



Log # TXX-95150
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Ref. # 10CFR50.73(A)(2)(iv)

June 2, 1995

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 NOS. 50-445 AND 50-446
ACTUATION OF REACTOR PROTECTION SYSTEM
LICENSEE EVENT REPORT 445/95-002-00

Gentlemen:

Enclosed is Licensee Event Report (LER) 95-002-00 for Comanche Peak Steam Electric Station Unit 1 and Unit 2. "Automatic Reactor Trip Caused by Lightning Strike."

Sincerely,

A handwritten signature in cursive script, appearing to read "C. L. Terry".

C. L. Terry

OB:tg
Enclosure

cc: Mr. L. J. Callan, Region IV
Mr. D. F. Kirsch, Region IV
Resident Inspectors, CPSES

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S PDR

Handwritten initials, possibly "Terry", with a checkmark-like flourish below them.

NRC FORM 366

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 4/30/92

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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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 Names					Docket Numbers																			
0	5	0	5	9	5	9	5	-	0	0	2	-	0	0	0	6	0	2	9	5	COMANCHE PEAK-UNIT 2					0	5	0	0	0	4	4	6
N/A																																	

Operating Mode (9) 1

Power Level (10) 100

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

20.402 (b)	20.405 (c)	50.73 (a) (2) (iv)	73.71 (b)
20.405 (a) (1) (i)	50.36 (c) (1)	50.73 (a) (2) (v)	73.71 (c)
20.405 (a) (1) (ii)	50.36 (c) (2)	50.73 (a) (2) (vii)	Other (Specify in Abstract below and in Text, NRC Form 366A)
20.405 (a) (1) (iii)	50.73 (a) (2) (i)	50.73 (a) (2) (viii) (A)	
20.405 (a) (1) (iv)	50.73 (a) (2) (ii)	50.73 (a) (2) (viii) (B)	
20.405 (a) (1) (v)	50.73 (a) (2) (iii)	50.73 (a) (2) (ix)	

Licensee Contact For This LER (12)

Name

R. FLORES

SYSTEM ENGINEERING MANAGER

Area Code Telephone Number

(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					

Supplemental Report Expected (14)



Yes (if yes, complete Expected Submission Date)



No

Expected Submission Date (15)

Month	Day	Year

Abstract (Limit to 1400 space, i.e., approximately fifteen single-space typewritten lines) (16)

On May 5, 1995, at approximately 8:06 p.m., a reactor trip of both CPSES Units 1 and 2 occurred from a lightning strike to the plant. The lightning strike created a voltage surge on the Rod Control System Neutral bus in both units causing a partial rod drop. The reactor trips actuated on the resulting Power Range Negative Rate Reactor Trip. The plant equipment response to the reactor trips was consistent with that expected for the existing plant conditions.

The cause of this event was determined to be; the failure of the lightning protection system to provide effective protection against lightning induced perturbations on sensitive plant electrical equipment.

Corrective actions were to form a Task Team. The Task Teams charter was to evaluate/investigate methods of minimizing the effects of a lightning strike, including any potential design modifications, needed to modify the existing lightning protection system to minimize the effects of a lightning strike, and prevent similar reactor trips.

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1. DESCRIPTION OF THE REPORTABLE EVENT

A. REPORTABLE EVENT CLASSIFICATION

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

B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

On May 5, 1995, Comanche Peak Steam Electric Station (CPSES) Unit 1 and Unit 2 were 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

Not applicable - no structures, systems or components were inoperable at the start of the event that contributed to the event.

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

On May 5, 1995, at approximately 8:06 p.m., a lightning strike created an electrical surge in the rod control power cabinets causing some of the +24 VDC power supplies (PS) to trip on over voltage protection. The loss of both the main and backup power supplies (PS1 and PS2) in some of the power cabinets for both CPSES Unit 1 and Unit 2 removed power to the control circuits. The loss of control power secured Control Rod Drive Mechanism (CRDM) current consequently dropping the associated rods for the affected power cabinets. The dropped rods caused a sufficient negative reactivity insertion to actuate the Power Range Negative Rate trip for both units. Additionally, the Auxiliary Feedwater System (EIIS:(BA))actuated due to a LO-LO steam generator signal.

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The Reactor Protection System (EIIS(JC)) for Units 1 and 2 responded correctly to the negative rate condition. The reactor trip breakers opened and the remaining rods fully inserted into the core and both plants were safely placed in Mode 3 Hot Standby.

Operations Shift personnel responded appropriately to the event. The reactor trips were immediately acknowledged by the operating staff and the correct actions performed.

An event or condition that results in an automatic actuation of any ESF, including the RPS, is reportable within 4 hours under 10CFR50.72(b)(2)(ii). At 9:33 p.m., on May 5, 1995, 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 ERROR

The overvoltage protection (OVP) for the +24 VDC rod drive power supplies was found tripped upon investigation of a non-urgent alarm on rod drive control cabinets received at the time of the trip.

II. COMPONENT OR SYSTEM FAILURES

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

Not applicable - no failed components have been identified.

B. CAUSE OF EACH COMPONENT OR SYSTEM FAILURE

Not applicable - no component or system failures have been identified.

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C. SYSTEMS OR SECONDARY FUNCTIONS THAT WERE AFFECTED BY FAILURE OF COMPONENTS WITH MULTIPLE FUNCTIONS

Not applicable - there were no failed components with multiple functions that affected this event.

D. FAILED COMPONENT INFORMATION

Not applicable - no failed components have been identified.

III. ANALYSIS OF THE EVENT

A. SAFETY SYSTEM RESPONSES THAT OCCURRED

The Reactor Protection System (EIIIS:(JC)) and Auxiliary Feedwater System (EIIIS:(BA)) actuated during the event.

B. DURATION OF SAFETY SYSTEM TRAIN INOPERABILITY

Not applicable - there were no safety systems which were rendered inoperable due to a failure.

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

The May 5, 1995, event consisted of a multiple control rod drop resulting in a reactor trip. The actuation signal was appropriate for the transient. The dropping of control rods is considered a misalignment of the rod cluster control assembly. The actual event is bounded in severity by the analysis presented in FSAR Section 15.4.3. In that analysis, the drop rod(s) result in a much more asymmetric core response than in the actual event where several control rod groups fell into the core. The analysis in FSAR Section 15.4.3 demonstrated that the successful automatic actuation of the reactor trip will ensure that the DNB design basis is met.

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Based on the above factors, this event did not adversely affect the safe operation of CPSES Unit 1 and Unit 2 or the health and safety of the public.

IV. CAUSE OF THE EVENT

TU Electric CPSES Licensee Event Report (LER) 445/90-028-00 previously identified the cause of a reactor trip from a lightning strike as a failure of the plant ground system to dissipate the current transient from the lightning strike and creating a surge on the 120 VAC supplies to the rod control power supplies. The corrective actions installed surge suppression on the 120 VAC lines.

Power supplies PS1 and PS2 provide +24 VDC are referenced to the system neutral bus. The neutral bus is connected to the CRDM cables, circuit cards and plant ground. The overvoltage protection system (OVP) measures the voltage across the +24 VDC and neutral bus. The OVP trips at approximately +28 VDC to prevent circuit card damage. A lightning strike not fully dissipated may create a surge over the ground grid to the rod control neutral bus and cause the power supply OVP to trip.

Along with the feedback through the ground, Westinghouse (the rod drive equipment vendor) and other utilities have postulated that the CRDM cables provide a path for a lightning induced spike on the rod control system. The CRDM cables are routed through containment penetrations and cable trays to the cabinets. The lightning discharge may cause a potential voltage on the containment liner either through common ground connections or capacitance. The liner potential induces a voltage surge on the CRDM neutral field conductors that pass through the penetration. This induced voltage spikes on the rod control system neutral and trips the OVP.

The root cause of the event was a failure of the lightning protection system designed to provide effective protection against lightning induced perturbations on sensitive plant electrical equipment.

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V. CORRECTIVE ACTIONS

A. IMMEDIATE

The Operators responded appropriately to the RPS actuation. Plant Emergency Operating Procedures were implemented and the plant was stabilized in Mode 3.

B. CORRECTIVE ACTIONS TO PREVENT RECURRENCE

TU Electric Task Team is evaluating the need to enhance/modify the existing lightning protection system.

VI. PREVIOUS SIMILAR EVENTS

Although 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 and LER 445/91-021-00), the evaluation performed during the aforementioned LERs, did not consider the impact on the rod control neutral bus. Therefore, corrective actions taken to resolve the root causes of the previous events would not have prevented this event.

VII. ADDITIONAL INFORMATION

The times listed in the report are approximate and Central daylight-saving time (CDT).