

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket Nos.: 50-445  
50-446

License Nos.: NPF-87  
NPF-89

Report No.: 50-445/97-08  
50-446/97-08

Licensee: TU Electric

Facility: Comanche Peak Steam Electric Station, Units 1 and 2

Location: FM-56  
Glen Rose, Texas

Dates: March 16 through April 26, 1997

Inspectors: H. A. Freeman, Acting Senior Resident Inspector  
V. L. Ordaz, Resident Inspector

Approved By: J. I. Tapia, Chief, Project Branch A  
Division of Reactor Projects

ATTACHMENTS: Supplemental Information

## EXECUTIVE SUMMARY

Comanche Peak Steam Electric Station, Units 1 and 2  
NRC Inspection Report 50-445/97-08; 50-446/97-08

This inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a 6-week period of resident inspection.

### Operations

- Good housekeeping was noted, however, several examples of equipment not being secured in accordance with procedure were identified (Section O1.1).
- The conduct of operations was professional and safety-conscious (Section O1.2).
- Routine operations surveillances were well controlled and professional (Section O2.1).
- The licensee appropriately responded to an increase in reactor coolant leakage. Management demonstrated a high level of attention to the increased leakage, and corrective actions were well coordinated (Section O2.2).

### Maintenance

- Maintenance activities were generally completed thoroughly and professionally (Section M1.1).
- Emergent maintenance on the turbine-driven auxiliary feedwater pump steam admission valve was conducted well and in accordance with licensee procedures (Section M1.2).
- Good communications between the licensee and the vendor were noted during multiple valve diaphragm failures on the turbine-driven auxiliary feedwater pump steam admission valve (Section M1.2).
- Management involvement during emergent maintenance activities was good (Section M1.2).

### Engineering

- The level of engineering involvement to resolve the repeated diaphragm operator failures of the turbine-driven auxiliary feedwater pump was appropriate and included the onsite presence of vendor representatives (Section M1.2).

### Plant Support

- Radiological controls were appropriately implemented. Workers were knowledgeable of radiological work permit requirements and controlled work to maintain radiation dose as low as reasonably achievable (Section R1).

- The shift manning procedures met or exceeded the minimum manning listed in the Final Safety Analysis Report; however, the procedures for fire in the control room and for loss of habitability in the control room did not include all individuals specified to perform functions during the event (Section P.1).

## Report Details

### Summary of Plant Status

Units 1 and 2 began and remained at approximately 100 percent power throughout the inspection period.

## I. Operations

### **O1 Conduct of Operations**

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of ongoing plant operations. In general, the conduct of operations was professional and safety-conscious.

#### O1.1 Plant Tours

##### a. Inspection Scope (71707)

The inspectors conducted frequent plant tours to inspect general plant housekeeping and to determine whether nonplant equipment could impact safety-related equipment during seismic events.

##### b. Observations and Findings

The inspectors found that housekeeping was generally good with some exceptions. The exceptions included several examples of unsecured nonplant equipment which could impact safety-related equipment. Procedure STA-661, "Non-Plant Equipment Storage and Use Inside Seismic Category I Structures," required that nonplant equipment with wheels have the wheels removed or restrained by blocking, c-clamps, or chocks on the wheels, or that the equipment have suitable brakes. The inspectors identified several carts and other items located near safety-related equipment that were not secured in accordance with Procedure STA-661 requirements. This included a ladder with wheels in the control room near the reactor protection set cabinets. The licensee immediately secured these items to comply with procedural requirements. The licensee planned to change the procedure to clarify the proper methods for securing nonplant equipment. This failure constitutes a violation of minor significance and is being treated as a noncited violation, consistent with Section IV of the NRC Enforcement Policy (NCV 50-445(446)/9708-01).

The inspectors found a few examples of ladders improperly tied off near safety-related equipment. This included one ladder tied to a component cooling water pump motor conduit and one ladder tied off close to a safety-related motor control center. In a seismic event, both of these ladders could potentially damage safety-related equipment due to their close proximity. The licensee promptly removed the ladders or secured them properly. The inspectors also found examples of improperly stored cleaning equipment which included a broom and some paper

wipes stored behind a normally open fire door. The inspectors found that these examples were not indicative of the generally good housekeeping discussed in previous inspection reports.

## O1.2 Control Room Tours

### a. Inspection Scope (71707)

The inspectors conducted frequent reviews of ongoing plant operations, technical specification compliance, and operator knowledge of control room annunciators and shift turnover information.

### b. Observations and Findings

The inspectors found that the conduct of operations was professional and safety-conscious. Access to the control room was properly controlled and operator performance was commensurate with the plant configuration and plant activities that were in progress. The control room was free of distractions and nonwork-related materials. Technical specifications were complied with, and control room logs were legible and complete. Operators were knowledgeable of the reasons for illuminated control room annunciators. Oncoming shift operators were adequately knowledgeable of shift turnover information.

## O2 **Operational Status of Facilities and Equipment**

### O2.1 Operational Surveillances

#### a. Inspection Scope (61726)

The inspectors observed all or portions of the following operational surveillance tests.

- Unit 1 component cooling water pump operability test
- Unit 1 solid state protection system test
- Unit 2 station service water pump operability test
- Unit 1 emergency diesel generator operability test
- Unit 1 safeguards slave relay actuation test

#### b. Observations and Findings

The inspectors found that prejob briefings for both periodic and infrequent evolutions appropriately included a review of procedural requirements. Communications between operators during the tests were good and independent verification steps were correctly performed. Operators demonstrated a thorough knowledge of procedural requirements. Unit supervisors exhibited good command and control of the surveillance activities. The inspectors found that the surveillance tests met Technical Specification requirements, tested the facility as described in

the Final Safety Analysis Report (FSAR), were performed in accordance with procedures, and that plant equipment was appropriately restored following the tests.

## O2.2 Auxiliary Feedwater System Walkdown

### a. Inspection Scope (71707)

The inspectors performed a walkdown of portions of the Unit 2 auxiliary feedwater system during the maintenance activities were being performed on the turbine-driven auxiliary feedwater pump steam admission valve. The inspectors reviewed valve lineups, observed housekeeping and general material condition, and reviewed switch and breaker lineups.

### b. Observations and Findings

The inspectors found that the auxiliary feedwater system was maintained in a condition as described in the Final Safety Analysis Report. General plant housekeeping in the vicinity of auxiliary feedwater equipment was good. No non-plant equipment was identified which could potential impact system operation.

## O2.3 Unit 2 Reactor Coolant System Identified Leakage

### a. Inspection Scope (71707)

On March 26, following a Unit 2 reactor coolant drain tank high pressure alarm, the licensee discovered that a pressurizer spray valve was leaking reactor coolant at approximately 3 gallons per minute. The inspectors reviewed the FSAR regarding the function of the valve, attended several planning meetings, and reviewed the licensee's determination that the leak constituted identified leakage.

### b. Observations and Findings

Following identification of increased reactor coolant system leak rate, temperature readings indicated that the pressurizer spray valve was leaking. Maintenance personnel entered containment and confirmed that the temperature of the leak-off line had risen substantially using portable temperature sensors. The inspectors reviewed Technical Specifications and concluded that the licensee appropriately classified the leakage as identified.

The inspectors found that licensee management had a high level of focus and attention on the increased reactor coolant system leakage. The licensee's decision to backseat the spray valve to terminate the leakage was appropriate. The inspectors reviewed the FSAR and verified that the valve was not assumed to mitigate the consequences of any design basis accident. Protective measures, which included radiation protection, security, and personnel safety, were discussed

in sufficient detail at the prejob briefing for the maintenance activity. The licensee also conducted a detailed postjob briefing. The inspectors concluded that the evolution was well coordinated and thoroughly planned.

**O8 Miscellaneous Operations Issues (92901, 90712)**

- O8.1 (Closed) Licensee Event Report (LER) 50-446/95004: ESF actuation initiated due to a failure of a main feedwater pump speed controller. The inspector verified that the licensee's corrective actions were reasonable and complete.
- O8.2 (Closed) LER 50-445/96003: ESF actuation caused by tripping of both the main feedwater pumps due to low suction pressure. The inspector verified that the licensee's corrective actions were reasonable and complete.
- O8.3 (Closed) LER 50-446/96003: manual reactor trip due to turbine load swings. This event was discussed in Inspection Report 50-445(446)/96-04. No new issues were revealed by the LER.
- O8.4 (Closed) Violation 50-445(446)/9608-01: failure to track a primary plant ventilation boundary penetration per Procedure ODA-308, "LCO Tracking Program." The inspector verified that the corrective actions described in the licensee's response letter, dated September 12, 1996, were reasonable and complete.

**II. Maintenance**

**M1 Conduct of Maintenance**

**M1.1 General Comments**

**a. Inspection Scope (62703)**

The inspectors observed all or portions of the following work activities:

- Transformer XST1/2 temporary modification installation
- DG Starting Air Modifications
- Rod drive motor generator 2-01
- DG 2-02 prelube pump repair
- Emergent maintenance on reactor coolant pump seal annunciator
- Unit 2 Pressurizer Spray leakage
- Service Water Pump 2-02 packing replacement
- Turbine-driven auxiliary feedwater pump steam admission valve

b. Observations and Findings

The inspectors found that the work performed under these activities was conducted professionally and in accordance with procedures. Maintenance workers were knowledgeable of the activities in progress and followed appropriate foreign material exclusion practices.

M1.2 Turbine-Driven Auxiliary Feedwater Pump Steam Admission Valve Diaphragm Failures

a. Inspection Scope (62707, 61726)

The inspectors observed portions of emergent maintenance activities performed on one of the two Unit 2 turbine-driven auxiliary feedwater (TDAFW) pump steam admission valves as a result of several valve actuator diaphragm failures. The inspectors attended planning meetings and discussed potential causes with engineering and maintenance personnel.

b. Observations and Findings

On April 11, the licensee identified an air leak on one of the diaphragm-operated steam admission valves to the TDAFW pump. The licensee entered the appropriate Technical Specification, replaced the diaphragm, and then tested the valve and pump successfully. The TDAFW pump was restored to service and declared operable. On April 15, the diaphragm again failed and caused the TDAFW pump to start and inject water to all four steam generators. Operators secured the pump prior to any negative impact on steam generator level or temperature. The diaphragm was again replaced and the pump tested and returned to service on April 17. On April 20, the diaphragm partially failed and the pump started but did not inject into the steam generators. The licensee replaced the diaphragm, and declared the pump operable on April 22. The licensee continued to monitor the valve at least twice per shift for the next several days.

The licensee began using a thicker diaphragm design during the previous refueling outage in Unit 1 which ended in November 1996. Shortly after those installations, one of the diaphragms failed. Troubleshooting by the vendor concluded that the diaphragm had been overtorqued. The licensee worked closely with the vendor to revise the procedure to ensure that the torque value and sequence were appropriate. A second diaphragm was then installed in the other Unit 1 valve without incident.

The original diaphragm was replaced on April 11 with a thicker, vendor-supplied diaphragm that was intended to be better suited for the higher pressures which occurred in the TDAFW application. The vendor had stopped producing the original thinner design diaphragm approximately 18 months earlier. The two subsequent



replacements were of the thicker diaphragm. The final diaphragm replaced on April 22, was a special order of the original thinner diaphragm.

Following the failure of the thicker diaphragm in Unit 2 on April 15, the licensee brought in a vendor representative who concluded that the diaphragm had been undertorqued. The diaphragm operator which the vendor had used to validate the process had been assembled without lubricant on the bolts whereas the licensee routinely used lubricant on all fasteners (lubricant significantly increases the closing force). Additionally, the vendor representative identified that the operator casing was slightly warped. Following casing repairs, the operator was reassembled using fasteners without lubricant. Following the next failure, the licensee replaced the diaphragm with a specially ordered, original (thin) diaphragm.

The inspectors observed portions of the installation of both the thick and thin diaphragms, the bench setting, the postmaintenance testing, and the operability testing. Overall, the maintenance was conducted well and in accordance with licensee procedures. The inspectors noted good management involvement. The maintenance and engineering organizations focused the appropriate amount of attention on this valve considering its safety significance. Technical Specifications were appropriately entered and exited. Communications with the vendor was a strength during the multiple diaphragm failures. Equipment was properly staged and the hoist for the actuator was appropriately controlled. The inspectors found that the immediate corrective actions taken to restore the valve and to initiate a task team to determine the root causes of the failures were appropriate. The licensee planned to issue an operating experience message on the nuclear network describing the failures and preliminary root cause. The inspectors will review the task team effort concerning the root cause of the diaphragm failures, the generic implications, the environmental qualification of the thicker diaphragm, and the preventive maintenance program for future diaphragm replacements. This will be an inspection followup item (IFI 50-445(446)/9708-02).

### M1.3 Station Service Water Pump Packing Replacement (62707)

#### a. Inspection Scope

The inspectors observed portions of the station service water pump packing replacement and questioned maintenance personnel regarding thread engagement.

#### b. Observations and Findings

The inspectors found that the gland packing nuts did not have full thread engagement and questioned the licensee as to whether this was acceptable. The licensee determined that the lack of full thread engagement was acceptable, but was not a "good mechanical practice." The licensee wrote an Operations Notification and Evaluation form to document the condition and then adjusted the stud and nut to ensure full engagement. The inspectors noted that the pump had

not been declared operable prior to reworking the fasteners and concluded that the licensee's actions were appropriate.

**M8 Miscellaneous Maintenance Issues (92902)**

- M8.1 (Closed) Followup Item 50-445/9613-01: review of Limitorque actuator approved design fastener configuration. The inspectors verified that the licensee's corrective actions were reasonable and complete and included providing instructions in the procedures on what processes to implement for obtaining acceptable replacement actuator limit switch compartment cover fasteners.
- M8.2 (Closed) Unresolved Item 50-445/9613-02: equipment/fastener configurations were not maintained. The inspectors concluded that the licensee's valve fastener reviews, analyses, plant walkdowns of a sample of valves, and the lack of identification of any additional plant equipment fastener problems were acceptable to resolve this item.

**III. Engineering**

**E1 Conduct of Engineering**

**E1.1 Refueling Water Storage Tank and Accumulator Level Annunciator Setpoints**

**a. Inspection Scope (37551, 71707)**

The inspectors reviewed the control room annunciator setpoints for the refueling water storage tank (RWST) low level and for the safety injection accumulator low and high level to determine whether they corresponded to Technical Specification limits and the Final Safety Analysis Report.

**b. Observations and Findings**

While touring the control room, the inspectors found that the annunciator setpoint for the RWST low level was set at 92.83 percent which was below the low limit of 95 percent indicated level, as specified in Technical Specification 3.5.4. The FSAR states that the RWST low level alarm is provided to assure that a sufficient volume of water is always available in the RWST in conformance with the Technical Specifications. The inspectors questioned the licensee regarding the differences between the setpoint and the Technical Specification. The licensee's initial review of the issue revealed that control board instrument uncertainty and precision were factored into the difference between the indicated levels and the annunciator setpoints. Additionally, the inspectors noted that the high level annunciator setpoint was higher and the low level annunciator setpoint was lower than the Technical Specification allowable values for the safety injection accumulators. The inspectors will review the calculations and instrument uncertainties, and required

water volume for the RWST and safety injection accumulators as an unresolved item (URI 50-445(446)/9708-03).

**E8 Miscellaneous Engineering Issues (90712)**

- E8.1 (Closed) LER 50-445/95005-00: power-operated relief valves potentially inoperable due to non-conservative alarm setpoints. The inspectors reviewed the licensee's corrective actions and found that they were appropriate. This LER was a minor issue, and was closed.
- E8.2 Criticality Monitoring: the inspections verified that an exemption to the requirements of 10 CFR 70.24, "Criticality Accident Requirements," was issued at the time of operating license issuance.

**IV. Plant Support**

**R1 Radiological Protection and Chemistry Controls (71707, 71750)**

During periodic plant tours, the inspectors noted that radiation workers complied with radiation work permit requirements and followed appropriate radiation work practices. Radiation workers were observed utilizing radiation protection staff expertise to determine the specific hazards that they could encounter during their assigned activities. The inspectors observed that radiological hazards were properly posted and controlled in a manner that kept dosage as low as reasonably achievable.

**P3 EP Procedures and Documentation**

**P.1 Minimum Shift Manning**

**a. Inspection Scope (71707)**

The inspectors compared the licensee's minimum shift manning as defined in: Procedure ODA-102, "Conduct of Operations"; in Technical Specification 6.2.2, "Unit Staff"; in FSAR Table 13.1-2, "Minimum Shift Crew Composition"; and in Emergency Plan Table 1.1, "Staffing Requirements for Emergencies." The inspectors reviewed Procedure ABN-905A, "Loss of Control Room Habitability," and Procedure ABN-803A, "Response to a Fire in the Control Room or Cable Spreading Room," to determine whether the minimum staffing was adequate to implement these procedures.

**b. Observations and Findings**

The inspectors noted that FSAR Table 13.1-2 restated the minimum manning requirements for licensed operators as defined in 10 CFR 50.54, "Conditions of

Licenses," and also defined minimum requirements for shift technical advisors, auxiliary operators, radiation protection technicians, and chemistry technicians. Operations Procedure ODA-102 implemented minimum manning requirements which met or exceeded the requirements of FSAR Table 13.1-2.

Procedures ABN-803A and ABN-905A required the support from instrumentation and controls (I&C) technicians or electricians, neither of which were included in minimum shift manning requirements as listed in ODA-102, FSAR Table 13.1-2, or Emergency Plan Table 1.1. The licensee did have a maintenance organization which was manned 24 hours per day and was staffed by both I&C technicians and electricians; however, the licensee did not have a procedure specifying minimum manning requirements or recall procedures for this organization. Based on the inspector's questions, the manager of this organization issued a memorandum to the supervisors specifying his expectations for minimum manning.

The inspectors noted that Emergency Plan Table 1.1 specified two control room communicators. The emergency planning manager stated that this function was fulfilled by the I&C technicians but that this duty was not specified by procedure. The emergency planning organization maintained a roster of individuals qualified to perform duties as control room communicator. The licensee informed the inspectors that they intended to review their procedures for personnel required to perform functions which were not included in their minimum shift manning procedures and then take appropriate measures. The inspectors will review the licensee's findings and any corrective actions in a future report as an inspection followup item (IFI 50-445(446)/9708-04).

#### **S1 Conduct of Security and Safeguards Activities (71750)**

During frequent plant tours, the inspectors observed security officers at permanent and compensatory posts. The inspectors noted that the officers were alert and aware of the assigned duties and that the compensatory measures were appropriate.

### **V. Management Meetings**

#### **X1 Exit Meeting Summary**

The inspectors presented the results of the inspection to members of licensee management at the conclusion of the inspection on April 29, 1997. The licensee acknowledged the findings presented. No proprietary information was identified.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. R. Blevins, Plant Manager  
D. L. Davis, Nuclear Overview Manager  
R. Flores, System Engineering Manager  
B. T. Lancaster, Plant Support Manager  
C. L. Terry, Group Vice President, Nuclear Production  
R. D. Walker, Regulatory Affairs Manager

INSPECTION PROCEDURES USED

37551	Onsite Engineering
61726	Surveillance Observations
62707	Maintenance Observations
71707	Plant Operations
71750	Plant Support Activities
90712	In-office Review of Written Reports of Nonroutine Events at Power Reactor Facilities
92700	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities
92901	Followup - Plant Operations

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-445(446)/9708-01	NCV	Improperly stowed nonplant equipment
50-445(446)/9708-02	IFI	Root cause followup on TDAFW steam admission valve diaphragm failures
50-445(446)/9708-03	URI	RWST/SI accumulator alarm setpoint basis review
50-445(446)/9708-04	IFI	Minimum shift manning procedure requirements

Closed

50-445(446)/9708-01	NCV	Improperly stowed nonplant equipment
50-446/95004	LER	ESF actuation due to a main feedwater pump speed controller failure
50-445/96003	LER	ESF actuation caused by tripping both main feedwater pumps on low suction pressure
50-446/96003	LER	manual reactor trip due to turbine load swings
50-445(446)/9608-01	VIO	failure to track a primary plant ventilation boundary penetration
50-445/9613-01	IFI	review of Limitorque actuator approved design fastener configuration
50-445/9613-02	URI	equipment/fastener configurations not maintained
50-445/95005	LER	power-operated relief valves potentially inoperable

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
FSAR	Final Safety Analysis Report
I&C	instrumentation and controls
IFI	inspection followup item
NCV	noncited violation
LER	licensee event report
RWST	refueling water storage tank
TDAFW	turbine-driven auxiliary feedwater
URI	unresolved item