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Ref: 10CFR50.73(a)(2)(iv)(A)

CPSES-200301393
Log # TXX-03115
File # 10010

July 14, 2003

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
REACTOR TRIP ON UNITS 1 AND 2 DUE TO GRID DISTURBANCE
LICENSEE EVENT REPORT 445/03-003-00

Gentlemen:

Enclosed is Licensee Event Report (LER) 03-003-00 for Comanche Peak Steam Electric Station Units 1 and 2, "Reactor Trip on Units 1 and 2 due to Grid Disturbance."

This communication contains no new commitments regarding CPSES Units 1 and 2.

IE22

Sincerely,

TXU Generation Company LP
By: TXU Generation Management Company LLC,
Its General Partner

C. L. Terry
Senior Vice President and Principal Nuclear Officer

By: Roger D. Walker
Roger D. Walker
Regulatory Affairs Manager

JDS/js

Enclosure

c - T. P. Gwynn, Region IV
W. D. Johnson, Region IV
D. H. Jaffe, NRR
Resident Inspectors, CPSES

Enclosure to TXX-03115

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 07/31/2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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REACTOR TRIP ON UNITS 1 AND 2 DUE TO GRID DISTURBANCE

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
									CPSES UNIT 2	05000446
05	15	03	03	003	00	07	14	03		05000

Operating Mode (9)	1	This report is submitted pursuant to the requirements of 10 CFR : (Check all that apply) (11)			
Power Level (10)	100	20.2201(b)	20.2203(a)(3)(i)	50.73(a)(2)(i)(C)	50.73(a)(2)(vii)
		20.2201(d)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(A)
		20.2203(a)(1)	20.2203(a)(4)	50.73(a)(2)(ii)(B)	50.73(a)(2)(viii)(B)
		20.2203(a)(2)(i)	50.36(c)(2)(i)(A)	50.73(a)(2)(iii)	50.73(a)(2)(ix)(A)
		20.2203(a)(2)(ii)	50.36(c)(1)(ii)(A)	X 50.73(a)(2)(iv)(A)	50.72(a)(2)(x)
		20.2203(a)(2)(iii)	50.36(c)(2)	50.73(a)(2)(v)(A)	73.71(a)(4)
		20.2203(a)(2)(iv)	50.46(a)(3)(ii)	50.73(a)(2)(v)(B)	73.71(a)(5)
		20.2203(a)(2)(v)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(C)	OTHER
		20.2203(a)(2)(vi)	50.73(a)(2)(i)(B)	50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

Licensee Contact For This LER (12)

Name	Telephone Number (Include Area Code)
STEVE SMITH - MTC SMART TEAM MANAGER	(254)897-6070

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

Cause	System	Component	Manufacturer	Reportable To EPIX	Cause	System	Component	Manufacturer	Reportable To EPIX
				N					

Supplemental Report Expected (14)			EXPECTED SUBMISSION DATE (15)	Month	Day	Year
YES (If YES, complete EXPECTED SUBMISSION DATE)	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On May 15, 2003 at 0252 with Units 1 and 2 in Mode 1 (Power Operation) with Unit 1 at 100 percent power and Unit 2 at 99.8 percent power, a disturbance on the Comanche Peak-Parker 345kV transmission line approximately four miles from the CPSES switchyard resulted in a loss of the 345kV switchyard and subsequent reactor trips on both units. Both units were stabilized in Mode 3 (Hot Standby) on natural circulation in accordance with plant emergency procedures as a result of the loss of non-safety related ac power.

The protective relaying system associated with the CPSES Parker Line breaker failed to trip the breaker to isolate the switchyard from the fault and to initiate local breaker failure backup relaying. Because the switchyard breaker failed to isolate the faulted 345kV transmission line, the 345kV switchyard was deenergized and the Reactor Coolant Pumps in both units (4 per unit) tripped due to the loss of non-safety related ac power. CPSES Units 1 and 2 experienced turbine trips and subsequent reactor trips. Both units at CPSES experienced an automatic start of the Auxiliary Feedwater System. Unit 1 Class 1E electrical buses experienced a slow transfer to their alternate source that was fed from the 138kV switchyard. The emergency diesel generators remained available but did not start or load because offsite power was provided to the 1E electrical buses as designed. Systems functioned as designed and the units were stabilized and maintained in MODE 3 on natural circulation.

All times in this report are approximate and Central Daylight Time unless noted otherwise.

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NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

I. DESCRIPTION OF REPORTABLE EVENT

A. REPORTABLE EVENT CLASSIFICATION

The subject event is reportable pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A), "...any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)." Specifically, 10CFR50.73(a)(2)(iv)(B)(1), reactor protection system (RPS) including: reactor scram or reactor trip and 10CFR50.73(a)(2)(iv)(B)(6), PWR auxiliary or emergency feedwater system.

B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

On May 15, 2003, Comanche Peak Steam Electric Station (CPSES) Unit 1 and Unit 2 were in Mode 1, with Unit 1 at 100 percent power and Unit 2 at 99.8 percent power.

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

There were no Technical Specification inoperable structures, systems, or components that contributed to the event.

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

On May 15, 2003 at 0252 a B–phase to ground fault occurred on the Parker line approximately four miles from the CPSES 345kV switchyard. The failure of the switchyard breaker protection to adequately recognize and clear the fault resulted in a total loss of the 345kV switchyard. The fault detector relays (EIIS: (FK)(51)) in both the primary and backup protection schemes of the CPSES Parker line circuit breaker did not function properly. Due to the failure of the primary and backup protection schemes for the CPSES to Parker transmission line breaker, the fault resulted in a total loss of the CPSES 345kV switchyard approximately 20 seconds after the fault began.

The Reactor Coolant Pumps (EIIS:(AB)(P)) sensed low voltage due to the loss of non-safety related ac power and Units 1 and 2 reactors tripped at approximately 1.5 seconds after failure of the switchyard breaker protection. Both unit generator breakers (EIIS:(TB)(BKR)) tripped due to generator distance relaying actuating generator lockout relays (EIIS:(TB)(86)) and subsequent load rejection protection circuits tripped both turbines.

All plant actuations occurred as designed. The Reactor Coolant Pumps tripped as expected due to the loss of non-safety bus voltage and the Reactor Coolant Pumps coasted down. The Auxiliary Feedwater Pumps actuated and provided auxiliary feedwater to the steam generators (SG) as designed. The Reactor Operators controlled AFW (Auxiliary Feedwater) flow and maintained the SG water levels. Main Feedwater isolation occurred immediately following the reactor trip as expected.

Natural circulation flows were established within one minute and adequate subcooling maintained. The reactors were maintained in Mode 3 under natural circulation until the Reactor Coolant Pumps were started at 0533 for Unit 1 and 0625 for Unit 2.

The system response of the Unit 1 and Unit 2 trips and the operator actions were consistent with the plant design and the supporting analyses presented in CPSES Final Safety Analysis Report (FSAR).

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

Control board indicators and alarms alerted the reactor operator (utility, licensed) in each unit that the generator breakers were open, the reactor trip breakers were open, and the Reactor Coolant Pumps were tripped.

II. COMPONENT OR SYSTEM FAILURES

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

The trip of Units 1 and 2 as a result of a disturbance on one of the 345kV transmission lines was not expected. TXU Energy believes that the primary and backup fault detection circuit relays did not function as designed.

B. CAUSE OF EACH COMPONENT OR SYSTEM FAILURE

Management oversight of switchyard activities, maintenance practices, and protective circuit design contributed to a high resistance build-up on the contacts of the fault detection circuit relays which prevented successful isolation of the grid disturbance.

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

Not applicable -- no failure of components with multiple functions have been identified.

D. FAILED COMPONENT INFORMATION

Manufacturer: General Electric
NSS/A-Model Number: Model 12CHC21A2A
Fault detector relays

III. ANALYSIS OF THE EVENT

A. SAFETY SYSTEM RESPONSES THAT OCCURRED

1. The reactor trip breakers opened.

2. The main turbine tripped (turbine stop valves closed).

3. The control rod drive mechanism allowed all the control rods to fully drop into the core.

4. All auxiliary feedwater (AFW) pumps started automatically and delivered water to all steam generators as required.

5. The Atmospheric Relief Valves (ARVs) actuated to control steam line pressure, and thus RCS temperature as designed.

6. The Unit 1 Safety Related 6.9kV busses preferred power supply was slow transferred to its alternate power supply as designed.

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B. DURATION OF SAFETY SYSTEM TRAIN INOPERABILITY

Not applicable -- No safety system was rendered inoperable.

C. SAFETY CONSEQUENCES AND IMPLICATIONS

The event is bounded by the analysis of the loss of non-emergency AC power to the station auxiliary transient as described in section 15.2.6 of the FSAR. The analysis uses conservative assumptions to demonstrate the capability of pressure relieving devices and the adequacy of the secondary heat removal systems.

A loss of non-emergency AC power to the station auxiliaries is classified as an ANS Condition II transient - a fault of moderate frequency. The loss of non-emergency AC power to the station auxiliaries would also result in a loss of normal feedwater, as the condensate pumps would lose power to operate; loss of the main condenser as a heat sink due to loss of Circulating Water; and loss of forced cooling due to loss of Reactor Coolant Pumps. Following the Reactor Coolant Pump coastdown, the natural circulation capability of the RCS provides an alternate means to remove residual and decay heat from the core. The residual and decay heat is removed by the secondary system by steaming through either the main steam safety valves or the atmospheric relief valves. (For this event, only the atmospheric relief valves were required for decay heat removal and the main steam safety valves were not challenged.) The steam generator liquid inventory is replenished by the Auxiliary Feedwater System. The analysis presented in section 15.2.6 of the FSAR demonstrates that the natural circulation flow in the RCS following a loss of AC power event is sufficient to remove residual heat from the core without violating any event acceptance criteria.

During the event, the Auxiliary Feedwater System of each unit responded as expected and maintained the necessary steam generator heat transfer capability. The atmospheric relief valves were used to provide a controlled steam release path. There were no equipment malfunctions or failures that complicated the plant response or otherwise elevated risk beyond the initiating event. The CPSES 138kV switchyard provided power to class 1E buses during this event. This event is bounded by the analysis of a Station Blackout and the loss of normal feedwater flow described in the FSAR in which conservative assumptions are made in the analysis to minimize the energy removal capability of the Auxiliary Feedwater system. This transient was assumed to be initiated from full power.

There were no safety system functional failures associated with this event.

Based on this analysis it was concluded that this event did not adversely affect the safe operation of CPSES Units 1 and 2 or the health and safety of the public.

IV. CAUSE OF THE EVENT

A fault on the Parker 345kV transmission line in conjunction with failure of primary and backup protection relays for the CPSES to Parker switchyard breaker, caused the remote grid breakers to trip and de-energize the CPSES 345kV switchyard resulting in the trip of Units 1 and 2 reactors. Management oversight of switchyard activities, maintenance practices, and protective circuit design contributed to a high resistance build-up on the contacts of the fault detection circuit relays which prevented successful isolation of the grid disturbance.

V. CORRECTIVE ACTIONS

The distribution/transmission company, Oncor, replaced the fault detector relays and adjusted the setpoints of the relays to prevent cycling of the contacts. Oncor ensured the remaining switchyard protection relays would function as designed by documenting and evaluating protection relay targets in the 345kV switchyard. Additionally, the 345kV switchyard East and West bus lockouts were tested to verify operability and that lockouts functioned correctly. Furthermore, Oncor has evaluated their activities as performed under the ERCOT (Electric Reliability Council of Texas) guidelines and has determined that the grid continues to be highly reliable.

As part of the corrective action program, TXU Energy is improving management oversight of switchyard activities to reduce the potential of a similar event. Some of the improvements include the following:

1. Tracking of switchyard equipment within the CPSES Preventative Maintenance Program and documenting equipment related issues in the corrective action program.
2. Performing post work reviews and tracking of switchyard maintenance activities by TXU Energy personnel.
3. Enhancing Oncor's switchyard maintenance calibration and testing process to provide more detailed specific instructions.
4. Review and, if necessary, change the setpoints of the switchyard fault detector relays and eliminate supervision of ground relays by switchyard fault detector relays.

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VI. PREVIOUS SIMILAR EVENTS

Although there have been previous events that resulted in RPS actuation due to a grid disturbance (refer to LER 445/91-013-00, LER 445/91-019-00, LER 445/91-021-00, and LER 445/91-022-00), the evaluation performed during the aforementioned LERs did not consider the impact on the fault detector relays. Therefore, corrective actions taken to resolve the root causes of the previous events would not have prevented this event.