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Log # TXX-00024
File # 10010
905.3
Ref. # 10CFR50 Appendix H (III)(B)(3)

March 21, 2000

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
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 both CPSES Units 1 and 2 as described herein.

The Reactor Material Surveillance Program is located in the licensee controlled document "Pressure and Temperature Limits Report" (PTLR). The requested change is to replace the Reactor Material Surveillance Program - Withdrawal Schedule PTLR Table 2-1, which is applicable to both units with a table which provides separate withdrawal schedules for each unit. These new tables reflect a delay in withdrawing the second capsule in Unit 2, a delay in withdrawing the third capsule for both units, and deletion of the requirement to withdraw a fourth capsule from both units for the duration of the current operating license.

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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.

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

TXU Electric requests approval of this proposed change by July 14, 2000, so TXU can avoid making unnecessary preparations for withdrawing the second capsule for Unit 2. This capsule is currently scheduled to be withdrawn during the fifth refueling outage for Unit 2 (fall 2000). This change, if approved by the NRC, would be included in the next appropriate revision to the Pressure and Temperature Limits Report.

If you have any questions, please contact Carl B. Corbin at (254) 897-0121.

Sincerely,

C. L. Terry

CBC/cbc

Attachments

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

Mr. Arthur C. Tate
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Texas Department of Public Health
1100 West 49th Street
Austin, TX 78704

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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

AFFIDAVIT

C. L. Terry being duly sworn, hereby deposes and says that he is Senior Vice President & Principal Nuclear Officer 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.

C. L. Terry

STATE OF TEXAS)
)
COUNTY OF Somervell)

Subscribed and sworn to before me, on this 21 day of March, 2000.

Notary Public

JEAN AMUNDSON
NOTARY PUBLIC
STATE OF TEXAS
My Commission Expires 08-31-2002

DESCRIPTION AND ASSESSMENT

I. BACKGROUND

Appendix H of 10CFR50 requires a program to ensure adequate toughness of the highly irradiated material in the reactor vessel beltline region. This program involves periodic withdrawal and analysis of surveillance capsules containing specimens of the "limiting" material in the reactor vessel beltline region. Results of these analyses must be reported to the NRC within one (1) year of the withdrawal date.

Prior to initial licensing of Comanche Peak Steam Electric Station (CPSES) Unit 1, TXU Electric and Westinghouse developed an overall plan for the withdrawal and analysis of the reactor vessel material surveillance capsules at CPSES. The original plan was based on fuel management strategies that involved core designs with comparatively high neutron leakage (fresh fuel added to the outer region of the core) and one (1) year fuel cycles. The original withdrawal strategy (contained in CPSES Technical Specifications Table 4.4-2 prior to Amendment 64) called for removing four (4) of the six (6) installed surveillance capsules. As part of the conversion to improved Technical Specifications during the summer of 1999, the original withdrawal schedule was relocated into the CPSES Pressure and Temperature Limits Report (PTLR) (Unit 1 and 2) as Table 2-1. In order for TXU to comply with the withdrawal schedule currently in the PTLR, the second Unit 2 capsule will have to be withdrawn during the fifth refueling outage for Unit 2 scheduled for the fall of 2000.

Initial capsule withdrawals for each unit were scheduled at the end of the first operating cycle. Scheduling these withdrawals early seemed desirable because (a) "new" material is most susceptible to irradiation damage, (b) the controlling material in both units is plate material and plate material (being anisotropic) might suffer anisotropic damage effects, and (c) it seemed appropriate to compensate for Lead Factors in the CPSES capsules being somewhat larger than those assumed in ASTM E 185. These concerns made it desirable to confirm that the material was behaving as expected at the earliest opportunity .

The first surveillance capsules for Units 1 and 2 were withdrawn and post-irradiation embrittlement tests were performed as described in References 1 and 3 respectively. Results from the embrittlement tests and capsule dosimeters suggested that reactor vessel beltline material ΔRT_{NDT} values will remain below 100°F at end-of-license (EOL) neutron exposure. Results from evaluation of the second capsule removed from Unit 1, Reference 5, corroborates these findings.

Forecast ΔRT_{NDT} shifts are expected to remain well below 100°F, so it is desirable to revise the capsule withdrawal schedule and remove only three (3) capsules over the life of each reactor vessel. To convert to a schedule with fewer withdrawals, it is necessary to delay withdrawal of the second and third Unit 2 capsules and the third Unit 1 capsule. The requested changes do not

impact the pressure and temperature limit curves located in the PTLR, and they satisfy the requirements of 10CFR50 Appendix H and ASTM E 185-82.

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

The withdrawal schedule is located in Table 2-1, "Reactor Vessel Material Surveillance Program Withdrawal Schedule" (Reference 6 for Unit 1 and Reference 7 for Unit 2). The primary change contained within the Table 2-1 is the delay in withdrawal times for the second capsule in Unit 2, delay of the third capsule withdrawal in each unit, and the deletion of the requirement for the withdrawal of a fourth capsule.

The specific changes for CPSES Unit 1 are:

(a) delete the requirement to withdraw capsule V, the third capsule at 9 EFPY, so this capsule becomes a standby capsule;

(b) change the requirement for withdrawal of capsule X, from the fourth capsule, at 15 EFPY, to the third capsule at 13 EFPY;

(c) revise the Lead Factors for all capsules based on the results reported in Reference 5; and

(d) add note "Capsule withdrawn and analyzed" to the withdrawal time for capsules U and Y.

The specific changes for CPSES Unit 2, are:

(a) change the requirement to withdraw capsule Y, from the second capsule at 6 EFPY, to standby;

(b) change the requirement to withdraw capsule V, from the third capsule at 9 EFPY, to standby;

(c) change the requirement for withdrawal of capsule X, from the fourth capsule, at 15 EFPY, to the second capsule at 8 EFPY.

(d) change the requirement for the withdrawal of capsule W, from standby to the third capsule at 14 EFPY;

(e) revise the Lead Factors for all capsules based on the results reported in Reference 3; and

(f) add note "Capsule withdrawn and Analyzed" to the withdrawal time for capsule U.

III. ANALYSIS

CAPSULE MATERIALS

At CPSES, both vessels are limited by plate material. Calculations using the methods of Regulatory Guide 1.99 Rev. 2, show that plate R1108-2 is currently limiting for Unit 1; however, at approximately 10 EFPY, plate R1108-1 will become limiting (Reference 2, Figure 2). Unit 2 is limited by plate R3807-2.

Relying on embrittlement forecasting methods accepted when the surveillance capsules were built, the Unit 1 capsules contain material from Plate R1108-2 and weldments from the joint between plates R1108-1 and R1108-2. The Unit 2 capsules contain material from plate R3807-2 and the weldment which joined plates R3807-2 and R3816-2.

Over the life of Unit 1, the forecast difference in adjusted reference temperature between plates R1108-1, and R1108-2 will remain within about 10°F of each other. According to the requirements of Regulatory Guide 1.99 Rev. 2, a margin of 34°F is typically added to the ΔRT_{NDT} to compensate for measurement uncertainties when determining adjusted reference temperature. This small difference in adjusted reference temperature of plates R1108-1 and R1108-2 means no meaningful difference in the performance would be expected as they accumulate irradiation damage.

PROGRAM RESULTS

One surveillance capsule has been withdrawn from Unit 2. Two surveillance capsules have been withdrawn from Unit 1. These capsules were removed during the first refueling outage for each unit and the sixth refueling outage for Unit 1. Analyses of the irradiated material and the dosimetry were completed and the required reports submitted to the NRC (References 1, 3, and 5). Analyses of the material in these capsules confirms that the limiting material in both Units is not highly susceptible to irradiation damage.

Accumulated irradiation 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 (ΔRT_{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.

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 ΔRT_{PTS} will approach 100° F even after 60 years of operation.

Pressurized Thermal Shock Reports (References 2 and 4) provide a direct comparison of the reference temperatures of the limiting material at EOL (assumed to be 32 EFPY). The methods of 10CFR50.61 and Regulatory Guide 1.99 Rev. 2, were used to forecast reference temperatures for the two units. Estimates of the EOL fluence are based on design assumptions about fuel management strategies and capacity factors. The reference temperatures and associated fluence values are:

Unit 1 - (plate R1108-1) 100°F at 32 EFPY (fluence* = 3.04 - Azimuth 25°)
Unit 2 - (plate R3807-2) 94°F at 32 EFPY (fluence* = 2.836)

* Fluence X 10E19 n/cm^2 (E>1MeV) at the inner surface of the vessel. (The vessel begins at the interface between the clad and the base metal.)

Forecasts show the irradiated properties of the two CPSES vessels are quite similar. Material from the Unit 1 vessel appears to be slightly limiting so the Unit 1 Heatup and Cooldown curves, Cold Overpressure Mitigation System, and LTOP setpoints were adopted for both units for simplicity. No appreciable loss of operating flexibility is experienced when using the common curves. The common curves and setpoints are presently based on the forecast irradiated properties of plate R1108-1 at 16 EFPY.

RATIONALE FOR SCHEDULE REVISION

Results from surveillance capsule dosimetry show the rate at which fluence is accumulating in the reactor vessel beltline region is at or possibly below initial projections. CPSES is now employing fuel management strategies and core designs that reduce the neutron leakage from the core. Factors such as increased capacity factor or changes in core design in response to axial

offset would tend to increase neutron leakage. The overall change in EOL fluence is expected to be negligible.

The current PTLR requires that four (4) reactor vessel material surveillance capsules be removed over the life of the vessel. Measured material properties confirm the projected shift in reference temperature will remain well below 100° F for both reactor vessels. Under the requirements of 10CFR50 Appendix H and ASTM E 185-82, only three (3) surveillance capsules need be withdrawn over the life of the vessel. The proposed change to Table 2-1 implements the three (3) capsule withdrawal schedule for both Units.

Reducing the number of capsules removed has both economic and ALARA benefits for CPSES. The proposed change does not provide either an increase or decrease in nuclear plant safety. The ALARA and safety benefits to personnel are the result of avoiding radiation exposure and work activities associated with unnecessary capsule withdrawals, offsite shipments and analyses. TXU estimates the economic benefits to be approximately $ 200,000.00 per unit.

The reactor vessel material surveillance program will continue to provide the necessary information for input into the operating parameters for CPSES. The operating parameters which are derived from the data taken from the surveillance capsules will continue to provide the equivalent safe operation that is currently employed at CPSES. The proposed change does not involve any hardware, setpoint or operational changes to the current safe operation of CPSES.

CONCLUSIONS

This change fully complies with the requirements of 10CFR50 Appendix H and ASTM E-185-82. The resulting operational parameters will provide the same level of safety as currently exhibited in the operation of CPSES.

IV. REFERENCES

1. 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]

2. WCAP-13437, "Evaluation of Pressurized Thermal Shock for Comanche Peak Unit 1." [TXU Electric letter logged TXX-92516, from William J. Cahill to the NRC, dated December 28, 1992]

3. 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]

4. WCAP-14345, "Evaluation of Pressurized Thermal Shock for the Comanche Peak Steam Electric Station (CPSES) Unit 2." [TXU Electric letter logged TXX-95243, from C. Lance Terry to the NRC, dated September 19, 1995]

5. 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]

6. ERX-99-004, Revision 1, CPSES Unit 1, Pressure and Temperature Limits Report (Applicable Up to 16 EFPY), July 1999.

7. ERX-99-003, Revision 1, CPSES Unit 2, Pressure and Temperature Limits Report (Applicable Up to 16 EFPY), July 1999.

[Mark-up of Page 5,
Pressure and Temperature Limits Report for CPSES Unit 1
Revision 1, July 1999]

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

CAPSULE NUMBER	VESSEL LOCATION	LEAD FACTOR	WITHDRAWAL TIME
U	58.5°	~~4.00~~ 4.20	~~1st Refueling~~ 0.9 EFPY*
Y	241.0°	~~3.69~~ 4.07	~~6 EFPY~~ 6.25 EFPY*
V	61.0°	~~3.69~~ 4.07	~~9 EFPY~~ Standby
X	238.5°	~~4.00~~ 4.40	~~15 EFPY~~ 13 EFPY
W	121.5°	~~4.00~~ 4.35	Standby
Z	301.5°	~~4.00~~ 4.35	Standby

*Capsule withdrawn and analyzed

[Mark-up of Page 5,
Pressure and Temperature Limits Report for CPSES Unit 2
Revision 1, July 1999]

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

CAPSULE NUMBER	VESSEL LOCATION	LEAD FACTOR	WITHDRAWAL TIME
U	58.5°	~~4.00~~ 4.10	~~1st Refueling~~ 0.9 EFPY*
Y	241.0°	~~3.69~~ 3.74	~~6 EFPY~~ Standby
V	61.0°	~~3.69~~ 3.74	~~9 EFPY~~ Standby
X	238.5°	~~4.00~~ 4.10	~~15 EFPY~~ 8 EFPY
W	121.5°	~~4.00~~ 4.10	~~Standby~~ 14 EFPY
Z	301.5°	~~4.00~~ 4.10	Standby

*Capsule withdrawn and analyzed

[Replacement Page 5,
Pressure and Temperature Limits Report for CPSES Unit 1]

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

CAPSULE NUMBER	VESSEL LOCATION	LEAD FACTOR	WITHDRAWAL TIME
U	58.5°	4.20	0.9 EFPY*
Y	241.0°	4.07	6.25 EFPY*
X	238.5°	4.40	13 EFPY
V	61.0°	4.07	Standby
W	121.5°	4.35	Standby
Z	301.5°	4.35	Standby

*Capsule withdrawn and analyzed

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

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

CAPSULE NUMBER	VESSEL LOCATION	LEAD FACTOR	WITHDRAWAL TIME
U	58.5°	4.10	0.9 EFPY*
X	238.5°	4.10	8 EFPY
W	121.5°	4.10	14 EFPY
Z	301.5°	4.10	Standby
V	61.0°	3.74	Standby
Y	241.0°	3.74	Standby

*Capsule withdrawn and analyzed