adder

The uncertainty associated with the net pump heat adder is derived by Westinghouse from the combination of primary system net heat losses and additions. The uncertainty allowance for the system heat losses (primarily attributed to charging and letdown flows) is ±10% of the measured value. An allowance of ±50% of the calculated value is provided for the ambient heat losses. The reactor coolant pump heat is known to a relatively high confidence level based on testing. The arithmetic sum of these uncertainties is less than 2 MWt which is less than the 0.085% RTP value used when RTP was defined to be 3411 MWt. This same conservative allowance will continue to be applied, even though Rated Thermal Power will be redefined as 3458 MWt.

For the remainder of the input parameters and indications to the core calorimetric measurement, standard SRSS methods are used to determine the uncertainty associated with a particular indication. Sensitivities of the core power to changes in the input parameters or indications are used to translate the uncertainty in the input to an equivalent uncertainty on the core calorimetric measurement. The sensitivities are summarized in Table 1.

The input parameters and indications actually used in the plant calorimetric measurement are feedwater pressure, feedwater temperature and steam pressure. A design allowance of 0.25% moisture for the steam moisture carryover input is used. Precision instrumentation, distinct from the main plant monitoring equipment, is used for this calorimetric measurement.

The basic components of the pressure indication uncertainty calculations (for both the main steam pressure and the feedwater pressure) are:

$$P_{unc} = \pm\{(SCA + SMTE + SD)^2 + STE^2 + SPE^2 + RCA^2\}^{1/2}$$

where (all units are % span):

SCA = Sensor calibration allowance
= ±0.60% span

SMTE = Sensor measurement and test equipment accuracy allowance
= ±0.60% span

SD = Sensor drift allowance between calibration intervals
= ±0.90% span

STE = Sensor temperature effect (an allowance for changes to the ambient temperature from calibration)
= ±0.25% span

SPE = Sensor pressure effect (an allowance, only required for differential pressure transmitters, for changes to ambient and process pressures from calibration)
= ±0.00% span

RCA = Rack calibration allowance (an allowance for the accuracy with which the plant computer reflects the signal from the transmitter). Because the plant computer, with its digital output, is used as the M&TE device in the calibration, only a very small value for RCA is required to address any uncertainties introduced by the indication. For example, the stated accuracy of the plant computer A/D conversion and indication is less than ±0.05% span.
= ±0.15% span

Therefore, $P_{unc} = \pm\{(SCA + SMTE + SD)^2 + STE^2 + SPE^2 + RCA^2\}^{1/2}$

$= \pm\{(0.60 + 0.60 + 0.90)^2 + 0.25^2 + 0.0^2 + 0.15^2\}^{1/2}$

$= \pm 2.12\%$ span.

These transmitters have a span of 500 psi; thus, the pressure uncertainty is 10.6 psi, rounded to 11 psi.

The feedwater temperature indication is calculated by the LEFM✓ system and has a stated accuracy of ±0.9°F.

The individual uncertainties associated with the precision calorimetric measurement are summarized in Table 1.

Table 1. Precision Calorimetric Uncertainties Using the LEFM✓

COMPONENT	INSTRUMENT ERROR	SENSITIVITY	POWER UNCERTAINTY
Feedwater Flow LEFM✓	**±0.48%**	**1:1**	**±0.48% RTP**
Steam Generator Blowdown	**±10.0%**	**1:0.002**	**±0.02% RTP**
Feedwater Enthalpy			
Temperature	**±0.9°F**	**0.1430%RTP/°F**	**±0.129% RTP**
Pressure	**±11.0 psi**	**0.0001035%RTP/psi**	**±0.001% RTP**
Steam Enthalpy			
Pressure	**±11.0 psi**	**0.00491%RTP/psi**	**±0.054% RTP**
Moisture	**±0.25 %mst**	**0.85%RTP/%mst**	**±0.21% RTP**
Net Pump Heat Addition			**±0.085% RTP**

The total power calorimetric uncertainty is:

$$UNC\text{-}PWRCAL = \pm\{(LEFM)^2 + (BLDN)^2 + (FWh_{temp})^2 + (FWh_{prs})^2 + (STMh_{prs})^2 + (STMh_{moist})^2 + (NPHA)^2\}^{1/2}$$

$$\text{UNC-PWRCAL} = \pm \{(0.48)^2 + (0.02)^2 + (0.129)^2 + (0.001))^2 + (0.054)^2 + (0.21)^2 + (0.085)^2\}^{1/2}$$

$$= \pm 0.55\% \text{ RTP}$$

This value is less than the value of ±0.61% RTP reported in the previously cited Caldon, Inc. Engineering Report (ER-80P).

<u>Question:</u> (EEIB1 cont.) **.... In addition, please provide a description of the programs and procedures that will control calibration of the LEFM system and the pressure and temperature instrumentation whose measurement uncertainties affect the plant power calorimetric uncertainties. In this description, please include the procedure for:**

1. **Maintaining calibration,**
2. **Controlling software and hardware configuration,**
3. **Performing corrective actions,**
4. **Reporting deficiencies to the manufacturer, and**
5. **Receiving and addressing manufacturer deficiency reports.**

<u>CPSES Response:</u>

1. The LEFM✓ system contains self-diagnostic routines. Alarms annunciate the detection of any off-normal conditions (i.e., when monitored parameters fall outside acceptable ranges). In addition to the continuous self-diagnostics internally performed, the LEFM✓ system is periodically calibrated per the manufacturer's recommendations. This procedure also includes a calibration of the pressure transmitters which provide input to the LEFM and their associated A/D converters. A separate procedure is periodically performed to verify the adequacy of the calibration of all the transmitters and their associated plant computer inputs which are used in the plant power calorimetric measurement.

2.-5. As described in FSAR Table 17A-1, the LEFM and its associated software are classified as non-1E equipment. Full QA requirements were not imposed for manufacture and/or installation; however, a specifically structured non-Appendix B QA program is applied at CPSES. The software and supporting hardware associated with the LEFM is controlled in accordance with the CPSES Nuclear Software Quality Assurance Program. This program includes measures to maintain the system in the validated configuration.

The CPSES Nuclear Software Quality Assurance Program includes provisions for reporting and resolving deficiencies as well as receipt and evaluation of condition reports received from the manufacturer. Non-conforming conditions are entered into the corrective action program where, among other activities, they are evaluated for 10CFR 21 reportability. This evaluation necessitates contact with the LEFM✓ system manufacturer. The manufacturer, Caldon, Inc., is also required, both contractually and in accordance with their Quality Assurance Plan, to report any non-conformance identified with the equipment or software to TXU Electric.

The other transmitters and associated channels that are used in the plant power calorimetric measurement are addressed within the non-Appendix B QA program, which includes the typical requirements for design and configuration control, processing of vendor information, and a corrective action program.

ATTACHMENT 4 TO TXX-01130

CPSES Unit 1: CUFs (Cumulative Usage Factors) and Maximum Calculated Stresses for Steam Generator Components (Non-Proprietary Version)

Westinghouse Non-Proprietary Class 3

Table of Information, Non-Proprietary Version: CPSES Unit 1: CUFs (Cumulative Usage Factors) and Maximum Calculated Stresses for Steam Generator Components

Component	Location	Uprate CUF	Allowable CUF	Uprate ksi	Allowable ksi
Tubesheet Center	Hot Side	[ ] a,c	1.000	[ ] a,c	[ ] a,c
	Cold Side	[ ] a,c	1.000	[ ] a,c	[ ] a,c
Tubesheet/ Stub Barrel	Hot Side	[ ] a,c	1.000	[ ] a,c	[ ] a,c
	Cold Side	[ ] a,c	1.000	[ ] a,c	[ ] a,c
Tubesheet/ Head	Hot Side	[ ] a,c	1.000	[ ] a,c	[ ] a,c
	Cold Side	[ ] a,c	1.000	[ ] a,c	[ ] a,c
Tubesheet Ring	Hot Side	[ ] a,c	1.000	[ ] a,c	[ ] a,c
	Cold Side	[ ] a,c	1.000	[ ] a,c	[ ] a,c
Tube/Tubesheet Weld	Horizontal	[ ] a,c	1.000	[ ] a,c	[ ] a,c
	45 deg	[ ] a,c	1.000	[ ] a,c	[ ] a,c
	Vertical	[ ] a,c	1.000	[ ] a,c	[ ] a,c
Divider Plate	Fillet	[ ] a,c	1.000	>3Sm (note)	[ ] a,c
	Drain Hole	[ ] a,c	1.000	>3Sm (note)	[ ] a,c
Tubes	Section A-A	[ ] a,c	1.000	[ ] a,c	[ ] a,c
Secondary Manway	Cover Plate	[ ] a,c	1.000	[ ] a,c	[ ] a,c
Steam Nozzle	Section A-A (inside)	[ ] a,c	1.000	[ ] a,c	[ ] a,c
Feedwater Nozzle	Section D-D (knuckle)	[ ] a,c	1.000	>3Sm (note)	[ ] a,c

ENCLOSURE 1 TO TXX-01130

Westinghouse Letter CAW-01-1463,
"Application for Withholding Proprietary Information from Public Disclosure,"
with Affidavit, Proprietary Notice, and Copyright Notice