May 2, 2007

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 - EVALUATION OF THE 2005 **STEAM GENERATOR TUBE INSPECTIONS PERFORMED DURING THE REFUELING OUTAGE (1RF11) (TAC NO. MD1837)**

Dear Mr. Blevins:

By letters dated November 7, 2005, and February 3, March 1, and June 12, 2006, TXU Generation Company LP (the licensee) submitted information summarizing the results of the 2005 steam generator tube inspections at Comanche Peak Steam Electric Station, Unit 1. These inspections were performed during the eleventh refueling outage (1RF11).

In addition, the U.S. Nuclear Regulatory Commission (NRC) staff previously summarized additional information concerning the 2005 steam generator tube inspections at Comanche Peak Steam Electric Station, Unit 1, in a letter dated May 18, 2006.

Based on a review of the information provided and the May 18, 2006, NRC staff summary, the NRC staff concludes that the licensee provided the information required by its technical specifications. In addition, the NRC staff concludes that there are no technical issues that warrant follow-up action since the licensee's inspections appeared to be consistent with the objective of detecting potential tube degradation, and the inspection results appeared to be consistent with industry operating experience at similarly designed and operated units.

Sincerely,

/RA/

Mohan C. Thadani**, Senior Project Manager**
Plant Licensing Branch IV
Division of Operating Reactor Licensing

Office of Nuclear Reactor Regulation

Docket No. 50-445

Enclosure: As stated

cc w/encl: See next page

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Mohan C. Thadani, Senior Project Manager
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SUMMARY OF STAFF'S REVIEW

COMANCHE PEAK STEAM ELECTRIC STATION, UNIT 1

2005 STEAM GENERATOR TUBE INSPECTIONS

TAC NO. MD1837

DOCKET NO. 50-445

By letters dated November 7 2005, and February 3, March 1, and June 12, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML053200044, ML060410171, ML060670445, ML061720032, respectively)**, TXU Generation Company LP (the licensee) submitted information summarizing the results of the 2005 steam generator tube inspections at Comanche Peak Steam Electric Station (Comanche Peak), Unit 1. These inspections were performed during the eleventh refueling outage (1RF11).**

In addition, the U.S. Nuclear Regulatory Commission (NRC) staff previously summarized additional information concerning the 2005 steam generator tube inspections at Comanche Peak, Unit 1, in a letter dated May 18, 2006 (ADAMS Accession No. ML061100059).

Comanche Peak, Unit 1, has four Westinghouse model D4 recirculating steam generators.
Each steam generator contains 4,578 mill annealed Alloy 600 tubes. Each tube has a nominal outside diameter of 0.75 inch and a nominal wall thickness of 0.043 inch. 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 were explosively expanded (with the WEXTEX process) for the full depth of the tubesheet at each end. 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 95-05), and an F-star (F*) tube repair criteria for degradation observed below the expansion transition for the tubes that have been hardroll-expanded into the tubesheet.

ENCLOSURE

A total of 736 tungsten inert gas (TIG)-welded sleeves were installed during the 1RF9 outage (fall 2002) in steam generators 2, 3, and 4. No TIG-welded sleeves were installed during 1RF10 (spring 2004); however, 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. No sleeves were installed during 1RF11 (fall 2005).

The Westinghouse model D4 steam generators have since been replaced at the ongoing refueling outage (1RF12) expected to be completed in April 2007.

The licensee provided the scope, extent, methods, and results of their steam generator tube inspections in the documents referenced above. In addition, the licensee described corrective actions (i.e., tube plugging) taken in response to the inspection findings. All four steam generators were inspected during 1RF11.

As a result of the review of the reports, the NRC staff has the following comments/observations:

A number of TIG-welded sleeves were found to be ovalized during the 1RF10 (spring 2004) inspections. The tubes with these potentially collapsed sleeves were plugged (approximately 60 tubes). During 1RF11, an additional 7 TIG-welded sleeves were found to be collapsed. None of the Alloy 800 sleeves were found to be collapsed. The licensee indicated that the internal pressure that results in sleeve collapse is not sufficient to pull the sleeve away from the tube in the expanded region of the lower sleeve joint since the material is cold worked by the expansion process and the resultant stiffness and residual contact forces present in the joint will preclude sleeve collapse in the expanded region of the lower sleeve joint. The basis for these statements was not provided.

It was indicated that one tube had significantly higher +Point™ amplitudes than another tube and thus the flaw depths were deeper. In research sponsored by the NRC, there is data that indicates that the deepest part of a flaw does not necessarily correspond to the peak amplitude in the eddy current signal. As a result, it is important to understand the limitations in sizing flaws when determining their acceptability (for continued service, for in-situ pressure testing, and for confirming that the performance criteria were satisfied). In the case of Comanche Peak, two tubes were selected for in-situ pressure testing during 1RF11: the longest flaw and the flaw with the largest +Point™ amplitude.

Although the staff did not review the condition monitoring acceptance limits or the tube integrity assessment methodology in detail, the limits and the general approach appeared reasonable.

Although the primary water stress-corrosion cracking was observed in the U-bend region of a row 13 tube in 1RF10 (spring 2004), the largest radius tube in which primary water stress corrosion cracking was identified in the U-bend region during 1RF11 (fall 2005) was in row 5.

The number of tubes identified with circumferential outside diameter stress-corrosion cracking during 1RF11 was less than that observed during the prior outage. Similarly, the number of tubes identified with outside diameter stress-corrosion cracking at dings during 1RF11 was less than that observed during the prior outage. The number of tubes identified with free-span outside diameter stress-corrosion cracking, however, increased when compared to the prior outage. All three of these degradation mechanisms were plugged on detection.

One tube was identified with an axially oriented outside diameter stress-corrosion crack approximately 2.5 inches below the top of the tubesheet. Given that the tube is expanded to the top of the tubesheet, the licensee questioned the validity of the indication. Since this indication was below the F* distance, it was permitted to remain in service.

In response to an NRC request for additional information (refer to the response to question 3 in the June 12, 2006 letter), the licensee indicated the term "upper bound" was defined by the probability and confidence level applied to the particular evaluation. In follow-up communications, it was clarified that although the probability and confidence levels were high, the actual reported burst pressure was a "lower bound" burst pressure with a high probability/confidence level, which is conservative.

Based on a review of the information provided and the May 18, 2006, NRC staff summary, the NRC staff concludes that the licensee provided the information required by its technical specifications. In addition, the NRC staff concludes that there are no technical issues that warrant follow-up action since the licensee's inspections appeared to be consistent with the objective of detecting potential tube degradation, and the inspection results appeared to be consistent with industry operating experience at similarly designed and operated units.

Principal Contributor: K. Karwoski

Date: May 2, 2007