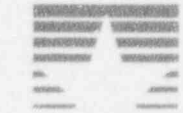

Log # TXX-94248
File # 10200
Ref. # 50.73(a)(2)(i)

September 22, 1994

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) - UNIT 1
DOCKET NO. 50-445
OPERATION PROHIBITED BY TECHNICAL SPECIFICATIONS
LICENSEE EVENT REPORT 445/94-004-00

Gentlemen:

Enclosed is Licensee Event Report 94-004-00 for Comanche Peak Steam Electric Station Unit 1, "Failure of Annunciator - Required Technical Specification Actions for Quadrant Power Tilt Ratio were not performed."

Sincerely,

C. Lance Terry

OB:clc

Enclosure

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

IE22
1

Enclosure to TXX-94248

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION

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

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.

LICENSEE EVENT REPORT (LER)

Facility Name (1)	Docket Number (2)	Page (3)
COMANCHE PEAK-UNIT 1	0 5 0 0 0 4 4 5	1 OF 6

Title (4)

FAILURE OF ANNUNCIATOR - REQUIRED TECHNICAL SPECIFICATION ACTIONS FOR QUADRANT POWER TILT RATIO WERE NOT PERFORMED

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 8	2 2	9 4	9 4	- 0 0 4	- 0 0	0 9	2 2	9 4	COMANCHE PEAK-UNIT 2	0 5 0 0 0 4 4 6
									N/A	0 5 0 0 0

Operating Mode (9): 1

Power Level (10): 0 5 0

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

20.402(b)	20.406(c)	50.73(a)(2)(iv)	73.71(b)
20.406(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
20.406(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	Other (Specify in Abstract below and in Text, NRC Form 366A)
20.406(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
20.406(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
20.406(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

Licensee Contact For This LER (12)

Name	Area Code	Telephone Number
D.L. WALLING, ELECTRICAL ENGINEERING MANAGER	8 1 7	- 8 9 7 - 5 7 6 7

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 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On August 22, 1994, following a Unit 1 load reduction at approximately 11:00 a.m., the Quadrant Power Tilt Ratio (QPTR) exceeded the Technical Specification (TS) 3/4.2.4. limits of 1.02. However, the QPTR annunciator did not annunciate and the Plant Computer calculated points did not appear on the Dynamic Alarm Display (DAD) screen or on the Control Room Plant Computer Alarm Printer. The Control Room Operators (utility, licensed) identified the problem at 3:15 p.m. the same day. At the time of discovery, Unit 1 was at approximately 50 percent power.

The reason the QPTR alarm did not annunciate as required was the Plant Computer alarm was set at 1.05 in lieu of 1.02.

The immediate action was to modify the Plant Computer database constant point to establish the QPTR alarm at 1.02; and compliance with the TS Action Statement was then reestablished for both units.

I. DESCRIPTION OF THE REPORTABLE EVENT

A. REPORTABLE EVENT CLASSIFICATION

Since the plant computer alarm was set at 1.05 and not the Technical Specification 1.02 limit, it did not annunciate as required to the Control Room operators because the plant computer drives the QTR alarms on the main control board and the required actions (i.e., restricting reactor power to less than or equal to 50 percent Rated Thermal Power (RTP) and increasing the frequency of the QTPR surveillance) were not performed. The event was deemed reportable pursuant to the requirements of 10CFR50.73(a)(2)(i).

B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

On August 22, 1994, Comanche Peak Steam Electric Station (CPSES) Unit 1 was in MODE 1, Power Operation, with reactor power at approximately 50 percent. CPSES Unit 2 was in Mode 1, Power Operation with reactor power at 100 percent.

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

Quadrant Power Tilt Ratio alarm was deemed to be inoperable for CPSES Unit 1 and Unit 2.

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

On August 22, 1994, CPSES Unit 1 was in MODE 1, 100 percent power. During maintenance on the Main Feedwater Pump (MFP) lube oil sensing line, a fitting broke; this resulted in a low lube oil alarm and subsequent MFP trip. At approximately 11:00 a.m., Unit 1 experienced a Turbine runback to 700 MWE due to the MFP trip, and the reactor power was reduced to approximately 48 percent.

At approximately 11:00 a.m., the Unit 1 Quadrant Power Tilt Ratio (QPTR) exceeded 1.02 as a result of the turbine runback; however, the computer failed to provide an alarm of this condition. As the reactor power was increased greater than 50 percent, Control Room operators determined that QPTR had exceeded its Technical Specification (TS) limit. When they ran the required QPTR surveillance subsequent to the power reduction, the operators noted that the 1.02 limit had been exceeded and questioned why no control board alarm had occurred.

On August 22, 1994, at approximately 3:15 p.m., CPSES Unit 1 entered TS Action Statement 3.2.4 for QPTR greater than 1.02, and as a conservative measure the Unit 2 surveillance frequency for QPTR was increased while evaluation of the reasons why the QPTR alarm had not annunciated were investigated.

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

The problem with the QPTR failed computer alarm function was discovered by Control Room personnel (utility, licensed) while performing QPTR measurements during the power increase following the runback.

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.

D. SYSTEMS OR SECONDARY FUNCTIONS THAT WERE AFFECTED BY FAILURE 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

Not applicable - There were no safety system responses associated with this event.

B. DURATION OF SAFETY SYSTEM TRAIN INOPERABILITY

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

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

The Quadrant Power Tilt Ratio (QPTR) limit ensures that the gross radial power distribution remains consistent with the design values used in the safety analyses. Precise radial power distribution measurements, using incore flux maps, are made during startup testing, after refueling, and periodically during power operation in accordance with TS 3.2.2, "Heat Flux Hot Channel Factor - $F_Q(Z)$," and TS 3.2.3, "Nuclear Enthalpy Rise Hot Channel Factor - $F^N_{delta\ H}$."

The process variables of QPTR, Axial Flux Difference, and Control Rod Insertion Limits, which are more easily monitored during normal operation, are used to detect any relatively slow, gross changes in the power distribution which may occur between the periodic measurements of the $F_Q(Z)$ and $F^N_{delta\ H}$. The power density at any point in the core must be limited so that the fuel design criteria are maintained. Together with TS 3.2.1, "Axial Flux Difference," and TS 3.1.3.6, "Control Rod Insertion Limits," the QPTR LCO provide limits on process variables that characterize and control the three dimensional power distribution of the reactor core. Control of these variables ensures that the core operates within the fuel design criteria and that the power distribution remains within the bounds used in the safety analyses.

The QPTR limit is not applicable at power levels of less than 50 percent RTP because there is either insufficient stored energy in the fuel or insufficient energy being transferred to the reactor coolant to require the implementation of a QPTR limit on the core power distribution. However, above 50 percent RTP, if the QPTR limit is exceeded, the Action Statements limit the power to less than 100 percent RTP in order to ensure that the margins of the accident analyses are preserved.

Based on the incore flux maps and the weekly required calculations for the QPTRs recorded for the Unit 1 Cycle 4 and Unit 2 cycle 1 operations, no significant quadrant power tilts were observed while at elevated power levels (greater than 50 percent) during this cycle. Because the QPTR is used to detect gross changes in the power distribution during the period between flux maps, and the flux maps indicated no significant quadrant power tilt, it has been concluded that no significant quadrant power tilt existed at elevated power levels during Unit 1 Cycle 4 operation and Unit 2 Cycle 1. The conclusion is being verified by a detailed search of plant computer archives to determine if the QPTR setpoints were exceeded. Based on the above, the event of August 22, 1994, did not adversely impact the safe operation of Unit 1 and Unit 2 or the health and safety of the public.

IV. CAUSE OF THE EVENT

TU Electric's review of the historical document indicate that the Westinghouse P2500 computer original design included radial flux tilts high incremental alarm limits to have a value of 1.05. On March 29, 1990 a design change notice was issued to modify the high incremental alarm of the radial flux tilt from 1.05 to 1.02 to match with the CPSES TS. During the time frame of December 1990, a decision was made to replace the Westinghouse P2500 plant process computer with a digital Vax computer based system. A contract was awarded to the vendor to supply computer hardware and software development for the new plant computer. The vendor adjusted the alarm limits for the radial flux tilt calculated points to 1.02; however the constant was set to the original tilt value of 1.05.

Based on the aforementioned review, it was determined that the Plant Computer did not provide indication to the operators for the following reason; the annunciator did not annunciate at the TS limit of 1.02 because the Plant Computer limit was improperly set at 1.05. The design documents were not adequately reviewed by engineering and the setpoint of 1.05 was not revised to 1.02 during the implementation of the 1990 design modifications to upgrade the computer system. The testing which was performed subsequent to the design modification was performed to the original design documents which reflected QPTR setpoint as 1.05, and therefore this error was not detected via the test program.

V. CORRECTIVE ACTIONS

The Plant Computer database was corrected to resolve the QPTR annunciator problem, and the required TS actions were performed for both Units. TU Electric engineering is revalidating all of the database constants. With respect to less than adequate review of the documents, management's expectations regarding attention to detail has been reemphasized to cognizant personnel.

Based on the past incore flux maps and the weekly required calculation for the power tilt ratios recorded for the Unit 1 Cycle 4 and Unit 2 Cycle 1 operations, no significant quadrant power tilts were observed while at elevated power levels during this cycle. Because the QPTR is used to detect gross changes in the power distribution during the period between flux maps, and the flux maps indicated no significant quadrant power tilt, it is concluded that no significant quadrant power tilt existed at elevated power levels during Unit 1 Cycle 4 and Unit 2 Cycle 1 operations. The conclusion is being verified by a detailed search of plant computer archives to determine if the QPTR setpoints have been exceeded in the past.

VI. PREVIOUS SIMILAR EVENTS

There have been no previous similar events attributable to improper plant computer setpoints reported pursuant to 10CFR50.73.

VII. ADDITIONAL INFORMATION

It should be noted that on August 24, 1994 CPSES Unit 2 power was rapidly reduced to 50 percent in order to remove the Main Feedwater Pump B from service to prevent potential feedwater pump turbine damage due to increasing auxiliary condenser water level and to prevent secondary chemistry problems from which appeared to be a consequence of an Auxiliary Condenser tube rupture.

The Xenon transient associated with the August 24, 1994 event was caused by a flux redistribution following the large power reduction and is not related to the QPTR setpoint issue of August 22, 1994 described in this LER.