



Log # TXX-96454
File # 10200
Ref. # 10CFR50.73(a)(2)(iv)

September 6, 1996

C. Lance Terry
Group Vice President

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555


SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NO. 50-445
ACTUATION OF REACTOR PROTECTION SYSTEM
LICENSEE EVENT REPORT 445/96-007-00

Gentlemen:

Enclosed is Licensee Event Report (LER) 96-007-00 for Comanche Peak Steam Electric Station Unit 1 "Automatic Reactor Trip Caused by Lightning Strike."

Sincerely,

C. L. Terry

By: 
James J. Kelley, Jr.
Vice President,
Engineering & Support

OB:ob
Enclosure

cc: Mr. L. J. Callan, Region IV
Mr. J. I. Tapia, Region IV
Resident Inspectors, CPSES

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NRC FORM 366
(4-95)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 4/30/98

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY
INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED
ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO
INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE
INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR
REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE
PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND
BUDGET, WASHINGTON, DC 20503.

Facility Name (1)

COMANCHE PEAK STEAM ELECTRIC STATION UNIT 1

Docket Number (2)

05000445

Page (3)

01 OF 06

Title (4)

AUTOMATIC REACTOR TRIP CAUSED BY LIGHTNING STRIKE

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------|-----|------|----------------|-------------------|-----------------|-----------------|-----|------|-------------------------------|----------------|---|---|---|---|---|---|---|---|---|---|--------------|---|---|---|---|---|---|---|---|
| Event Date ((5)) | | | LER Number (6) | | | Report Date (7) | | | Other Facilities Involved (8) | | | | | | | | | | | | | | | | | | | | |
| Month | Day | Year | Year | Sequential Number | Revision Number | Month | Day | Year | Facility Name | Docket Numbers | | | | | | | | | | | | | | | | | | | |
| 0 | 8 | 0 | 9 | 9 | 6 | 9 | 6 | - | 0 | 0 | 7 | - | 0 | 0 | 0 | 9 | 0 | 6 | 9 | 6 | CPSES UNIT 2 | 0 | 5 | 0 | 0 | 0 | 4 | 4 | 6 |
| | | | | | | | | | | N/A | 0 | 5 | 0 | 0 | 0 | | | | | | | | | | | | | | |

This report is submitted pursuant to the requirements of 10 CFR 5. (Check one or more) (11)

| | | | | | |
|--------------------|-----|-----------------------|----------------------|----------------------|---------------------------|
| Operating Mode (9) | 1 | 20.2201 (b) | 20.2203 (a) (2) (v) | 50.73 (a) (2) (i) | 50.73 (a) (2) (viii) |
| Power Level (10) | 100 | 20.2203 (a) (1) | 20.2203 (a) (3) (i) | 50.73 (a) (2) (ii) | 50.73 (a) (2) (x) |
| | | 20.2203 (a) (2) (i) | 20.2203 (a) (3) (ii) | 50.73 (a) (2) (iii) | 73.71 |
| | | 20.2203 (a) (2) (ii) | 20.2203 (a) (4) | X 50.73 (a) (2) (iv) | OTHER |
| | | 20.2203 (a) (2) (iii) | 50.36 (c) (1) | 50.73 (a) (2) (v) | Specify in Abstract below |
| | | 20.2203 (a) (2) (iv) | 50.36 (c) (2) | 50.73 (a) (2) (vii) | or in NRC Form 366A |

Licensee Contact For This LER (12)

Name

RAFAEL FLORES - SYSTEM ENGINEERING MANAGER

Telephone Number (Include Area Code)

(817)897-5590

Complete One Line For Each Component Failure Described in This Report (13)

| Cause | System | Component | Manufacturer | Reportable To NPRDS | Cause | System | Component | Manufacturer | Reportable To NPRDS |
|-------|--------|-----------|--------------|---------------------|-------|--------|-----------|--------------|---------------------|
| | | | | N | | | | | |
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Supplemental Report Expected (14)

| | | | | | | |
|---|---|----|-------------------------------|-------|-----|------|
| YES (If yes, completed EXPECTED SUBMISSION DATE) | X | NO | EXPECTED SUBMISSION DATE (15) | Month | Day | Year |
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On August 09, 1996, at approximately 12:03 p.m., TU Electric was performing a normal surveillance test procedure on Power Range Neutron Flux Channel N-43. This testing required that the Overtemperature (OT) N-16 trip function, which uses the N-43 as an input, to be placed in the TRIP condition. While the Power Range Channel N-43 was in test, a severe lightning storm was occurring outside. A lightning strike caused the Channel IV T_{cold} to spike high which resulted in OT N-16 setpoint reduction and a subsequent trip signal. This completed the two-out-of-four logic for a reactor trip on OT N-16. All rods fully inserted into the core. The plant equipment response to the reactor trip was consistent with that expected for the existing plant conditions.

The cause of the reactor trip was deemed to be lightning strike coupled with the Power Range Channel N-43 being in the trip position. Management's expectations will be issued to plant personnel with respect to scheduling and/or suspension of tests/surveillances, which could impact plant operations, during severe weather.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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| COMANCHE PEAK STEAM ELECTRIC STATION UNIT 1 | 05000445 | Year | | Sequential Number | | Revision Number | | | | |
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Text (if more space is required, use additional copies of NRC Form 366A) (17)

1. DESCRIPTION OF THE REPORTABLE EVENT

A. REPORTABLE EVENT CLASSIFICATION

An event or condition that resulted in a manual or automatic actuation of any Engineered Safety Feature (ESF) including the Reactor Protection System (RPS).

B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

On August 9, 1996, Comanche Peak Steam Electric Station (CPSES) Unit 1 was in Mode 1, Power Operation, and operating at 100 percent power.

C. STATUS OF STRUCTURES, SYSTEMS, OR COMPONENTS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT

Power Range Channel N-43 was in 'TEST' for channel calibration. This condition requires that the power range high neutron flux and overtemperature N-16 reactor trip functions be placed in the TRIP condition. There were no other inoperable structures, systems or components that contributed to the event.

D. NARRATIVE SUMMARY OF THE EVENT, INCLUDING DATES AND APPROXIMATE TIMES

On August 9, 1996, at approximately 12:03 p.m., Instrument and Control Technicians (Utility, Non-Licensed) were performing a normal surveillance test procedure on power range channel N-43 (EIIS:(CHA)(JC)). This testing required that (Channel III) the Overtemperature (OT) N-16 trip function, which uses the N-43 as an input, to be placed in the TRIP condition. While power range channel N-43 was in test, unknown to the Operations Staff (due to locality of the control room), a severe lightning storm was occurring outside. A lightning strike caused the Channel IV T_{cold} to spike high which resulted in OT N-16 setpoint reduction and Channel IV to trip. This completed the two-out-of-four logic for a reactor trip on OT N-16. All rods fully inserted into the core. The steam dump bypass control system operated properly, and the reactor coolant system (EIIS:(AB)) was at a T_{ave} no load condition of 557 °F. Plant Operators (Utility, Licenced) manually started both motor-driven auxiliary feedwater pumps

LICENSEE EVENT REPORT (LER)
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(EIIS:(P)(BA)) when steam generator (EIIS:(SG)(SB)) water level decreased to 30 percent narrow range in anticipation of the auto start signal at a steam generator water level of 25 percent narrow range. This Steam Generator water level decrease was expected. All other emergency core cooling systems and the emergency diesel generators were fully operable if needed.

An event or condition that results in an automatic or manual actuation of any ESF, including the RPS, is reportable within 4 hours under 10CFR50.72(b)(2)(ii). At approximately 1:20 p.m. on August 9, 1996, the Nuclear Regulatory Commission Operations Center was notified of the event via the Emergency Notification System.

E. THE METHOD OF DISCOVERY OF EACH COMPONENT OR SYSTEM FAILURE, OR PROCEDURAL OR PERSONNEL ERROR

The Control Room Staff received an Overtemperature N-16 alarm.

II. COMPONENT OR SYSTEM FAILURES

A. FAILED COMPONENT INFORMATION

Not applicable - there were no component failures associated with this event.

B. FAILURE MODE, MECHANISM, AND EFFECT OF EACH FAILED COMPONENT

Not applicable - there were no component failures associated with this event.

C. CAUSE OF EACH COMPONENT OR SYSTEM FAILURE

Not applicable - there were no component failures associated with this event.

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D. SYSTEMS OR SECONDARY FUNCTIONS THAT WERE AFFECTED BY FAILURES OF COMPONENTS WITH MULTIPLE FUNCTIONS

Not applicable - there were no component failures associated with this event.

III. ANALYSIS OF THE EVENT

A. SAFETY SYSTEM RESPONSES THAT OCCURRED

The lightning strike caused the Channel IV T_{cold} to spike high which resulted in OT N-16 setpoint reduction and Channel to trip. This completed the two-out-of-four logic for a reactor trip on OT N-16. All rods fully inserted into the core. The steam dump bypass control system operated properly, and the reactor coolant system was at a T_{ave} no load condition of 557° F. The plant tripped on OT N-16. Plant Operators (Utility, Licenced) manually started both motor-driven auxiliary feedwater pumps when steam generator water level decreased to 30 percent narrow range in anticipation of the auto start signal.

B. DURATION OF SAFETY SYSTEM TRAIN INOPERABILITY

Not applicable - there was no safety system train inoperability that resulted from this event.

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

The subject reactor trip was caused due to a lightning strike, which spiked Unit 1 Channel IV T_{cold} high (approximately 568° F). This condition resulted in the automatic reduction of the overtemperature reactor trip setpoint to approximately 64 percent Rated Thermal Power (RTP). The Overtemperature N-16 setpoint for Channel III was in trip position as a consequence of the surveillance testing being performed on N-43. Because the plant was being operated at 100 percent RTP, the two out of four logic for the overtemperature N-16 trip function was met, resulting in the trip of Unit 1.

This event is bounded by the analysis of the turbine trip presented in

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Section 15.2.3 of the CPSES Final Safety Analysis Report (FSAR). The analysis uses conservative assumptions to demonstrate the capability of pressure relieving devices and to demonstrate core protection margins. The event of August 9, 1996, occurred at 100 percent reactor power, and all systems and components functioned as designed. The event is bounded by the FSAR accident analysis which assumes an initial power level of 102 percent and conservative assumptions which reduce the capability of safety systems to mitigate the consequences of the transient. It is concluded that the event of August 9, 1996, did not adversely affect the safe operation of CPSES Unit 1 or the health and safety of the public.

IV. CAUSE OF THE EVENT

The reactor trip was automatically generated due to an electrical spike on Reactor Coolant System loop 4 cold leg temperature (Channel IV) reading high, which was caused by a severe weather lightning strike. With Power Range Channel N-43 (Channel III) in test, the spike completed the two out of four logic for an automatic reactor trip on Overtemperature N-16.

TU Electric believes that a contributing factor which may have caused this event was that, the control room staff was not aware of the rapid change in the weather. Moreover, the suspension of the Power Range Channel N-43 could have been delayed until the severe weather had subsided.

V. CORRECTIVE ACTIONS

A bypass modification to allow Reactor Protection System (EIIS:(JE))/Engineered Safety Features Channel testing in 'bypass', as opposed to 'trip' has been scheduled. This modification has already been implemented at CPSES Unit 2. The bypass feature may have prevented this reactor trip while one channel was under test condition.

Managements expectations will be issued to plant personnel with respect to scheduling of tests/surveillances, which could impact plant operations during severe weather.

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Moreover, TU Electric is evaluating various methods to enhance the control room weather monitoring systems (e.g., dedicated radar channel, other electronic weather monitoring system to supplement existing system, etc., etc..)

VI. PREVIOUS SIMILAR EVENTS

There have been previous events that resulted in RPS actuation due to lightning strikes (refer to LER 445/90-028-00; LER 445/91-019-00, LER 445/91-021-00 and LER 445/95-002-00). However, the details of previously reported events are sufficiently different from the events described in the subject LER, such that previous corrective actions could not have prevented this event.