UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

SEP - 4 2003

C. L. Terry, Senior Vice President
and Principal Nuclear Officer
TXU Energy
ATTN: Regulatory Affairs
Comanche Peak Steam Electric Station
P.O. Box 1002
Glen Rose, Texas 76043

SUBJECT: SUMMARY OF AUGUST 25, 2003, MEETING FOR COMANCHE PEAK STEAM ELECTRIC STATION

Dear Mr. Terry:

This refers to the meeting conducted in Arlington, Texas, on August 25, 2003. This purpose of this meeting was to discuss the Comanche Peak plant response to a grid disturbance on May 15, 2003.

Topics discussed during the meeting included a summary of the grid disturbance event; a discussion of the event by a representative of the Electric Reliability Council of Texas; an analysis of the event by a representative of Oncor, the electric distribution company; and the response of the Comanche Peak Steam Electric Station units to the event. Corrective actions taken and planned were also discussed. Members of the public present at the meeting were given an opportunity to ask questions and comment on the proceedings.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the NRC's Public Document Room.

Should you have any questions concerning this matter, we will be pleased to discuss them with you.

Sincerely,

William D. Johnson, Chief
Project Branch A
Division of Reactor Projects

Dockets: 50-445
50-446
Licenses: NPF-87
NPF-89

Enclosures:
1. Attendance List
2. Presentation Slides

cc w/enclosures:
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ENCLOSURE 1

ATTENDANCE LIST

PURPOSE OF MEETING: Update on Comanche Peak Plant Response to Grid Disturbances

LOCATION: NRC Region IV, Arlington, Texas

DATE: August 25, 2003

TIME: 2 p. m.

NAME (PLEASE PRINT)	ORGANIZATION	TITLE
William Johnson	NRC, Region IV	Branch Chief
Fred Madden	TXU Energy	Licensing Manager
Steve Smith	TXU Energy	ST [illegible] Main Mgr
Mark Carpenter	Oncor	System protection mgr.
Anthony T. Gody	NRC, RIV	Chief, Operations Branch
Arthur T. Howell III	NRC, RIV	Director, Director, DRP
Pat Gwynn	NRC, RIV	Acting Regional Administrator
Gail M. Good	NRC, RIV	Deputy Director, DRS
Mitch Lucas	TXU	Director of Nuclear Eng.
Ellis Rankin	Oncor	Grid Operations Manager
Bruce Cates	Oncor	Glen Rose District Mgr.
Roger Walker	TXU Energy	Regulatory Affairs Mgr
Jerry Zemanek	Oncor	FW Region Trans. Mgr
Joe Thompson	Oncor	Sr. Vice President
Mike Blevins	TXU Energy	VP & Deputy to SVP & PNO
Lance Terry	TXU Energy	Sr VP & Principal Nuclear Officer
Sam Jones	ERCOT	Chief Operating Officer
Mike Riggs	TXU Energy	~~Senior Engineer - Regulatory Affairs~~ [illegible]
Jeff LaMarca	TXU Energy	SMART Team 3 - System Eng'n Mgr
Alan Hall	TXU Energy	Shift Manager - Shift Operations
Steven D. Karpiak	TXU Energy	Supervisor - Risk & Reliability Cases
Randal LaVorn	TXU Energy	Communications
Steve Brown	DP Engineering	Principal Engineer
Keith Frazier	STP NOC	System Engineer
Evan Heacock	South Texas Project NOC	Senior Consulting Engineer

ATTENDANCE LIST

PURPOSE OF MEETING: Update on Comanche Peak Plant Response to Grid Disturbances

LOCATION: NRC Region IV, Arlington, Texas

DATE: August 25, 2003

TIME: 2 p. m.

NAME (PLEASE PRINT)	ORGANIZATION	TITLE
W.E. Moolhoek	STP Nuclear Operating Co.	Licensing Engr.
ALFRED A. SANCHEZ, JR	NRC - RIV - DRP	RI @ CPSES

Comanche Peak

Response to Grid Disturbance

8/25/03

Presenters

- Mike Blevins
  - TXU Energy
    Vice President & Deputy to Senior Vice President & Principal Nuclear Officer
- Sam Jones
  - ERCOT (Electric Reliability Council of Texas)
    Chief Operating Officer/Executive VP
- Mark Carpenter
  - Oncor Transmission Asset Services
    System Protection Manager
- Steve Smith
  - TXU Energy
    CPSES Maintenance Smart Team 3 Manager

May 15, 2003
Grid Disturbance

Event Summary

- Fault occurred on the Comanche Peak – Parker 345 kV line
- Relay protection for the Parker 345 kV line at Comanche Peak (CB 8040) did not operate to clear the fault
- CPSES generator breakers and 345 kV remote switchyard breakers opened to isolate the fault
- Comanche Peak sustained a dual unit reactor trip with a loss of normal AC power
- Emergency power continued through 138 kV

TXU Energy and Oncor Response

- Grid Protection responded as expected after initial event and failure of 345 kV breaker 8040 to trip
- Plant Safety Equipment and Personnel Responded as Expected
- Established Root Cause Analysis Team
- Corporate Executive Management directed Independent Assessment of
  - Plant Response
  - Grid Response

ERCOT
THE TEXAS CONNECTION

ERCOT Underfrequency Event

May 15, 2003

Presented To The Nuclear Regulatory Commission

August 25, 2003

Sam Jones

ERCOT COO

What Is ERCOT?

The Electric Reliability Council Of Texas

- An Intra-state, single point of control Interconnection
- Formed in 1941 to support the World War II effort
- Continued, following the war, for reliability reasons
- Today, it is one of three Interconnects in the US
  - 37,000 miles of transmission lines
  - ~75,000 MW of electric generation
  - 60,157 MW peak load in 2003
  - 85% of the electrical load in Texas
- ERCOT staff is an independent, third party, not for profit organization

ERCOT Responsibilities

- Reliable operation of the ERCOT bulk electric grid
- Restoration of the grid following any significant disturbance including priority restoration of power to critical facilities
- Analysis and planning of the future needs of the ERCOT transmission system
- Ensure equal access to the transmission system by all participants
- Wholesale energy accounting
- Retail customer information database

ERCOT Underfrequency Load Shedding Requirement

High Set Underfrequency – 59.7 Hz – Automatic – qualifies as spinning reserve – up to 50% of Spinning requirement allowed – compensated interruptible load

Firm Load Shedding:

- 59.3 Hz – 5% of ERCOT system load
- 58.9 Hz – 10% of ERCOT system load
- 58.5 Hz – 10% of ERCOT system load

The amount of load on feeders with underfrequency relaying is sampled yearly in varying seasons to determine if it meets the requirement

Nuclear Plant Trip Studies

ERCOT studies in 1987 predicted:

- One nuclear unit trip (1150-1250 MW) – frequency decline to 59.65 Hz – depending on load level at the time – verified during nuclear unit licensing
- Two nuclear units simultaneously – frequency decline to ~59.3Hz at load level of ~ 28,000MW – subject to on peak/off peak considerations – less at higher loads on peak
- The Study was considered valid only out to 15 seconds – recognized that boiler stability could be an issue during heavy governor demands

ERCOT
THE TEXAS CONNECTION

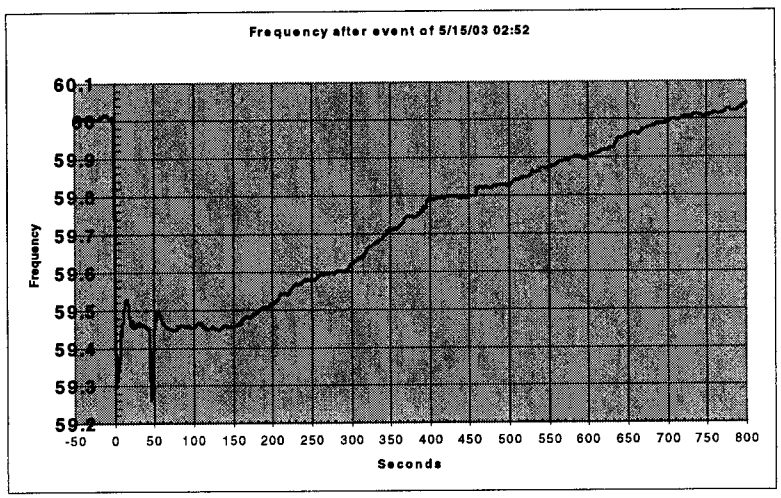
May 15, 2003
2:52 AM

- Two Comanche Peak units with total generation of 2275 MW tripped simultaneously due to loss of the transmission from the plant
- Immediately, three more generators with total load of 1146 MW tripped – at least one of them was a CT that tripped on underfrequency
- Approximately 43 seconds later a generator loaded to 775 MW by governor response tripped – followed by one more unit 7 minutes later

ERCOT
THE TEXAS CONNECTION

May 15, 2003
2:52 AM

- Total capacity loss was 7215 MW
- Total actual generation lost was ~3621 MW
- Total load shed on High Set underfrequency relays was 471 MW
- Total firm load shed on underfrequency relaying was ~ 1549 MW (5.6%) in the ERCOT grid – distributed throughout most of Texas



Load Restoration

ERCOT operations utilized all available capacity to allow for quickest practical load restoration – not enough immediately available to restore all load

- Significant load restoration within one hour
- All load was restored by 6:30 am

Conclusion

The system worked as designed and predicted – no cascading or islanding experienced

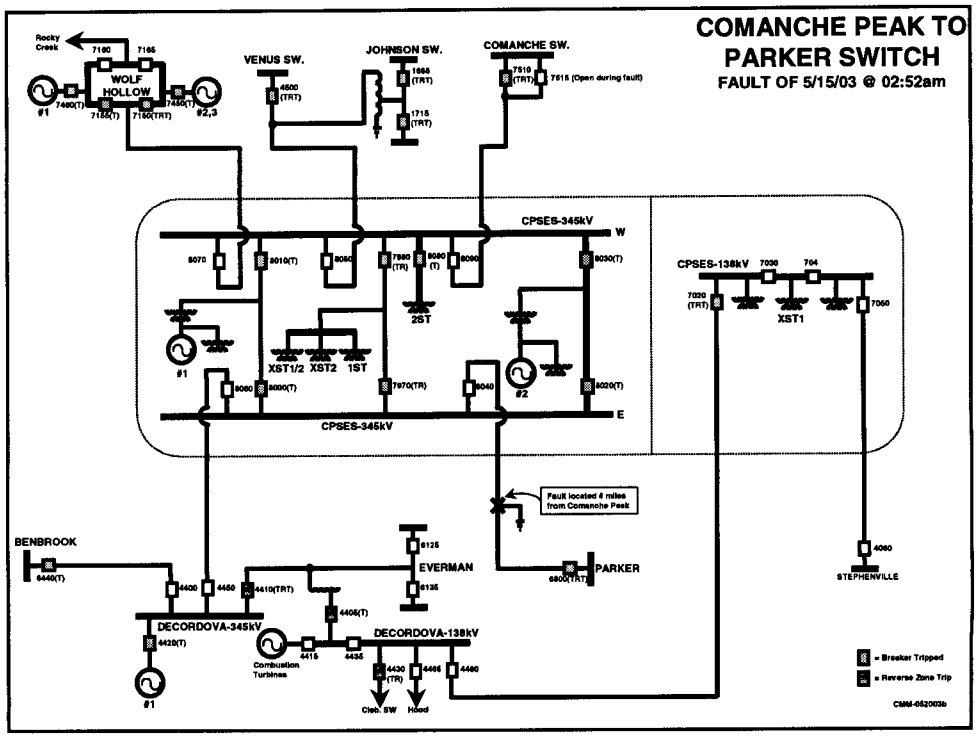
A full report is being prepared – it will be reviewed by our Reliability and Operating Subcommittee and then posted for use by any interested parties

Oncor Event Analysis

Mark Carpenter
System Protection Manager

Initiating Event

- The fault occurred 4 miles from CPSES switchyard
- Insulators and static wires were damaged by the fault
- Remote breakers cleared the fault



Immediate Response to the Event

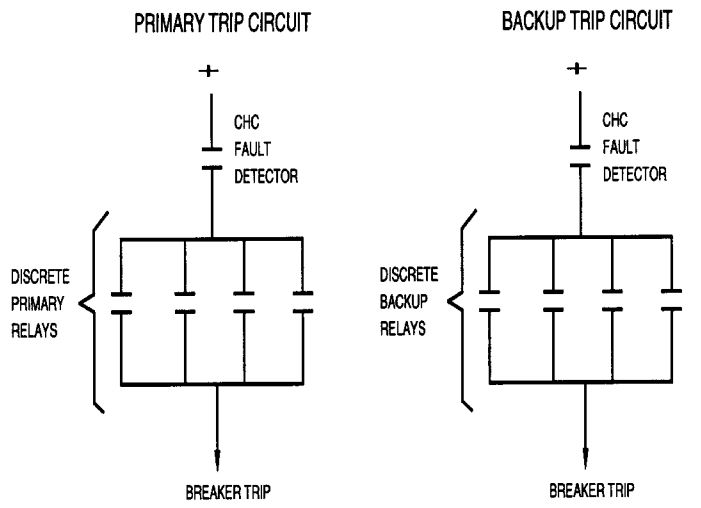
- Inspected equipment for damage
- CPSES 345 kV switchyard restored at 4:55 a.m.
- Aerial patrol
- Relay assessment of the 345 kV switchyard
- Initiated a Third Party Review

Undesirable Operations

- Comanche Peak 345 kV breaker 8040 failure to trip
- DeCordova 345 kV breaker 4450 failure to trip
- Tripping of Comanche Peak 138 kV breaker 7020
- Loss of Supervisory Control and Data Acquisition (SCADA) communications between Comanche Peak and Transmission

Causes for Undesirable Operations

Event root cause is the fault detector relays failed to operate on CPSES breaker 8040.



SIMPLIFIED TRIPPING LOGIC
FOR BREAKER 8040

Contributing Factors for Failure of Relay Protection on Breaker 8040

- Fault detector relay failed to operate
  - Settings relative to load current on circuit
  - Maintenance practices
- Relay system design in CPSES switchyard

Improvement Actions for Maintenance Practices

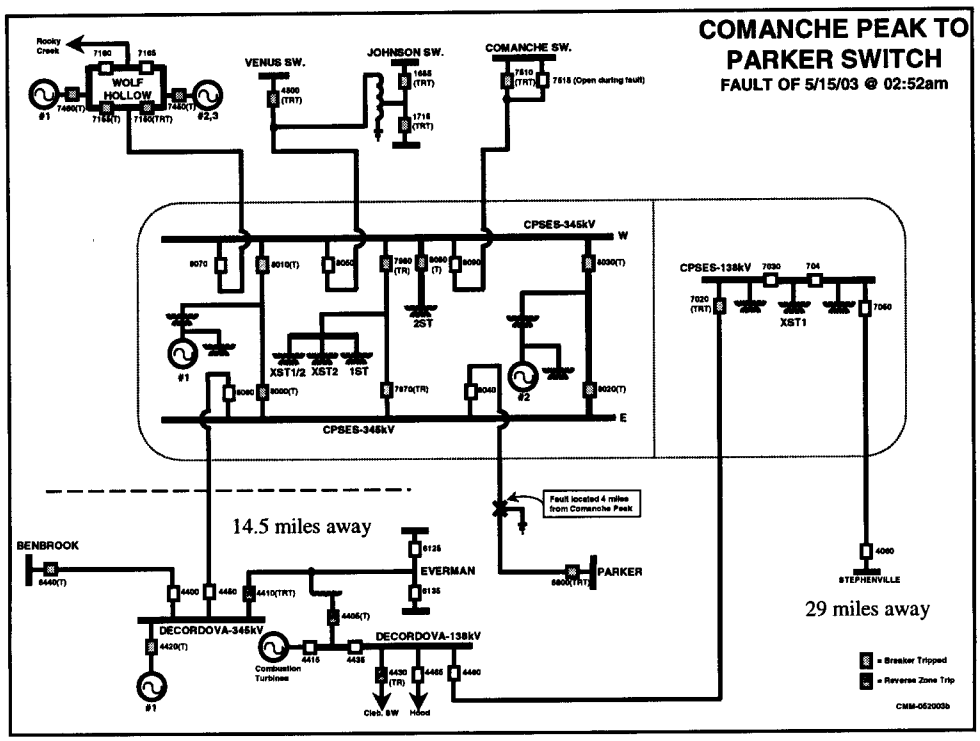
- Revise Procedures
  - Maintenance
  - Relay testing
- Enhanced Training
  - Procedures
  - Reporting
- Enhanced qualification verification program for technicians to work in the Comanche Peak switchyard

Improvement Actions for CPSES 345 kV Switchyard Relaying

- Load flow and relay coordination optimization studies
- Revise settings
  - CHC fault detectors
- Modify design to increase dependability
- Consider recommendations from Third Party Review

DeCordova 345 kV Breaker 4450 Failure to Trip

- Lack of coordination at DeCordova for failure of primary and backup relay failures at CPSES
- Intentionally designed not to over trip



Tripping of Comanche Peak 138 kV Breaker 7020

- Lack of coordination with DeCordova breaker 4450

Improvement Actions for CPSES 138 kV Switchyard Relaying

- Immediate relay setting modifications
- Additional relay system enhancements

Causes for Undesirable Operations

- Loss of SCADA communications between Comanche Peak and TGM
  - Potential differences between Plant and Microwave Site ground grids
  - Two power supply cards at Microwave Site failed

Corrective Actions for Loss of SCADA Communication

Enhance the grounding system as it pertains to the microwave tower and the communication systems.

Conclusion/Summary

- Revise relay settings
- Enhanced maintenance procedures and practices
- Improve tracking and trending of as-found conditions
- Additional relay system enhancements

CPSES Plant Response

Steve Smith

Smart Team 3 Manager

Event Investigation

- Root Cause Analysis Team
  - Involvement from Oncor, INPO, South Texas Personnel
  - Consensus on cause of the event, corrective actions, and recommended enhancements
  - Corrective actions tracked within CPSES Corrective Action Program
- Independent Assessment of Plant Response
  - Equipment Response
  - Relative to the Event
    - Determine how CPSES design compares to the industry
  - Design Change Recommendations

Plant Equipment Response

- Equipment required for event mitigation performed their functions as designed
  - Generator, Turbine, and Reactor Protection
  - AFW System response
  - ARVs control of Steam Line pressure and RCS temperature
  - Control Systems used to establish and maintain natural circulation for core cooling
- Equipment response was consistent with analyses presented in Chapter 15 of the FSAR

Impact on Comanche Peak

- Control Room Operators did an exemplary job in implementing emergency operating procedures and taking both Units safely to Mode 3
- Off-site power was maintained to both Unit's safety related power buses from the 138kv Switchyard

Plant Equipment Impact

- Review of Failed Fuel analysis indicated that zero fuel defects were present before and after the event
- Primary to Secondary data analysis indicates zero Steam Generator tube leakage before or after the event

Plant Conservative Design Features

- Safety Related power sources are provided by two independent Switchyards. A total of seven transmission lines are routed through the two Switchyards
- Each Unit has Instrument Air Compressors that are powered from Safety Related buses

Plant Issues Being Resolved

- Unit 2 Low Pressure Turbine Diaphragm Rupture
- Control Room HVAC Noise Level

Switchyard and Transmission Interfaces

- CPSES Plant and Transmission Grid Interfaces are in accordance with
  - ERCOT Requirements
  - Generation Interconnection Agreement
  - Oncor Maintenance Agreement Contract

Switchyard and Transmission Interfaces

- CPSES Procedure STA-629
  - Defines Switchyard Equipment Ownership
  - Design, Maintenance, Operation and Grid Notification Responsibilities
  - Applies to all Organizations Which Operate, Access, or Perform Work in the 345kV and 138kV Switchyards
  - Establishes Switchyard Access Control

Interface Lessons Learned

- Interface Agreement's adequately identify requirements, work processes and responsibilities
- Additional Plant oversight is required to ensure equipment issues are properly identified, evaluated, and resolved
- Work Instructions, quality and content are key for consistent implementation of preferred maintenance practices

Corrective Actions for Switchyard Maintenance

- Switchyard Equipment Issues will be Documented in Plant's Corrective Action Program
- Switchyard Equipment (CPSES & Oncor) will be Monitored within Plant's Preventative Maintenance Program
- Plant Personnel will Perform Post Work Review of all Switchyard Work Documents
- CPSES Support Enhancement of Switchyard Maintenance Procedures

Plant Response Lessons Learned

- Plant Safety Equipment Responded as Designed
- Operators Safely Placed each Reactor in Mode 3
- Enhanced Design Features Facilitated Reactor Safety
- Some Plant Auxiliary Systems Require Follow-up Actions
- Switchyard Design Modifications Proposed that could Enhance Plant Reliability and Safety

Conclusions/ Summary

Conclusions/ Summary

- The ERCOT System Responded as Designed to Limit the Impact of the Event and Continued to Provide Off Site Power
- Procedures, Interface Agreements and Personnel Resulted in Prompt Restoration of the 345 kV Switchyard
- While the 5/15/2003 Grid Disturbance Posed a Significant Challenge to Plant Equipment and Personnel, Plant Safety Equipment and Control Room Operators Responded as Expected

Questions?