UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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ARLINGTON, TEXAS 76011-4005

March 18, 2004

EA-04-009

M. R. Blevins, Senior Vice President
and Principal Nuclear Officer
TXU Energy
ATTN: Regulatory Affairs
Comanche Peak Steam Electric Station
P.O. Box 1002
Glen Rose, TX 76043

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION, UNIT 1 - NRC SUPPLEMENTAL INSPECTION REPORT 05000445/2004-006

Dear Mr. Blevins:

On March 4, 2004, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Comanche Peak Steam Electric Station, Unit 1. The enclosed report documents the inspection findings, which were discussed on March 4, with Steve Ellis, Systems Engineering Manager, and other members of your staff.

As required by the NRC Reactor Oversight Process Action Matrix, this supplemental inspection was performed in accordance with Inspection Procedure 95001. The purpose of the inspection was to examine the causes for and actions taken related to the White finding associated with the failure to identify and correct an indicated flaw in a steam generator tube during Refueling Outage 1RF08. This supplemental inspection was conducted to provide assurance that the root causes and contributing causes of the events resulting in the White finding are understood, to independently assess the extent of condition, and to provide assurance that the corrective actions for risk significant performance issues are sufficient to address the root causes and contributing causes and to prevent recurrence. The inspection consisted of selected examination of representative records and interviews with personnel.

The NRC concluded that your staff performed a thorough evaluation of the failure to identify and correct the steam generator tube flaw in Refueling Outage 1RF08. We also determined that your corrective actions fully addressed the root and contributing causes for the missed flaw, and that you have implemented appropriate actions to prevent recurrence.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Charles S. Marschall, Chief
Engineering Branch
Division of Reactor Safety

Docket: 50-445
License: NPF-87

Enclosure:
Inspection Report 05000445/2004-006

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	50-445
License:	NPF-87
Report No.:	05000445/2004-006
Licensee:	TXU Electric
Facility:	Comanche Peak Steam Electric Station, Unit 1
Location:	FM-56 Glen Rose, Texas
Dates:	March 4, 2004
Inspector:	W. Sifre, Reactor Inspector
Approved By:	Charles S. Marschall, Chief Engineering Branch Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000445/2004-006; March 4, 2004; Comanche Peak Steam Electric Station, Unit 1: 95001, Supplemental Inspection for a White Finding.

The report covered a two-day period of inspection by a regional reactor inspector. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

NRC-Identified and Self Revealing Findings

Cornerstone: Barrier Integrity

The U.S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess the licensee's evaluations associated with the failure to identify and correct an indicated flaw in a steam generator tube during Refueling Outage 1RF08. The failure to remove the tube from service resulted in a primary coolant leak that caused operators to shut the plant down. The NRC concluded, based on the condition of the tube (as determined by in-situ testing) that the failure to identify the flaw and remove the tube from service was a performance deficiency with risk significance characterized as White (low to moderate risk significance). During this supplemental inspection, performed in accordance with Inspection Procedure 95001, the inspectors determined that the licensee performed a comprehensive evaluation of the causes and extent of the performance deficiency that resulted in failure to identify the flaw. The licensee's evaluation resulted in changes in processes and practices for eddy current analysis, improved peer review, and more supervisory oversight. The root-cause evaluation also resulted in additional reviews of the eddy current data obtained in Refueling Outage 1RF09, insuring that analysts identified similar defects. In addition, the licensee applied the lessons learned during the subsequent refueling outage for Unit 2.

Report Details

1 INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess the licensee's evaluation associated with the failure to identify a steam generator tube flaw that resulted in a leak. This performance issue was previously characterized as "white" in NRC Inspection Report 50-445/02-09 and is related to the barrier integrity cornerstone in the reactor safety strategic performance area.

4OA2 Problem Identification and Resolution

a. Problem Identification

On September 26, 2002, Comanche Peak Steam Electric Station, Unit 1, developed a steam generator tube leak that resulted in a unit shutdown on September 28. The NRC conducted a special inspection to evaluate the effectiveness of the examination methods used to examine the degraded tube during the previous outage, and determine whether licensee evaluators missed an opportunity to identify the degraded tube. The team determined that the licensee failed to identify and correct a degraded steam generator tube during Refueling Outage 1RF08 and this failure directly resulted in a steam generator tube leak. The team determined that this failure was a violation of 10 CFR Part 50, Appendix B, Criterion XVI. The NRC performed a Phase 3 analysis of this condition and determined that the change in large early release frequency (ΔLERF) was 5.5×10^{-7}/year. This frequency determination corresponded with a "white" finding in the significance determination process.

b. Root Cause and Extent of Condition Evaluation

The inspection team identified that the licensee's Refueling Outage 1RF08 eddy current analysis guidelines were written to analyze freespan indications either without the presence of a ding or to a smaller threshold in the presence of a ding. The indication that resulted in the leak did not meet the guideline reporting criteria because the ding was masked by the probe wobble signal. This condition resulted in both the primary and secondary analysts applying the non-conservative criteria for non-ding locations. This resulted in the flaw not being identified and the tube remained in service until it leaked.

The inspectors reviewed the licensee's root-cause analysis and found that the licensee had identified that the computerized primary analysis process was rule-based and would not have identified the indication. The licensee further found that the work process for eddy current analysis was less than adequate in that it relied on a single individual to perform a detailed task with no peer, independent, nor supervisory review.

Based on this review, the inspectors concluded that the licensee clearly understood the root causes and contributing causes for the failure to identify the flawed tube prior to the developed leak. The inspectors further concluded, based on the licensee actions described in NRC Inspection Report 50-445/02-09, that the licensee fully addressed the extent of condition and extent of cause for the missed flaw.

c. Corrective Actions

The inspectors reviewed the licensee's initial corrective actions that included revision of the eddy current process and plugging of the failed tube. This review is described in detail in NRC Inspection Report 50-445/02-09. The inspector found that the licensee has initiated following long-term corrective actions:

- Licensee and vendor lead analysts are assigned to review the performance of primary and secondary analysts daily by comparing their calls to those of the resolution analysts.
- Additional controls have been incorporated into the automated data screening software to ensure correct sorts are used.
- The resolution analysts are separated into two teams and resolution of data is performed independently with the most conservative call taking precedence.
- Lead analysts have been assigned on each shift to provide increased oversight and guidance.
- History look up requirements have been changed to require review back to the first inservice inspection as opposed to only the last inservice inspection.
- Additional training and testing has been added on data look ups for changes in signal.

The inspectors concluded that the corrective actions described in NRC Inspection Report 50-445/02-09 fully addressed the root causes and contributing causes for the missed flaw and that those actions combined with the actions stated above will prevent recurrence. Additional detail of the special inspection team's evaluation of the causes and corrective actions can be found in NRC Inspection Report 50-445/02-09.

4OA5 **Other Activities**

1. (Closed) AV 05000458/2002007-01 Failure to identify and correct an indicated flaw in a steam generator tube during Refueling Outage 1RF08.

   As documented in NRC Special Inspection Report 05000445/2002-09, the inspectors identified a violation of 10 CFR Part 50, Appendix B, Criterion XVI for failure to promptly identify a flaw in Comanche Peak, Unit 1, Steam Generator No. 2 Tube R41C71 and correct it by removing it from service. As a result, in September 2002, the flaw developed into a leak that caused operators to shut the plant down. The tube subsequently failed in situ testing.

   The final significance determination was completed and documented in "Final Significance Determination for a White Finding and Notice of Violation," (EA-04-009) dated February 13, 2004. The finding was determined to be of low to moderate safety significance (White) because the tube failed in-situ testing. This failure indicated a

higher probability of inservice failure for the tube during postulated initiating events and core damage sequences. (VIO 05000445/2004006-01)

2. (Closed) VIO 05000445/2004006-01 Failure to identify and correct an indicated flaw in a steam generator tube during Refueling Outage 1RF08.

   As documented in section 4OA2, above, the inspectors determined that the licensee performed a comprehensive evaluation of the causes and extent of the performance deficiency that resulted in failure to identify the flaw. The licensee's evaluation resulted in changes in processes and practices for eddy current analysis, improved peer review, and more supervisory oversight. The root-cause evaluation also resulted in additional reviews of the eddy current data obtained in Refueling Outage 1RF09, insuring that analysts identified similar defects. In addition, the licensee applied the lessons learned during the subsequent refueling outage for Unit 2.

4OA6 **MANAGEMENT MEETINGS**

Exit Meeting Summary

On March 4, 2004, the inspectors presented the inspection results to Mr. S. Ellis and other members of his staff who acknowledged the findings. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. Several documents were identified as proprietary information by the licensee. The inspectors ensured that the proprietary documents were returned to licensee.

Regulatory Performance Discussion

On March 18, 2004, Charles Marschall, Chief, Engineering Branch, Division of Reactor Safety, NRC Region IV, conducted a Regulatory Performance meeting by telephone conference with the following Comanche Peak managers and staff:

Name	Title
Steve Ellis	Systems Engineering Manager
Fred Madden	Regulatory Affairs Manager
Tim Hope	Regulatory Performance Manager
Bob Kidwell	Licensing Engineer

The participants discussed the performance deficiencies associated with the failure to identify and correct the steam generator tube flaw. The discussion also addressed the corrective action taken by the licensee, and the results achieved.

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

G. Dyes, Nuclear Overview Auditor
S. Ellis, Manager, Systems Engineering
T. Hope, Manager, Regulatory Performance
B. Kidwell, Licensing Engineer
F. Madden, Manager, Regulatory Affairs
B. Mays, Manager, Steam Generator Replacement Project
V. Polizzi, Manager, Site Engineering, Westinghouse
K. Studer, Manager, System Engineering Smart Team
M. Sunseri, Manager, Nuclear Overview
T. Weyandt, Steam Generator Coordinator

NRC personnel

D. Allen, Senior Resident Inspector
V. Klein, Intern

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000458/2004006-01	VIO	Failure to identify and correct an indicated flaw in a steam generator tube during Refueling Outage 1RF08 (Section 4OA5)

Closed

50-445/0202-01	LER	Steam Generators Meeting C-3 Category
50-445/02-09-01	APV	Failure to Identify and Correct a Degraded Steam Generator Tube during Refueling Outage 1RF08

LIST OF DOCUMENTS REVIEWED

TXU Unit 1 Steam Generator Eddy Current Analysis Guidelines - 1RF09, Revision 5

TXU Unit 1 Steam Generator Eddy Current Analysis Guidelines - 1RF10, Revision C

Westinghouse Report WPT-16430, "TXU Generation LP Comanche Peak Steam Electric Station Unit 1 1RF09 Steam Generator Pulled Tube Report"