July 15, 2005

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION, UNIT 1 - SUMMARY OF THE TENTH REFUELING OUTAGE (1RF10) STEAM GENERATOR TUBE INSERVICE INSPECTION (TAC NO. MC4458)

Dear Mr. Blevins:

By letters dated April 27, July 29, August 27, September 27, 2004, TXU Generation Company LP, the licensee for Comanche Peak Steam Electric Station (CPSES) Unit 1 summarized the results of the steam generator tube inspections performed during the tenth refueling outage (spring 2004).

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the licensee's submittals and the followup responses to the NRC staff's requests for additional information. In the enclosed staff evaluation, the NRC staff outlines the reviews and concludes that the licensee provided the information as required by the plant's Technical Specifications, and the inspections conducted by the licensee appear to be consistent with the industry operating experience at similarly-designed and operated plants, except as noted in the enclosed staff evaluation.

Additionally, the NRC staff did not identify any outstanding technical issues that warrant a followup action at this time.

If you have any questions on this response, please contact me at (301) 415-1476.

Sincerely,

/RA/

Mohan C. Thadani, Senior Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-445

Enclosure: As stated

cc w/encl: See next page

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SUMMARY OF STAFF EVALUATION BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

COMANCHE PEAK STEAM ELECTRIC STATION, UNIT 1

TXU GENERATION COMPANY LP

SPRING 2004 REFUELING OUTAGE 1RF10

STEAM GENERATOR INSERVICE INSPECTIONS

By letters dated April 27, 2004 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML042180202), July 29, 2004 (ADAMS Accession No. ML042160400), August 27, 2004 (ADAMS Accession No. ML042450536), and September 27, 2004 (ADAMS Accession No. ML042790553), TXU Generation Company LP, the licensee for Comanche Peak Steam Electric Station (CPSES) Unit 1 summarized the results of the steam generator (SG) tube inspections performed during CPSES Unit 1 spring 2004 refueling outage (1RF10). The Nuclear Regulatory Commission (NRC) staff held telephone conference calls with the licensee during the 1RF10 outage. The results of the telephone conference calls are summarized in a letter dated July 20, 2004 (ADAMS Accession No. ML042040079). By letter dated March 14, 2005 (ADAMS Accession No. ML050810474), the licensee provided responses to a request for additional information on its submittals.

CPSES Unit 1 has four Westinghouse Model D4 recirculating SGs. Each SG contains 4,578 mill annealed Alloy 600 tubes, which are nominally 0.75 inches in diameter and have a nominal wall thickness of 0.043 inches. Approximately 90 percent of the tubes are hardroll expanded for the full depth of the tubesheet at each end, and the remaining 10 percent of the tubes are explosively expanded at each end (with the WEXTEX process), for the full depth of the tubesheet. The tubes are supported by a number of carbon steel tube support plates with circular shaped holes and V-shaped chrome plated Alloy 600 anti-vibration bars. The licensee is authorized to implement the voltage-based tube repair criteria for degradation at the tube support plates (as discussed in Generic Letter (GL) 95-05), and an F-star (F*) tube repair criterion for degradation observed below the expansion transition for the tubes that have been hardroll expanded into the tubesheet.

The licensee provided the scope, extent, methods, and results of their SG tube inspections in the documents referenced above. In addition, the licensee described corrective actions (e.g., tube plugging or repair) taken in response to the inspection findings. A summary of the significant aspects of the inspection is provided below.

A total of 547 Alloy 800 leak-limiting sleeves were installed during 1RF10. Approximately one-half (270) of the tubes sleeved during 1RF10 were previously out of service and were de-plugged prior to sleeving.

ENCLOSURE

No tungsten inert gas (TIG)-welded sleeves were installed during 1RF10. A total of 736 TIG-welded sleeves were installed during the previous (1RF9) outage in SGs 2, 3, and 4.

During 1RF10, 38 TIG-welded sleeves would not permit the passage of a 0.500-inch diameter +Point™ probe, and 22 TIG-welded sleeves were found to be ovalized. The 22 ovalized sleeves permitted the passage of the standard diameter +Point™ probe used for sleeve inspection. All of these 60 tubes were plugged. The licensee performed an evaluation using a methodology consistent with that for past evaluations of sleeve collapse, and concluded that the sleeve's welded joint maintains structural and leakage integrity and that the hardroll joint retains "axial load bearing capability" (i.e., structural integrity). The licensee did not specifically address the leakage integrity of the hardroll joint; however, since no report pursuant to 50.73 of Title 10 of the *Code of Federal Regulations* (10 CFR) was made that indicated that the SGs did not have adequate leakage integrity, the staff assumed that the SGs did have leakage integrity (i.e., the staff did not review the licensee's basis for this conclusion).

The licensee stated that +Point™ inspection was performed in the region where the lower roll joints of the Alloy 800 leak-limiting sleeves were to be established (i.e., 7 inches to 10 inches below the top-of-tubesheet). +Point™ examinations were not performed on the parent tube in the location where the sleeve's upper joints were to be established. The licensee concluded that, given the (1) bobbin inspections of all tubes in the region where the upper sleeve joints were to be established, (2) the absence of circumferential cracks and a limited number of outside diameter stress corrosion cracking (ODSCC) in the straight leg freespan, (3) 100 percent +Point™ inspection of all dings greater than 5 volts between the top-of-tubesheet and the H3 tube support plate, (4) 20 percent +Point™ inspection of all dings greater than 2 volts between the top-of-tubesheet and the H3 tube support plate, and (5) the post-sleeving +Point™ inspection provided reasonable assurance of a defect-free upper sleeve joint.

Regarding the indications detected in dents or dings, the licensee was asked in a request for additional information whether its data show any trends on the susceptibility of the dent/ding to cracking based on temperature or severity of the dent or ding. The licensee stated that the observed trends support the historical trends that show a reduced initiation potential for larger voltage dings. The majority of the ODSCC indications at CPSES Unit 1 have occurred in the U-bend region, and the licensee indicated that this occurrence is likely related to partial de-tubing and re-tubing during initial manufacture. The licensee provided no statistical data on susceptibility of dents or dings to cracking or to support its statement that larger voltage dents or dings show a reduced initiation potential than lower voltage dents or dings.

Oblique (circumferential) primary water stress corrosion cracking (PWSCC) was detected in the U-bend region of large radius tubes (Row 3 and higher). These PWSCC indications were detected through out Row 13. The susceptibility to oblique PWSCC decreases with increasing U-bend radius. Based on operating temperature and duration of service, the licensee concluded that CPSES Unit 1 represented the highest PWSCC initiation potential of operating units, and that the observation of oblique PWSCC in Row 13 was not unexpected. The large radius U-bend inspection scope for next refueling outage (1RF11) will follow a critical area and buffer zone approach.

The licensee indicated that the number of tubes with circumferential ODSCC, ding ODSCC, and freespan ODSCC were less than that reported during the previous outage, and that the flaws detected during 1RF10 were less severe than those found in the prior inspection. This trend

was attributed to the stable (i.e., non-changing) environment and depletion of the most susceptible tube population through tube plugging. This is believed to have resulted in a decrease in the observed degraded population of tubes from one outage to the next. As the most susceptible tube population is eliminated by plugging, the future degraded population of tubes would be expected to be less numerous and less severe than previously observed. The licensee also stated that chemical cleaning of the SGs during the 1R05 outage likely removed the most aggressive species, and that ongoing chemistry monitoring and control reduce the aggressiveness of the environment. The licensee also stated that since data quality has either remained the same or improved over that of the previous outage, it was unlikely that data quality negatively affected the 1RF10 detection condition. The NRC staff notes that at many plants, the number of tubes affected by corrosion degradation increases with time (i.e., the reported trends at CPSES Unit 1 may not be typical).

Based on the review of the information provided, the staff concludes that the licensee provided the information required by the Technical Specifications. The staff also concludes that there are no technical issues that warrant follow-up action at this time, since the inspections appear to be consistent with the objective of detecting potential tube degradation and the inspection results appear to be consistent with industry operating experience at similarly-designed and operated units, except as noted above.

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Date: July 15, 2005

Comanche Peak Steam Electric Station

cc:

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