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C. Lance Terry Senior Vice President & Principal Nuclear Officer

Ref. #10CFR50 Appendix H (III)(B)(3)

CPSES-200101786 Log # TXX-01133 File # 10010 905.3

August 16, 2001

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

## SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES) DOCKET NO. 50-446 REVISION TO THE REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM WITHDRAWAL SCHEDULE

Gentlemen:

Pursuant to 10CFR50 Appendix H III(B)(3), TXU Electric hereby requests approval for a revision to the reactor vessel material surveillance program withdrawal schedule. These changes apply to CPSES Unit 2 as described herein.

The Reactor Material Surveillance Program is located in the licensee controlled document "Pressure and Temperature Limits Report" (PTLR). A separate PTLR is generated for each CPSES unit. The requested change is to replace Table 2-1, Reactor Material Surveillance Program - Withdrawal Schedule, in the Unit 2 PTLR. The new table reflects a delay in withdrawing the second capsule in Unit 2.

Attachment 1 is the required affidavit. Attachment 2 provides a detailed description of the proposed changes and an assessment of the proposed changes. Attachment 3 provides the affected PTLR pages electronically marked-up to reflect the proposed changes and the table with changes incorporated.

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This communication contains no new licensing basis commitments regarding CPSES Units 1 and 2.

TXU Electric requests approval of this proposed change by February 15, 2002, so TXU Electric can avoid making unnecessary preparations for withdrawing the second capsule for Unit 2. This capsule is currently scheduled to be withdrawn during the sixth refueling outage for Unit 2 (spring 2002). The Unit 2 Pressure and Temperature Limits Report will be revised to incorporate this change upon approval.

If you have any questions, please contact Jack Hicks at (254) 897-6725.

Sincerely,

C. L. Terry

W. Ober By:

Roger D. Walker Regulatory Affairs Manager

JCH/jch Attachments 1. Affidavit 2. Description and Assessment 3. Markup of PTLR

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

Mr. Arthur C. Tate Bureau of Radiation Control Texas Department of Public Health 1100 West 49<sup>th</sup> Street Austin, TX 78704

#### UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

In the Matter of	)		
TXU Electric	)	Docket No.	50-446
(Comanche Peak Steam Electric Station, Unit 2)	)	License No.	NPF-89

### **AFFIDAVIT**

Roger D. Walker being duly sworn, hereby deposes and says that he is Regulatory Affairs Manager of TXU Electric, the licensee herein; that he is duly authorized to sign and file with the Nuclear Regulatory Commission this Revision to the Reactor Vessel Material Surveillance Program Withdrawal Schedule; 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.

Roget-D. Walker Regulatory Affairs Manager

STATE OF TEXAS

)
)

COUNTY OF Somervell

Subscribed and sworn to before me, on this  $\underline{lb^{+}}$  day of  $\underline{\alpha u g u s t}$ , 2001.

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Gayle R. Peck Jespersen Notary Public, State of Texas My Comm. Expires 03/16/02

Notary Public

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#### DESCRIPTION AND ASSESSMENT

#### I. BACKGROUND

Appendix H of 10 CFR Part 50 (Reference 1) requires a material surveillance program to monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region which result from exposure of these materials to neutron irradiation and the thermal environment. Under this program, fracture toughness test data is obtained and analyzed from material specimens exposed in surveillance capsules which are withdrawn periodically from the reactor vessel. Test results must be reported to the NRC within one year of the date of capsule withdrawal. Also, Section III.B.3 of Appendix H of 10 CFR Part 50 requires the capsule withdrawal schedule to be approved by the NRC prior to implementation.

The design of the surveillance program and the withdrawal schedule must meet the requirements of the edition of ASTM E 185 that is current on the issue date of the ASME Code to which the reactor vessel was purchased. The reactor pressure surveillance programs for the Comanche Peak Steam Electric Station (CPSES) units were initially established in accordance with ASTM E 185-70 (Reference 2). This edition of the ASTM standard was in effect on the issue date of Section III of the ASME Boiler and Pressure Vessel Code (1971) to which the CPSES Units 1 and 2 reactor vessels were fabricated.

### II. DESCRIPTION OF CHANGE TO THE REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM - WITHDRAWAL SCHEDULE

The reactor vessel material surveillance program withdrawal schedule for CPSES is located in Table 2-1, "Reactor Vessel Material Surveillance Program - Withdrawal Schedule" of the Pressure and Temperature Limits Report (PTLR) (Reference 3 for Unit 1 and Reference 4 for Unit 2). The only change requested is a delay in withdrawing the second capsule for Unit 2. No changes are requested for the Unit 1 capsule withdrawal schedule.

The specific change for the CPSES Unit 2 is:

Change the withdrawal time for Capsule X from 8 EFPY to 9 EFPY.

#### III. ANALYSIS

#### CURRENT CAPSULE WITHDRAWAL SCHEDULE

Prior to initial licensing of CPSES, TXU Electric and Westinghouse Electric Company developed an overall plan for the withdrawal and analysis of the reactor vessel material surveillance capsule at CPSES. The first surveillance capsules for Units 1 and 2 (Capsule U) were withdrawn, and post-irradiation embrittlement tests were performed as described in Attachment 2 to TXX-01133 Page 2 of 4

References 5 and 6, respectively. Results from the embrittlement tests and capsule dosimeters suggested that reactor vessel beltline material  $\Delta RT_{NDT}$  values would remain below 100°F at end-of -license (EOL) neutron exposure and the limiting material in both the units would not be highly susceptible to irradiation damage. Results from evaluation of the second capsule removed from Unit 1 (Capsule Y) confirmed these findings (Reference 7).

In light of the favorable embrittlement test results obtained from the analysis of the withdrawn capsules, TXU Electric requested the NRC to allow revising the original capsule withdrawal schedule for CPSES Units 1 and 2 and remove only 3 capsules over life of each reactor vessel (Reference 8). The request was granted by the NRC in Reference 9, and the revised capsule withdrawal schedule is shown in Table 2-1 of the PTLRs for the respective CPSES units. The revised withdrawal schedule did not impact the pressure and temperature limit curves located in the PTLRs. These limit curves satisfy the requirements of 10 CFR Part 50, Appendix H and ASTM E 185-70, and remain applicable up to 16 EFPY for both the units.

The first capsule (Capsule U) for both the CPSES units was withdrawn at 0.9 EFPY, thus satisfying the ASTM 185-70 recommendation to obtaining one data point corresponding to the neutron exposure of the reactor vessel at no greater than 30% of its design life. The second capsule for Unit 1 (Capsule Y) was withdrawn at 6.25 EFPY, and that for Unit 2 (Capsule X) is scheduled for withdrawal at 8 EFPY. This schedule would meet the ASTM E 185-70 recommendation for the second capsule to be withdrawn and tested (note that ASTM E 185-70 does not outline any specific requirement for when the data point shall be obtained for the second capsule). The third capsules for Unit 1 (Capsule X) and that for Unit 2 (Capsule W) are scheduled to be withdrawn and tested at 13 and 14 EFPY, respectively; thus meeting the recommendation of ASTM E 185-70 for the third capsule.

#### SUMMARY OF CAPSULE ANALYSIS RESULTS

Accumulated radiation damage is reflected as an upward shift in the adjusted reference temperature. Under the rules of 10CFR50.61 "Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events," the PTS screening criteria for plate material ( $RT_{PTS}$ ) is 270°F at EOL. Before vessel-specific data was available, adjusted reference temperatures were forecast using the methodology of 10CFR50.61 and Regulatory Guide 1.99, Rev. 2. In 1992, the EOL  $RT_{PTS}$  temperature for the Unit 1 vessel was forecast to be 100°F and three years later the EOL  $RT_{PTS}$  temperature for the Unit 2 vessel was forecast to be 94°F. The corresponding shifts in reference temperature ( $\Delta RT_{PTS}$ ) were forecast to be 66°F for the Unit 1 vessel and 50°F for the Unit 2 vessel. The forecast shifts in reference temperature show both the CPSES Unit 1 and Unit 2 reactor pressure vessels have very substantial margins against pressurized thermal shock (based on the 270°F screening criteria) which translates into substantial fracture toughness margins.

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Analysis of material in surveillance capsules adds assurance that the forecast shift in reference temperature are an "upper-bound" for the vessel-specific reference temperatures. Changes in the CPSES fuel management strategies and core designs have tended to lower the neutron exposure in the reactor vessel beltline region. As such, there is no reason to expect measured values of  $\Delta RT_{PTS}$  will approach 100° F even after 60 years of operation. Results from the surveillance capsule dosimetry show the rate at which fluence is accumulating in the reactor vessel beltline region is at or possibly below initial projections.

#### **RATIONALE FOR SCHEDULE REVISION**

With the implementation of 18-month fuel cycles and shorter refueling outages, the capacity factor at CPSES has increased to approximately 93%. This increased capacity factor is considerably higher than the 80% capacity factor utilized in determining the present capsule withdrawal schedule for CPSES. The capacity factor of 93% for the CPSES units places EOL at 37.2 EFPY, based on the current plant license of 40 years (40 years x 0.93). With the present capsule withdrawal schedule for CPSES Unit 2 the post-irradiation tests of Capsule X (scheduled for withdrawal at 8 EFPY) will provide embrittlement and dosimetry results that would be projected to 32.8 EFPY [8 EFPY x Capsule X Lead Factor (4.10)]. The heatup and cooldown curves in the current PTLR are intended to be replaced at 16 EFPY, and replacement curves would be needed for both units before the end of this period. In order to cover the current estimated EOL of about 37 EFPY, a delay in the withdrawal of the second Unit 2 surveillance capsule until 9.1 EFPY is proposed. This delay in the withdrawal will allow TXU Electric to use specimens that have been exposed to a more representative fluence to generate replacement cooldown and heatup curves.

The scheduled withdrawal of the third capsules from Units 1 and 2 at 13 EFPY and 14 EFPY, respectively, will provide the necessary data needed to generate heatup and cooldown curves beyond 37 EFPY, in the event a plant life extension is pursued for CPSES in the future. In addition, there are three standby capsules in the reactor pressure vessel of each unit that could be used to supplement the scheduled capsule withdrawals, if necessary.

#### **CONCLUSION**

The request to revise the withdrawal schedule for CPSES Unit 2 second surveillance capsule (Capsule X) fully complies with the requirements of 10 CFR 50 Appendix H and ASTM E-185-70. In addition, this request remains in full compliance with the requirements set forth in Technical Specifications 3.4.3, 3.4.12 and 5.6.6.

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#### IV. REFERENCES

- 1. Code of Federal Regulations, Title 10, Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," January 1998.
- 2. American Society of Testing and Materials, "Standard Recommended Practice for Surveillance Tests for Nuclear Reactor Vessels," ASTM E 185-70.
- 3. ERX-99-004, Revision 1, CPSES Unit 1, Pressure and Temperature Limits Report (Applicable Up to 16 EFPY), July 1999.
- 4. ERX-99-003, Revision 1, CPSES Unit 2, Pressure and Temperature Limits Report (Applicable Up to 16 EFPY), July 1999.
- WCAP-13422, "Analysis of Capsule U from the Texas Utilities Electric Company Comanche Peak Unit No. 1 Reactor Vessel Radiation Surveillance Program." (TXU Electric letter logged TXX-92516, from William J. Cahill to the NRC, dated December 28, 1992)
- WCAP-14315, "Analysis of Capsule U from the Texas Utilities Electric Company Comanche Peak Unit No. 2 Reactor Vessel Radiation Surveillance Program."(TXU Electric letter logged TXX-95243, from C. Lance Terry to the NRC, dated September 19, 1995)
- WCAP-15144, "Analysis of Capsule Y from the TU Electric Company Comanche Peak Unit 1 Reactor Vessel Radiation Surveillance Program." (TXU Electric letter logged TXX-99076, from C. Lance Terry to the NRC, dated April 8, 1999)
- TXU Electric Letter logged TXX-00024, from C. L. Terry to the NRC dated March 21, 2000, "Revision to the Reactor Vessel Material Surveillance Program Withdrawal Schedule."
- NRC Letter from Robert A. Gramm to C. Lance Terry dated August 9, 2000 (TAC Nos. MA8497 and MA8498), "Request to Revise Reactor Pressure Vessel Surveillance Program Capsule Withdrawal Schedule."

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## [Mark-up of Page 5, Pressure and Temperature Limits Report for CPSES Unit 2 Revision 2, September 2000]

# Table 2-1 Reactor Vessel Material Surveillance Program - Withdrawal Schedule

CAPSULE <u>NUMBER</u>	VESSEL <u>LOCATION</u>	LEAD <u>FACTOR</u>	WITHDRAWAL TIME
U	58.5 <sup>0</sup>	4.10	0.9 EFPY*
Х	238.5 <sup>o</sup>	4.10	<del>8 EFPY</del> 9 EFPY
W	121.5 <sup>o</sup>	4.10	14 EFPY
Ζ	301.5 <sup>o</sup>	4.10	Standby
V	61.0 <sup>0</sup>	3.74	Standby
Y	241.0 <sup>o</sup>	3.74	Standby

\*Capsule withdrawn and analyzed

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## [Replacement Page 5, Pressure and Temperature Limits Report for CPSES Unit 2]

# Table 2-1 Reactor Vessel Material Surveillance Program - Withdrawal Schedule

CAPSULE <u>NUMBER</u>	VESSEL LOCATION	LEAD <u>FACTOR</u>	WITHDRAWAL TIME
U	58.5 <sup>0</sup>	4.10	0.9 EFPY*
х	238.5 <sup>°</sup>	4.10	9 EFPY
W	121.5 <sup>0</sup>	4.10	14 EFPY
Z	301.5 <sup>0</sup>	4.10	Standby
V	61.0 <sup>0</sup>	3.74	Standby
Y	241.0 <sup>0</sup>	3.74	Standby

\*Capsule withdrawn and analyzed