U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF SPECIAL PROJECTS

NRC Inspection Report: 50-445/87-22 Construction Permit: CPR-126

Docket No: 50-445

Applicant: TU Electric
Skyway Tower
400 North Olive Street
Lock Box 81
Dallas, Texas 75201

Facility Name: Comanche Peak Steam Electric Station (CPSES), Unit 1

Inspection At: Comanche Peak Site, Glen Rose, Texas

Inspection Conducted: October 19-23, 1987

Inspectors: Amarjit Singh, Reactor Operation Engineer, Office of Special Projects. 1/6/88 Date

Dennis Kelley, Senior Resident Inspector, Comanche Peak Steam Electric Station 1/6/88 Date

Also participating and contributing to the report were:

Harvey Thomas, Brookhaven National Laboratory (BNL)
Anthony Fresco, BNL
Thomas Storey, Science Application International

Reviewed by: Phillip F. McKee, Deputy Director, Comanche Peak Project Division, Office of Special Projects 1/11/88 Date

Inspection Summary

Inspection Conducted October 19-23, 1987 (Report 50-445/87-22)

Areas inspected: Special announced inspection of the implementation of fire protection program and compliance with Branch Technical Position (BTP) CMEB 9.5-1, Fire Protection for Nuclear Power Plants," (formerly Appendix A to BTP APCSB 9.5-1); per FSAR commitments and SER evaluation.

Results: Within the areas inspected, no violations were identified.

DETAILS

1.0 Persons Contacted

TU Electric

R. Bab, Fire Protection Engineer
J. Barker, TU Electric
H. Beck, CPE/FP
C. Becket, CPE/FP
M. Blevins, TU Electric
J. Boothroyd, TU OPS F.P
B. Browning, Startup
F. Cobb, Proj.
C. Creamer, Project I&E Engineer
P. Desar, CPE/I&C
J. Disewwright, TU Electric
T. Evans, CPE/EE
D. Fuller, TU Electric
W. Grace, TU Electric (Nuc Ops)
R. Howe, EPM/FP
J. Jamer, CPE/MECH
J. Kelly, TU Electric
J. LaMarca, CPE/EE
B. Lancaster, TU-Electric
O. Lowe, TU Electric
R. Laytun, Fire Protection Coordinator
F. Madden, CPE-MECH
S. Popek, CPE/FP
J. Reywerson, TU Electric
W. Rowe, CPE/civil
C. E. Scott, TU Electric
J. Smith, TU Electric
N. Terrel, TU Electric
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John Echternacht
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EPM

Enrique Marqalejo

2.0 Background and Inspection Approach

This report documents findings during an inspection conducted by Mr. A. Singh and Mr. D. Kelley of the Office of Special Projects (OSP), Mr. T. A. Storey of Science Applications International Corporation (SAIC) and Messrs. H. Thomas and A. Fresco of Brookhaven National Laboratory during the period October 19-23, 1987.

The fire protection program for Comanche Peak Steam Electric Station (CPSES) is described in the applicant's Fire Protection Report (Ref. A.1) and the FSAR. The applicant is committed to the Fire Protection Program of Appendix A to APCSB 9.5-1, as modified by applicant correspondence to the NRC that documents additional commitments and deviations from FSAR commitments. Supplement 12 to the Safety Evaluation Report (NUREG-0797) issued in October 1985 presents the staff review of the CPSES Fire Protection Program. In Supplement 12 the staff reviewed the applicant's program against Branch Technical Position (BTP) CMEB 9.5.1, which superseded Appendix A to BTP APCSB 9.5.1. Among other changes, the criteria of Appendix R to 10 CFR Part 50 were factored into BTP CMEB 9.5.1. TUEC letter dated October 9, 1987 provided the staff with an advance copy of a change to the FSAR sections relative to the fire protection program. TUEC letter dated October 2, 1987 provided the staff with revised deviations to BTP APCSB 9.5-1 Appendix A and 10 CFR 50, Appendix R.

A site inspection of the CPSES fire protection program was conducted during October 29 through November 2, 1984. The inspection was documented in Inspection Report (IR) 50-445/84-44. This inspection (hereafter referred to as 84-44 inspection) included personnel from the Office of Nuclear Reactor Regulation, Region IV and the Office of Inspection and Enforcement and resulted in a number of open items.

Areas examined during the 84-44 inspection included establishment and implementation of the fire protection program and compliance with the requirements of BTP "Fire Protection for Nuclear Power Plants," per FSAR commitments and SER evaluation. Within these areas, the inspection consisted of selective examination of procedures and representative records, interviews with personnel, and observations by the inspectors. During this inspection, open items resulting from previous NRC audits and inspections were reviewed. The results of these reviews are included within this report.

3.0 Fire Protection Program Requirements

3.1 Fire Protection Program

In SSER 12, the staff stated that the fire protection program meets the guidelines of BTP CMEB 9.5-1 and is therefore, acceptable. During the 84-44 inspection, the inspectors found that the applicant's program did not specifically designate responsibility for fire brigade training and maintenance of training records. In addition, the inspectors found that the program did not identify that a QA program was established for the fire protection program (Unresolved Item 445/8444-0-01, 1st item).

During this inspection the applicant presented procedure FIR-101, "Fire Protection Program" which had been revised to address the staff concerns stated above. The revisions were found to adequately address the assignment of fire brigade training and records maintenance responsibilities and clearly established that a QA program would be provided for fire protection. Open Item 445/8444-0-01, 1st item, is therefore closed.

3.2 Fire Hazards Analysis

In SSER 12, the staff concluded that the fire hazards analysis (FHA) met the guidelines of BTP CMEB 9.5-1. The applicant has since revised the FHA and has included it in the Fire Protection Report dated September 22, 1987. Revisions to the FHA reflect changes in plant design or changes in the Fire Safe Shutdown Analysis report. As a result of this revision, a new deviation relating to the RHR isolation valves was identified. Also, a number of changes to previous deviations were made. Where these changes may have affected previous staff evaluations, they are discussed in this inspection report. The new deviation is discussed in Section 4.2 of this report.

3.3 Administrative Controls

The staff concluded in SSER 12 that the administrative controls identified by the applicant met the guidelines of BTP CMEB 9.5-1. During the 84-44 inspection, four items were identified where administrative procedures were inadequate. The items were as follows:

Failure to designate who is responsible for obtaining a fire permit for controlling ignition sources. (Open Item 445/8444-0-01, 4th item)

Failure to delete a temporary instruction for protection of the new fuel area after the permanent procedure was in place. (Open Item 445/8444-0-01, 5th item)

Discrepancies between the proposed Technical Specifications and the fire protection surveillance procedures. (Open Item 445/8444-0-02)

Failure to include a fire pump performance curve in the preoperational test procedure. (Open Item 445/8444-0-03)

During this inspection the applicant demonstrated that all of the above mentioned discrepancies had been addressed in revisions to procedures. These procedures were reviewed during the inspection and found acceptable. The above listed open items are therefore closed.

3.4 Fire Brigade and Fire Brigade Training

In SSER 12, the staff stated that the fire brigade and fire brigade training program meet the guidelines of BTP CMEB 9.5-1. During the 84-44 inspection, the definition of the fire brigade composition was

found to be in conflict with several plant procedures (Open Item 445/84-44-0-01, 3rd item). Also, the applicant's fire protection training procedure did not adequately address the tracking of the continuing qualification of fire brigade members.

During this inspection, the team reveiwed the fire brigrade training records and the revised fire protection training procedures and found them acceptable. Therefore, these issues are considered resolved and Open Item 445/844-0-01, 3rd item, is closed.

3.5 Reactor Coolant Pump (RCP) Oil Collection System

An inspector reviewed the installation of the RCP oil collection system. The inspector looked at two of the four RCPs and verified that all external potential leakage areas were adequately covered and would drain oil into a separate collection tank. The design drawings were reviewed and the inspector confirmed that each collection tank was designed to hold all of the oil inventory from its associated pump. During the inspection the applicant stated that seismic analysis for the RCPs had not been completed to verify that the system was seismically qualified. This item is considered open pending completion of the analysis by TU Electric (445/8722-0-01).

4.0 General Plant Guidelines

4.1 Building Design

Section D.1.j of Appendix A to BTP APCSB 9.5-1 states that floors, walls and ceilings enclosing separate fire areas should have a minimum fire rating of three hours, including penetration seals, fire doors and dampers. The staff stated in SSER 12 that all fire rated assemblies are tested for three hours in accordance with American Society for Testing and Materials (ASTM) E 119, are designed in accordance with three-hour-rated fire barrier designs obtained from the fire Resistance Directory published by Underwriters Laboratories (UL), or are constructed of 8-inch-thick reinforced concrete in accordance with the "Uniform Building Code" (International Conference of Building Code Officials) for a minimum fire resistance rating of 3 hours. The staff concluded in SSER 12 that the fire-rated walls and floor/ceiling assemblies are provided in accordance with the guidelines of BTP CMEB 9.5-1 Section C.5.a and are therefore acceptable.

During this inspection several barriers separating redundant trains of safe shutdown equipment were identified by the inspector as not being three-hour-rated. Specifically, unrated steel hatches were located in fire area boundaries. The applicant presented an analysis which stated that due to low combustible loading on either side of the hatches, automatic suppression on at least one side of the hatch and a one hour fire resistive coating on both sides of the hatch, it was not likely that a fire would propagate through the hatch. The inspector reviewed the analysis and found it acceptable. However, it was identified that this was a deviation from Section D.1.j of Appendix A to BTP APCSB 9.5-1 and must be identified as such in the FSAR. The applicant committed to

identify these unrated steel hatches in a future FSAR amendment. This item is considered open pending submittal by the applicant of an FSAR amendment addressing this deviation (445/8722-0-02).

Section D.4.(f) of Appendix A to BTP APCSB 9.5-1 states that "Stairwells, elevators and chutes should be enclosed in masonry towers with minimum fire rating of three hours...." In Amendment 65 to the FSAR, the applicant identified as a deviation that stairwells providing access and egress routes to areas containing safe shutdown equipment were provided with two hour rated barriers. Due to the negligible combustible loading inside stairwells and the lack of safe shutdown equipment being separated by the stairwell walls, the inspector found no major issues with applicant's stairwell boundaries. Acceptance of the deviation from Section D.4(f) of Appendix A to BTP APCSB 9.5-1 will be addressed by the staff in their review of Amendment 65 to the FSAR.

A number of stairwell walls were identified during the inspection where the inspector considered the justification was not adequate to support two hour rated construction. The applicant presented an evaluation which was conducted to determine the rating of fire area and stairwell boundaries. This evaluation was used to justify the fire rating of those boundaries which were not built specifically to the specifications of an independent testing organization. Where specific installation criteria of a recognized approval agency was not followed, the evaluation was used to determine if criteria were met or exceeded in such items as wall thickness and material type. The inspector identified six stairwell walls that could not be directly related to the installation criteria established by a recognized approval agency. The applicant has committed to take actions to resolve this issue. Pending actions taken by the applicant to resolve this issue and NRC review of those actions, this item is considered unresolved (445/8722-0-01).

Appendix A to APCSB 9.5-1 Section D.1.(j) states that "Penetrations in fire barriers, including conduits and piping, should be sealed or closed to provide a fire resistive rating at least equal to that of the fire barrier itself. Door openings should be protected with equivalent rated door frames and hardware that have been tested and approved by a nationally recognized laboratory." During the inspection, the inspector expressed concern that the method of sealing conduits four inches in diameter and smaller was not in accordance with rated configurations and had not been identified as a deviation from staff guidance. The applicant stated that conduits with either suppression or detection on both sides of the penetration would only be sealed on one side while conduits with no detection or suppression on at least one side would be sealed on both sides at the first opening. The inspector was concerned that this plan would allow for only one seal outside of the barrier in locations where their was only detection on both sides of the barrier with no suppression on either side. The applicant agreed to revise their position and committed to seal conduits four inches and smaller on both sides at the first opening regardless of the presence of detection or suppression. This item is considered open pending the completion of the seal installation (445/8722-0-03).

In NRC Inspection Report 50-445/85-16; 446/85-13 concerns were raised that certain BISCO seals used at the plant may not have adequate documentation to justify the rating of the seal. Specifically, American Nuclear Insurers (ANI) had identified a seal being used by BISCO which had failed a fire test. During this inspection the inspector reviewed documentation presented by the applicant which demonstrated that the BISCO seals being installed at the plant were accompanied by documentation which demonstrated that the seals had passed fire tests. The inspector found the documentation acceptable and therefore Unresolved Items 445/8516-U-06, 446/8513-U-06 and 445/8516-U-07, 446/8513-U-07 are therefore closed.

During this inspection a number of modifications to fire doors, primarily for security hardware, were observed. Although the doors and frames contained labels which demonstrated compliance with testing criteria of Underwriter's Laboratory, the inspector was concerned that these modifications would degrade the performance of the door under fire conditions. The applicant presented documentation from Underwriter's Laboratory concerning how security modifications could be made without jeopardizing the rating of the door. However, these guidelines may not have been implemented during modification of the plant fire doors. The applicant committed to review all fire doors presently installed to determine if modifications comply with guidance provided by Underwriter's Laboratory. Where compliance cannot be established, the applicant committed to bring the door into compliance or replace the door with one that conforms to the guidelines. The applicant also committed to ensure that all future modifications will conform to the guidance established by Underwriter's Laboratory. This item is considered open pending the completion of applicant's review of this issue (445/8722-O-04).

SSER 12 addressed a number of deviations dealing with heating, ventilation and air conditioning (HVAC) penetrations of fire rated barriers. Due to demonstrated difficulties in the operation of these dampers under air flow conditions, the applicant has instituted a program to completely change out the dampers with the exception of those dampers remaining in stairwells. The previously approved deviation associated with the remaining dampers still applies since they cannot be mounted completely inside the barrier due to interference with tornado pressure relief dampers. The fire dampers protrude approximately two inches and are covered with a one hour rated fire resistive material. Combustible loading on both sides of the stairwell dampers is low. The inspector confirmed there is reasonable assurance that these dampers would prevent the propagation of fire from one side of the barrier to the other since the dampers are essentially in the barrier and would function normally.

4.2 Fire Protection of the Safe Shutdown Capability

During the 84-44 inspection, the redundant pressurizer transformers located in the Safeguards Building were found not to be in compliance with the separation criteria of Section III.G.2 of Appendix R to to 10 CFR 50. The applicant stated during this inspection that, based on Fire Separation Calculation 152, Rev. 3, and Westinghouse's Thermal Hydraulic Analysis (WCAP #11331), the pressurizer transformers are no

longer required to achieve safe plant shutdown. The inspector reviewed the analysis and found it acceptable. Therefore, open item 445/3444-0-05 is considered closed.

By letter of October 2, 1987 the applicant identified an additional deviation to Section III.G.2.d of Appendix R for the Residual Heat Removal inlet isolation valves because the redundant valves are within the same fire area and are not protected with automatic suppression. One set of redundant valves are within 20 feet of each other. Valves 1-8701A and 1-8701B are located in the corridor outside of the steam generator compartment, fire zone 101B. Valves 1-8702A and 1-8702B are located within the steam generator compartment, fire zone 101C. The valves in the corridor are separated by approximately 40 feet. Intervening combustibles consist of three cable trays which do not run directly between the valves. The valves inside the compartment are separated by approximately six feet; however, a partial height concrete wall extends from just below the valve bonnet up several elevations. Thermistor strip heat detection is provided in both zones containing the valves. Combustible loading inside the containment is 34,200 BTU/square feet, comprised mainly of reactor coolant pump lubrication oil. All four pumps are provided with oil collection systems.

The inspector was concerned that a fire in containment could spread between redundant RHR inlet isolation valves and effect the ability of the plant to safely shutdown. However, the combustible loading inside the containment is low. Due to the large volume, any fires that were to occur, would develop slowly and dissipate its heat due to the large air volume. In addition, detection is provided in both zones containing the redundant valves. The detection which alarms in the control room would alert the operators to a fire in the area of the valves who in turn could have the plant fire brigade respond. Also, since access to the containment is restricted during plant operation, it is unlikely that transient combustibles or ignition sources would be introduced into the area. Based on the above, the inspector determined it would be unlikely that a fire could occur in the containment that would disable the redundant valves in both sets of RHR inlet isolation valves. Acceptance of the deviation from Section III.G.2.d of Appendix R to 10 CFR 50 will be addressed by the staff in their review of the applicant's October 2, 1987 letter.

During the inspection, two adjacent manholes were found which provided access to service water pump power and control cables. At the time of the inspection, both manhole covers were removed for maintenance reasons. The inspector was concerned that a flammable liquid spill and subsequent fire at the same time both covers were removed could jeopardize redundant trains of safe shutdown cables. The concern was heightened when it was observed that the manholes were approximately 40 feet from the unloading area for emergency diesel fuel oil and could be directly adjacent to the path that tanker trucks would travel to the unloading station. It was also observed that a minimal grade existed that would direct the flow of flammable liquids away from the manholes. The manhole covers were of substantial steel construction and when in

place, provided an environmentally tight cover. The applicant had performed an evaluation to demonstrate that the manhole covers would provide a barrier equivalent to three hours. However, the applicant did not address the flammable liquids issue. During the inspection, the applicant committed to administratively control the manhole covers to ensure that only one cover is removed at any time during plant operation. In addition, a procedure change was presented to the inspection team which called from the operations department to ensure that the manhole covers were in place during diesel fuel unloading operations. This resolution is found to be satisfactory to ensure the integrity of both trains of service water pump cables.

In SSER 12 the staff approved a deviation from Section III.G.2 of Appendix R to 10 CFR 50 for lack of one hour separation between redundant service water pumps. By letter dated October 2, 1987 the applicant requested that this deviation request be expanded to include the service water isolation valves, service water recirculation valves, branch circuits, exhaust fans and branch circuit MCCs. The previous deviation was granted based on negligible combustible loading, and the presence of early warning smoke detection and area wide automatic suppression. Based on inspection of the area in question, the inspector determined that previous conclusions for granting the deviation appear to remain valid. Acceptance of the deviation from Section III.G.2 of Appendix R to 10 CFR 50 will be addressed by the staff in their review of the applicant's October 2, 1987 letter.

4.3 Lighting and Communication

SSER 12 stated that "emergency lighting will be installed in all areas of the plant that may have to be manned for safe shutdown operations and at access and egress routes to and from all areas." During the 84-44 inspection, a number of lights, were found misaligned and some areas requiring safe shutdown operations were found not to have emergency lights (445/8444-0-04). During the inspection, the applicant presented procedures that were designed to ensure the proper alignment of emergency lights. While a number of lights were observed to be misaligned, the applicant stated that due to the present construction status of the plant, it was difficult to maintain the lights in alignment. However, the applicant stated that a complete alignment of lights would be performed prior to operation and then routinely thereafter. The applicant also presented a procedure for identifying locations requiring emergency lights. The areas identified in the 84-44 inspection as lacking lights had been provided with lights and therefore open item 445/8444-0-04 is considered closed. New areas requiring lights had been identified by the applicant resulting from changes in the safe shutdown analyses. As noted in Section 6.1.2 of this report, areas were identified by inspectors where additional emergency lights may be required. Pending completion of TU Electric's evaluation identifying locations requiring additional lights, including resolution of the emergency lighting issues discussed in Section 6.1.2 of this report, this item is considered open (455/8722-0-05).

At the time of the 84-44 inspection, plant procedures identified the "Gaitronics" page system as the method for notifying fire brigade and other emergency response personnel. The inspection team was concerned that a control room fire would disable the page thereby leaving no emergency communications system (Open Item 445/8444-0-01, item 2). During this inspection the applicant provided details of a recently installed radio system that would provide communications independent of the control room. Therefore, the concerns raised during the 84-44 inspection have been resolved and Open Item 8444-0-01, item 2, is considered closed.

During a review of the radio system, it was noted that the radio system may be disabled by a fire in certain plant areas. Additionally, a fire in the same area may require manual operator actions in the field; therefore, leaving the plant page as the only method for operator-control room communications. The inspector was concerned that since some of these manual operations involved regulating flows, the proximity of plant pages did not lend this system for adequate communications for this type of operation. In order to address the inspector's concerns, the applicant simulated these manual operations utilizing the page as the method of communications from the control room to the operator in the field. Even with the assumption that the pages nearest the valves were inoperable, the applicant demonstrated that the page would provide an adequate means of communication for these manual operations in the event the radio system was disabled.

4.4 Fire Detection and Suppression

4.4.1 Fire Detection

Section E.1 of Appendix A to APCSB 9.5-1 provides the minimum requirements for fire detection systems. Detection systems should comply with NFPA 72D, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems." NFPA 72D requires that fire alarm control panels be listed or approved for the purpose for which they are intended. During the 84-44 inspection, it was observed that the fire alarm panels used in the plant were not listed or approved in accordance with NFPA 72D (Open Item 445/8444-0-06). To address this issue, an alarm panel, originally designated for training, was provided by the applicant to Factory Mutual for testing. Factory Mutual performed the same series of tests on this panel that are used to approve commercial systems. During this inspection the applicant presented a report from Factory Mutual to the inspection team which documented approval of the plant fire alarm panels. The report was reviewed and found acceptable. Therefore, Open Item 445/8444-0-06 is considered closed.

NFPA 72D indicates that detector placement should be in accordance with NFPA 72E which provides guidance on the location and spacing of detectors. During the inspection the inspector was concerned that early warning smoke detectors may not be located in accordance with NFPA 72E. The applicant presented an evaluation in which each plant area was reviewed for compliance with NFPA 72E. As a result of this review, a number of plant areas had been identified where additional detectors were required. Although many of these areas had not yet had the new

detectors installed, the applicant presented documentation which was established to track the new installations. Some areas were identified by the applicant that were not in strict compliance to NFPA 72E. For these areas, TU Electric presented evaluations allowing for deviations from NFPA due to low combustible loading and the lack of safe shutdown requirements. The inspector reviewed these evaluations and found no issues.

4.4.2 Fire Protection Water Supply System

As a result of problems with microbiological induced corrosion (MIC) in the fire water piping, the applicant is planning to replace the current lake fire water supply with dedicated fire water tanks. This modification will include adding redundant 504,000 gallons storage tanks and three 50 percent capacity fire pumps (2000 gpm, 160 psi). Two of the pumps will be diesel driven and the third will be electric. The new design was reviewed during the inspection and found to comply with the guidance as outlined in Section E.2 of Appendix A to BTP APCSB 9.5-1 "Fire Protection Water Supply Systems."

4.4.3 Sprinkler and Standpipe Systems

Section E.3.(c) of Appendix A to BTP APCSB 9.5-1 states that "Automatic sprinkler systems should as a minimum conform to requirements of appropriate standards such as NFPA 13, Standard for the Installation of Sprinkler Systems." During the 84-44 inspection, a number of sprinkler systems in the plant were found that did not conform to the requirements of NFPA 13 (Open Item 445/8444-0-07). Specifically, sprinkler spacing exceeded the maximum requirements for distance from the ceiling. As a result of this open item, the applicant performed a review of all of the installed sprinkler systems against the requirements of NFPA 13. This review identified a number of areas where sprinkler installation was in conflict with the code. These areas were then addressed by a major retrofit program to bring all sprinkler systems in compliance with NFPA 13. During this inspection the sprinkler installations were reviewed for compliance with NFPA 13. All areas reviewed were found to be in compliance with NFPA 13. Therefore, Open Item 445/8444-0-07 is considered closed.

NRC IE Information Notice 83-41 discusses cases in which inadvertent actuations of fire suppression systems had adversely affected the operability of safety related equipment. The inspector was concerned during the inspection whether the applicant had adequately addressed this issue. The applicant presented an evaluation in which safety related equipment had been walked down to ensure that the placement of fire suppression systems would not effect the operation of the safety systems in the event the fire protection systems were to operate. The inspector reviewed the evaluation and determined that it adequately addressed the issue of fire protection systems adversely affecting safety related systems.

4.4.4 Halon Suppression Systems

Section E.4 of Appendix A to BTP APCSB 9.5-1 states that "The use of Halon fire extinguishing agents should as a minimum comply with the requirements of NFPA 12A and 12B, Halogenated Fire Extinguishing Agent Systems - Halon 1301 and Halon 1211." During this inspection, the inspector was concerned that the Halon system provided in the Cable Spreading Room may not be in compliance with NFPA 12A. The applicant indicated that the review of the system against the requirements of NFPA 12A had not been performed. Therefore, the applicant needs to perform a review of the Cable Spreading Room Halon system against the requirements of NFPA 12A. Any deviations identified in this review will be required to be submitted to the staff for evaluation. The NRC considers this item open pending applicant completion of the evaluation and NRC review of the results (445/8722-0-06).

5.0 POST FIRE SAFE SHUTDOWN CAPABILITY

During the 84-44 inspection, numerous apparent inconsistencies were noted in the applicant's analysis and assumptions concerning the protection of fire safe shutdown equipment for areas outside of the control room and cable spreading room where alternative safe shutdown is not required.

Since the 84-44 inspection, the applicant has provided a more comprehensive methodology and analysis in two documents, the Fire Safe Shutdown Design Basis Document (DBD), DBD-ME-020, and the Fire Protection Report (FPR). The Fire Hazards Analysis Report (FHAR) [Ref. Appendix A, A.1(b)] which is contained within the FPR, describes each fire area and its associated fire protection features. The fire safe shutdown equipment located within an area is listed in the Fire Safe Shutdown Analysis Report (FSSAR) [Ref. Appendix A, A.1(c)] also contained within the FPR. For each fire area which contains safe shutdown components, the reference to the components protected to achieve safe shutdown is typically a general statement: "One train of the required redundant equipment and components within the area is protected by one of the means provided in Section II.4.5." Section II.4.5 contains only a listing of all of the potential means of complying with CMEB 9.5.1 C.5.b separation requirements. Therefore, the FHAR does not identify specifically what components are protected for a postulated fire in that area, except in certain circumstances such as for Fire Area AA where the protection of CCW isolation valves 1HV4512, 1HV4513, 1HV4514, and 1HV4515 and their associated circuits is described.

The listing of protected components for each fire area is provided in three volume document collectively referred to as Calculation No. 152, Revision 3 [Ref. Appendix A, A.3]. Calculation No. 152 is predominantly a computer printout for each fire area of the raceways, the safe shutdown cables, the cables which must be thermolagged in the area, the corresponding safe shutdown devices and associated equipment location (fire zones of the devices), the electrical nodes (junction boxes) and the raceway length. A discussion of protection of associated circuits is provided in Section 7 of this report.

From the perspective of mechanical systems operability, Calculation No. 152 provides two tables in Attachment 16 of Volume 3: Table 1 "Fire Area Compliance Table" and Table 2 "Operator Actions for Fire Areas." Table 1 summarizes the compliance method for separation for each fire area, but in the inspectors opinion does not provide a clear path for determining equipment to be protected. Table 2 is a listing of safe shutdown devices and location by fire zone which require certain operator actions including repairs, the location of the action, and the affected fire areas where a fire in those areas may create a requirement for the manual action. Also the actions are classified according to whether they are required for hot shutdown (hot standby) or cold shutdown.

The inspection team noted that Table 2 is a key document in the applicant's justification for compliance with separation requirements for those areas not requiring alternative shutdown. The basis of the applicant's analysis and protection methodology for these areas is a combination of protecting certain components in a given fire area, in many instances of either redundant train, plus reliance on the local operator actions described in Table 2.

The following procedures [Refs. App. A, B1 to 8] in addition to Procedure No. ABN-803A, "Response to a Fire in the Control Room or Cable Spreading Room," have been prepared by the applicant to address manual actions:

- ABN-804A "Response to Fire in the Safeguards Building"
- ABN-805A "Response to Fire in the Auxiliary Building or the Fuel Building"
- ABN-806A "Response to Fire in the Electrical and Cont... Building"
- ABN-807A "Response to Fire in the Containment Building"
- ABN-808A "Response to Fire in Service Water Intake Structure"
- ABN-809A "Response to Fire in the Turbine Building"

In view of the manual actions required to ensure compliance with separation requirements, the team considers the above procedures to be an integral part of the applicant's fire hazards analysis and fire safe shutdown analysis reports. The team considered it of considerable importance that the feasibility of the manual actions be properly analyzed with respect to the postulated fires and the protected components within each fire area. As a minimum, the manual actions should be sorted so that those which need to be performed in the same fire area or zone in response to a postulated fire in that area or zone are identified and the time after reactor trip when the action must be performed compared to the area accessibility and component operability after the postulated fire.

During the inspection, the team noted that the information in Table 2 concerning the manual actions was not adequately sorted to identify actions which must be taken in the same fire area as the postulated fire. Furthermore, the feasibility of each action with respect to the postulated fire was not presented. The applicant presented a revised listing of the manual actions with justifications for each action just prior to the exit meeting. The list indicated that some revisions to

Table 2 were necessary and that some actions had been deleted. The new listing of actions would be presented in a previously planned Revision 4 of Calculation No. 152.

The issue of the adequacy of manual actions which must be taken in the same area as the postulated fire remains unresolved pending TU Electric's revision to Calculation No. 152 and NRC review of the document (445/8722-U-02).

6.0 ALTERNATE SHUTDOWN

6.1 Procedures

During the 84-44 inspection, the inspection team noted that procedures for alternate shutdown were preliminary and incomplete. During this inspection, the inspectors found that procedures for alternate shutdown had been prepared. The inspection team's evaluation concentrated on Procedure ABN-803A, "Response to a Fire in the Control Room or Cable Spreading Room," Revision 0 dated June 16, 1987, with Procedure Change Notices ABN-803A-RO-1 dated July 30, 1987 and ABN-803A-RO-2 dated October 9, 1987. Procedure ABN-803A is based primarily on the previously referenced Calculation No. 152, Revision 3, and a Westinghouse document, WCAP-11331 "Comanche Peak Steam Electric Station Thermal/Hydraulic Analysis of Fire Safe Shutdown Scenario" dated October 30, 1986 (Ref. Appendix A, A-5) which was prepared to demonstrate the ability to achieve safe shutdown conditions following a Control Room or Cable Spreading Room fire. WCAP-11331 compares baseline assumptions for the Appendix R, Section III.L conditions against the effects of single spurious sinoles on safe shutdown capability. The results of the review and walkdown of procedure ABN-803A are as follows.

6.1.1 Procedure Review

The procedure is organized into a main text with four (4) major attachments to achieve hot shutdown. The main text is implemented primarily by the Shift Supervisor in the hot shutdown phase. Attachment 1 is entitled, "Reactor Operator Actions to Achieve Hot Shutdown," Attachment 2 "Relief Reactor Operator Actions to Achieve Hot Shutdown," Attachment 3 "Auxiliary Operator No. 1 Actions to Achieve Hot Shutdown" and Attachment 4 "Auxiliary Operator No. 2 Actions to Achieve Hot Shutdown." Thus, there are five (5) operating staff members required to implement the hot shutdown phase. Attachment 13, "Operator Action Timeliness," provides a summary of the key operator actions and the required completion times for attachments 1 through 4. The WCAP previously referenced is intended to ensure that given any spurious signal, the completion times are such that safe shutdown can be accomplished.

The following items were noted during the procedural review. Most of these concerns were resolved through the issuance of Procedural Change Notice (PCN) ABN-803A-RO-3 dated October 21, 1987:

1. There was no provision for termination of spurious pressurizer (PZR) heater operation. PCN ABN-803A-RO-3 contained a change to the procedure that resolved this concern.

2. Upon a spurious safety injection signal, the WCAP indicates that the rupture disk on the PZR relief tank (PRT) would burst after 52 minutes even though all operator actions would be completed normally as required by the procedure.

   This concern is made more serious considering that multiple operator actions may be or are required inside containment during the hot shutdown phase, i.e., manually opening 1-HV-8112, the seal water return isolation valve, and to manually close accumulator injection isolation valves 1-8808A, 1-8808B, 1-8808C, and 1-8808D. These actions, steps 2.4(d) and 2.4(t), would take place after 2-hour maintenance of hot standby conditions. This concern is further discussed in Section 6.1.3 below and is identified there as an unresolved item.

3. An alternative step to manually opening 1-HV-8112 as mentioned in (2) above (by observing that seal water return flow is available from outside the containment) was not provided. This concern was resolved by PCN ABN-803A-RO-3 which directs the operator to check that the seal water return filter delta pressure is greater than 0 psi by observing the difference between 1-PI-175 and 1-PI-176. The applicant agreed to consider the use of a portable delta pressure gauge which could be installed if required by oscillation of the gauge needles.

4. The procedure did not specifically address restoration of offsite power at any time during the procedure implementation. The applicant indicated that this action was handled by Procedure No. ABN-601A, "Response to a 138/345 KV System Malfunction."

5. The procedure did not detail the steps required to manually operate the steam generator atmospheric PORVs. By means of PCN ABN-803A-RO-3, caution statements were added concerning the safety actions for the operators to follow such as wearing eye and hearing protection and donning a steam suit.

6. Step 2.3.e calls for the reactor operator to perform several operator actions prior to evacuating the control room, one of which is to place both RHR pumps in the PULL-TO-LOCK position. All of the actions are verified by the reactor operator in attachment 1 except for the step involving the RHR pumps. This concern was resolved by PCN ABN-803A-RO-3.

7. There was no reference in the main test of the procedure to Attachments 7 and 8 which list the controls and instrumentation available at the remote shutdown panel. By means of PCN ABN-803A-RO-3, such a reference was included in step 2.4.b.

8. There was no provision in Attachment 1 for the reactor operator to notify the relief reactor operator, who is starting diesel generator A in attachment 2, in case of failure of service water flow to the diesel. PCN ABN-803A-RO-3 calls for an additional note in attachment 1 to cover this situation. The applicant also provided an entry from the operators log book (App. A, A.5) showing that the same diesel had been run unloaded for over 60 minutes without service water flow.

There were other items which were substantially editorial in nature to reduce the probability of operator error which were also resolved by the PCN ABN-803A-RO-3.

6.1.2 Procedure Walkdown

A procedural walkdown of ABN-803A was conducted with one NRC representative each following an assigned applicant operating staff member. There are five operators required to implement the procedure: the Shift Supervisor, Reactor Operator, Relief Reactor Operator, Auxiliary Operator No. 1, and Auxiliary Operator No. 2. The walkdown was conducted with the additional condition that the fire brigade would be called out simultaneously to simulate a control room fire. The walkdown ended once hot standby conditions had been achieved.

The team was generally impressed with the organization of the procedure and the operators' ability to carry it out. However, one minor concern was identified by the inspectors. The procedure did not direct the shift supervisor to assist the reactor operator in tracking the progress of the other operators in accomplishing their tasks within the time limits shown in the Operator Action Timeliness in attachment 13 of ABN-803A. By means of the previously referenced PCN, an appropriate note was added to the procedure, so that this item is considered resolved.

The portions of the procedure applying to the time after hot standby conditions have been achieved, which involved either manual actions inside containment or repairs to achieve cold shutdown, were separately walked down.

For the actions inside containment, the scenario of coincident loss of offsite power with evacuation of the control room results in the inability to monitor the conditions inside the containment. Therefore, the operators must wear full respiratory gear including Scott air packs, which can limit the operator's mobility and access in certain areas.

Th[illegible] that Step 2.4.d of APN-803A, which required the c[illegible] en 1-HV-8112, the seal water return isolation v[illegible] nted reasonably well with the airpacks mounted. h[illegible] to be no 8-hour battery pack emergency lighting in t[illegible] er step inside containment, step 2.4.t, to manually close all [illegible] ulator isolation valves 1-8808A, 1-8808B, 1-8808C, and 1-8808D, [illegible] e consuming since it may require as much as 20

minutes per valve. It was noted that access to valve 1-8803D was difficult, but not impossible, with the full respiratory gear on. Also there did not appear to be any 8-hour emergency lighting in area near accumulator No. 4. The need for TU Electric to complete their assessment of locations where emergency lighting is needed is addressed in Section 4.3 of this report.

Regarding the section in the procedure involving repairs, attachment 6 for the emergency air supply hookup to RHR valves 1-FCV-618 and 1-HCV-606 referenced actions to close instrument air valves 1CI-650 and 1CI-651 which were difficult to locate and poorly labeled. There also did not appear to be 8-hour emergency lights in the area. The need for TUEC to complete their assessment of locations where emergency lighting is needed is addressed in Section 4.3 of this report. The issue of the poorly labeled valves is considered an open item pending further review by the staff (445/8722-O-07).

Attachment 5 of ABN-803A does not involve repairs but rather manual closure of valves 1PS-100, 1PS-100, 1PS-113, 1PS-126, and 1PS-139 for steam generators 1 through 4 sample line isolation. These valves were extremely difficult to locate amongst all of the other valves in the safeguards 810 primary sample room. It was also difficult to locate CVCS valves 1 CS-8453, 1CS-8455, 1CS-8430, and 1CS-8444 in the Auxiliary Building 822 Blender Room. All of these locations were acceptably clarified by the PCN previously referenced.

6.1.3 WCAP-11331 "CPSES Thermal/Hydraulic Analysis of Fire Safe Shutdown Scenario"

As previously mentioned, WCAP-11331 was prepared to analyze the plant's ability to achieve safe shutdown following a control room or cable spreading room fire by evaluating certain spurious operation cases as sensitivity studies to a baseline scenario. The thermal/hydraulic analysis described in WCAP-11331 was generated using the TREAT (Transient Real Time Engineering Analysis Tool) computer code. Use of this code was approved by the NRC staff for the South Texas Plant in NUREG-0781, Supplement No. 3, May 1987, for small-break LOCA analyses, but not for Comanche Peak.

The spurious operation scenarios analyzed in WCAP-11331 were:

1) Stuck Open Pressurizer PORV
2) Stuck Open Steam Generator PORV(s)
3) Spurious Head Vent Operation
4) Auxiliary Feedwater System Misalignment
5) Spurious SI System Operation
6) Main Feedwater and Turbine Do Not Trip at Reactor Trip
7) Backup Heaters Fail On

All of the above cases were compared to the operator actions described in Procedure ABN-803A. The only concerns noted were for case (5), the spurious SI system operation. The WCAP refers on page 67 to calculations that were performed to determine whether or not the PRT

rupture disk would rupture. The calculations are stated to show that rupture would occur approximately 52 minutes following transient initiation, with the release of approximately 11400 lbm of steam prior to initiation of normal seal injection return flow at 90 minutes in operational guidelines. It should be noted that these calculations are not actually provided in the WCAP.

The rupture at 52 minutes would occur well before the operator actions could be taken inside containment to manually open the seal water return isolation valve 1HV-8112 and to manually close the accumulator isolation valves 1-8808 A/B/C/D (see discussion in Section 6.1.2 of this report).

The applicant attempted to address the concern raised by the team regarding the feasibility of the manual actions inside containment by preparing, during the inspection, a calculation (ref. Appendix A, A.6) intended to show that time for rupture of the PRT rupture was overly conservative and that the rupture disk would not burst at all. The team did not have time to review this calculation as it was presented on the evening prior to the exit meeting and because the actual Westinghouse calculations are not provided in the WCAP. This item remains unresolved pending the NRC review of the calculation (445/8722-U-03).

6.2 Alternative Shutdown Instrumentation

10 CFR 50, Appendix R, III.G.3 and III.L states that, if the licensee elects to establish alternative safe shutdown capability, provisions need to be provided for direct readings of process variables necessary to perform and control the reactor shutdown function. NRC Information Notice 84-09 states that instrumentation be supplied to provide the following information:

- Pressurizer Pressure and Level
- Reactor Coolant Hot Leg Temperature - T_{hot}
- Reactor Coolant Cold Leg Temperature - T_{cold} or T_{avg}
- Steam Generator Pressure and Level (wide range)
- Source Range Flux Monitor
- Level Indication for All Tanks Used During the Shutdown Process
- Diagnostic Instrumentation for Shutdown Systems

TU Electric has installed a remote shutdown panel which is located in the Electrical Equipment Area, Fire Zone SE16, Safeguards Building on Elev. 831'-6". The inspector found that the panel provides the capability to bring the plant to cold shutdown utilizing either Train A or Train B equipment.

The following instrumentation is available on the hot shutdown panel:

- Steam Generator 1 Wide Range Level - 1LI501A
- Steam Generator 2 Wide Range Level - 1LI502A
- Steam Generator 1 Pressure - 1LI514B
- Steam Generator 2 Pressure - 1LI524B
- Pressurizer Level - 1LI459B
- Pressurizer Pressure (WR) - 1PI455B
- Source Range Detector - 1NI31F
- RCS Loop 1 Hot Leg Temperature - 1TR413F
- RCS Loop 1 Cold Leg Temperature _ 1TR410F
- RCS Loop 2 Hot Leg Temperature - 1TI423F
- RCS Loop 2 Cold Leg Temperature - 1TI420F
- RCS Loop 3 Hot Leg Temperature - 1TI433F
- RCS Loop 3 Cold Leg Temperature - 1TE430F
- RCS Loop 4 Hot Leg Temperature - 1TR443F
- RCS Loop 4 Cold Leg Temperature - 1TR440F
- Condensate Storage Tank Level - 1LI2478B

The refueling water storage tank level indication will be available locally at the tank.

The above instrumentation is dedicated to the Train A hot shutdown panel and which is installed in areas outside of the control room, where it is not subject to damage as the result of a control room fire.

The instruments are serviced by dedicated power supplies which are located at the shutdown transfer panel. The cables for these instruments do not enter the control room and consequently are not subject to damage due to a fire in the control room.

The inspector determined that the instrumentation as provided met the guidance in NRC Information Notice 84-09.

6.3 Hot Shutdown Panel

The hot shutdown panel contains instrumentation and controls for both Train A and Train B components. Train A controls are isolated from the control room by switches at the shutdown transfer panel on Elevation 810'-6" in the electric equipment area, fire zone SD9. The Train B isolation switches are located at the hot shutdown panel. A fire at the hot shutdown panel could damage both Train A and Train B controls located on the panel. However, due to the remote location of shutdown transfer panel, Train A control will be available in the control room.

The major shutdown devices which are operable for alternative safe shutdown at the hot shutdown panel are as follows:

Main Steam Isolation Valves	1HV2333A 1HV2334A 1HV2[illegible]A 1HV2336A

Main Steam Isolation Bypass Valves	1HV2333B 1HV2334B 1HV2335B 1HV2336B
Turbine Driven Auxiliary Feedwater Pump	
Motor Driven Auxiliary Feedwater Pump 1	
Motor Driven Auxiliary Feedwater Pump 2	
Steam Generator 1 PORV	1PV2325
Steam Generator 2 PORV	1PV2326
Steam Generator 3 PORV	1PV2327
Steam Generator 4 PORV	1PV2328
Service Water Pump 1	
Service Water Pump 2	
Diesel Generator 1	
Diesel Generator 2	
Centrifugal Charging Pump 1	
Centrifugal Charging Pump 2	
Pressurizer Level Control Valve	1FCF121
Letdown Isolation Valve	1LCV459
Letdown Isolation Valve	1LCV460
Letdown Orifice Isolation Valve	1-8149A
Letdown Orifice Isolation Valve	1-8149B
Letdown Orifice Isolation Valve	1-8149C
Control Room Manual Reactor Trip	
Backup Heater Group A	
Backup Heater Group B	
Backup Heater Group C	
Pressurizer Block Valve	1-8000A
Pressurizer Block Valve	1-8000B
Component Cooling Water Pump 1	
Component Cooling Water Pump 2	
RHR Pump 1	
RHR Pump 2	
Accumulator Isolation Valve	1-8808A
Accumulator Isolation Valve	1-8808B
Accumulator Isolation Valve	1-8808C
Accumulator Isolation Valve	1-8808D
Charging Pump Isolation Valve	1-8105
Charging Pump Isolation Valve	1-8106
Pressurizer Pump PCV455A	LPCV455A

The applicant has developed modifications which will enable local operation of the diesel generators. These are the subject of Design Change Authorization DCA 61447. DCA 61447 was initiated to resolve the consequences of uncoordinated 125 VDC circuits EG 104509, EG 145211, and EG 130661. This DCA, when implemented, will require the installation of branch circuit fuses or the installation of thermal lag protection. Pending completion of the modification and review by the NRC, this item is considered open (445/8722-0-08).

7.0 PROTECTION FOR ASSOCIATED CIRCUITS

Appendix R, Section III.G, states that protection be provided for associated circuits that could prevent operation or cause maloperation of redundant trains of systems necessary for safe shutdown. The circuits of concern are generally associated with safe shutdown circuits in one of three ways:

- common bus concern
- spurious signal concern, and
- common enclosure concern

The associated circuits were evaluated by the team for common bus, spurious signal, and common enclosure concerns. Approximately 250 power, control, and instrumentation circuits were examined by the inspector for potential problems. This sample size, which represents about 80% of the safe shutdown circuits, was used in making the review since many circuits were involved and a determination of cable routing took considerable time. The samples were selected based on the components which the licensee proposed to use for safe shutdown.

The applicant analysis of protection of associated circuits related to safe shutdown was found to be substantially completed. The analysis resulted in the need for a number of modifications, many of which have not been completed. One area where a significant amount of work remained to be done was installation of thermolag. Until the analysis is completed and the staff reviews the results, this item is considered open (445/8722-0-09).

The following sections present the inspectors review of the specific areas of common bus concern, spurious signal concern, common enclosure concern, and multiple high impedence faults.

7.1 Common Bus

The licensee had reviewed the class IE and associated circuits in the plant to ascertain the effects of coordination or uncoordination on the plants capability to achieve post fire safe shutdown. It was demonstrated to the inspector that corrective action since the 84-44 inspection had been taken to correct deficiencies in the electrical coordination of safe shutdown circuits. Some of the actions were as follows:

- Replace existing fuses with new fuses which coordinate.
- Provide thermal lag to protect safe shutdown circuits.
- Replace existing trip units with Westinghouse AMP tester units.
- Reanalysis of circuits which compensated by taking into account feeder or cable lengths located in the fire area.

The team examined, on a sampling basis, the protection for several circuits including coordination of fuses, circuit breakers, and relays. The samples selected for the coordination review were as follows:

- Diesel Generator Source Breaker 1EG1 for Bus 1ER1
- Component Cooling Pump #1
- Motor Driven Auxiliary Feedwater Pump #1
- Centrifugal Charging Pump #1
- Service Water Pump #1
- Compartment 5F MCC XEB1-1 - 480V AC
- MCC 1EB1-2 480V AC SWGR
- Circuit 4 Distribution Panel 1ED1-2 125V DC
- Circuit 1 Distribution Panel 1ED1-2 125V DC
- Circuit 2-12 Future on Switchboard 1ED1 125V DC
- Circuit 1-6 Spare on Switchboard 1ED1 125V DC
- IEB.1 - 480V Switchgear

The applicant's review identified some circuits which were not coordinated. Some of these circuits were:

- Panel Boards - 1EC3
  1EC3-1
  1EC4-1
  1EC3-2
  1EC4-2

An assessment of need of these circuits for safe shutdown was made by the applicant and, with the exception of 1EC3-1, none of the above panels were required for safe shutdown. The applicant proposed to protect the safe shutdown circuits on 1EC3-1 with thermal lag although the thermal lag had not yet been installed.

The 480V switchgear 1B1 and 1B2 were found by the applicant to be uncoordinated and a design change was authorized (DCA42381) to replace the existing trip units with AMPTECTOR Type II A devices.

Panel 1ED-1 (125V DC) was determined to be coordinated by including the added impedance of effected cable located within the limits of the fire area.

The applicant identified circuits which were not completely analyzed to account for ampacity effects due to the increased operating temperature resulting from the thermal lag wrap. The applicant indicated that Revision 4 of the CPSES FSSA Calculation No. 152 will address this issue and could result in further circuit modifications or thermal lag changes. The common bus concern cannot be satisfactorily resolved until Revision 4 of the FSSA and the final thermal lag report, ECF-M1700, have been completed. The issue of ampacity effects due to increased operating temperatures resulting from thermal lag wrap will remain open subject to completion of TU Electric's analysis. This item is considered part of Open Item (445/8722-0-09).

7.2 Spurious Signal

The spurious signal concern is made up of 2 items:

- False motor, control, and instrument indications can occur such as those encountered during the Brown's Ferry fire. These could be caused by fire initiated grounds, short or open circuits.

- Spurious operation of safety related or non-safety related components can occur that would adversely affect shutdown capability (e.g.,RHR/RCS isolation valves).

7.2.1 Current Transformer Secondaries

The applicant had completed the analysis for the current transformer secondaries concern, and had determined that the voltage control and governor control circuits were protected and would be functional in the local control mode. No additional current transformer applications were identified which could affect post fire safe shutdown. The inspector reviewed portions of the applicants analysis and found it acceptable.

7.2.2 High Low Pressure Interfaces

The high low pressure interfaces which were identified by the applicants' analysis are as follows:

- Reactor Head and Pressurizer Vent Valves 1-HV3607, 1-HV3608, 1-HV3607, 1HV3610

  RHR/RCS Boundary Isolation Valves 1-8701A, 1-8702A, 1-8701B, 1-8702B

- Pressurizer Power-operated Relief Valves 1PCV455A, 1PCV456

- Normal letdown isolation Valve 1LCV459 and excess letdown isolation valves 1-8153 and 1-8154.

The applicant presented the following methods to preclude any unwanted spurious actions:

- Reactor Head and Pressurizer Vent Valves. One valve in either train of the valves in each path is disabled by disconnecting DC power.

- RHR/RCS Boundary Isolation Valves. The applicant intends to remove power from either of the two Path A and B valves by opening the appropriate circuit breaker.

- Pressurizer Power-operated Relief Valves. The applicant intends to close the respective pressurizer block valve (1-8000A, 1-8000B) or disconnect the DC power to the air controlling solenoid valve for the PORV. It should be noted the control cables for the block valves (1-8000A, 1-8000B) are vulnerable to damage as the result of a control room fire and that they are not equipped with handwheels. Block Valves 1-8000 A & B will be closed at their respective MCC's. The control circuits for the pressurizer PORV's are electrically isolated from the control room.

- Excess Letdown Valve - 1-8153, 1-8154. Controls for 1-8153 can be failed closed at the hot shutdown panel.

- Normal letdown isolation valve 1LCV459. VA 1-8149B can be closed from the hot shutdown panel.

7.2.3 General Fire Instigated Spurious Signals

The applicant presented analyses for a number of devices which may be spuriously operated subject to a fire in the control room, some of which are as follows:

. Main Steam Isolation Valves (MSIVs) 1HV23333A&B, 1HV2334A&B, 1HV2335A&B, and 1HV2336A&B. These devices can be closed from the hot shutdown panel and are electrically isolated from the control room.

. Steam Generator PORVs 1PV2325, 1PV2326, 1PV2327, 1PV2328. The controls for these valves are not electrically isolated from the control room; their manual operation of the valve will be the means of operation. The appropriateness of these manual actions is encompassed in the previously identified unresolved item discussed in Section 5.1 of this report.

. The normal charging isolation valves 1-8105 and 1-8106. These valves are electrically isolated from the control room and can be operated from the hot shutdown panel.

. Pressurizer level control valve 1FCV121. This valve can be put in its fail safe position by either venting through instrument air or disconnecting the DC power to the valve.

The control circuit for the accumulator isolation valves 1-8808A, B, C and D are not electrically isolated from the control room. The applicant intends to utilize jumpers to maintain control or manually operate the valves during hot shutdown. The inspection team considers this action a hot shutdown repair which is not consistent with staff guidelines. Further information is needed to resolve this concern (445/8722-U-04).

7.3 Common Enclosure

The common enclosure concern occurs when nonsafety related cables are run from one redundant train to another and a fire can thereby endanger both redundant trains.

Seven levels of cable separation are in use at Comanche Peak: 1) Train A, orange cable; 2) Train B, green cable; 3) nonsafety, black; 4) protection channel, red; 5) protection channel, white; 6) protection channel, blue; and 7) protection channel, yellow. There is no intermixture of any of the seven levels, and whenever a cable exits a raceway or enclosure, fire stops or seals are installed. The common enclosure concern was found to be satisfactorily addressed by the applicant.

7.4 Multiple High Impedance Faults

TUEC's analyses for the effect of multiple high impedance faults on post fire safe shutdown accounted for the summation of the high impedance fault currents for the affected cables in the fire areas in addition to the maximum operating current for cables outside the fire area. The power supplies are considered by TU Electric to have failed due to fire induced multiple high impedance faults where the total feeder current exceeds the long-term trip current of the affected power supply feeder breaker. The inspector determined that separation and protection were adequate to prevent loss of redundant safe shutdown power supplies. Based on the inspector's review TU Electric's analysis was considered acceptable.

8.0 OPEN ITEMS

Open items are matters which have been discussed with the applicant, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or applicant or both. Open items identified during the inspection are discussed in Sections 3 (one item), 4 (five items), 6 (three items), and 7 (one item) of this report.

9.0 UNRESOLVED ITEMS

Unresolved items are matters about which more information is required in order to determine whether they are acceptable items, violations, or deviations. Unresolved items identified in this inspection are discussed in Sections 4 (one item), 5 (one item), 6 (one item), and 7 (one item) of this report.

10.0 EXIT INTERVIEW (30703)

An exit interview was conducted on October 23, 1987, with the applicant's representatives identified in section 1 of this report. During this exit interview, the scope and findings of the inspection were summarized.

APPENDIX A

Documents Reviewed

A. Reports and Correspondence

1. TU Electric - Generating Division, "Comanche Peak Steam Electric Station - Unit No. 1, Fire Protection Report" Revision 0, September 22, 1987, with the following sections:

   a) Section I - Introduction

   b) Section II - Fire Hazards Analysis Report (FHAR)

   c) Section III - Fire Safe Shutdown Analysis Report (FSSAR)

   d) Section IV - Appendices

2. "Texas Utilities Electric - Comanche Peak Engineering - CPSES Units 1 and 2 - Design Basis Document - Fire Safe Shutdown Analysis", DBO-ME-020, Revision 0, June 19, 1987.

3. "FSSA Calculation No-152, Revision 3, CPSES. Unit No. 1 Fire Area Separation Analysis" Volumes 1, 2 and 3 with transmittal letter 4 May 1987 to Mr. John E. Krechting, TU Electric, from Mr. Elden E. York, Engineering Planning and Management, Inc.

4. A.F. Gagner etc. al. "CPSES - Thermal Hydraulic Analysis of Fire Safe Shutdown Scenario", WCAP-11331, Westinghouse Electric Corp, October 30, 1986.

5. CPSES Operator's Log Entry-Evening Shift May 2, 1984. T. Beandi, Shift Supervisor.

6. S. Popek, "Spurious Safety Inspection Analysis" Engineering Planning and Management Calculation No. EPM - P257 - 167, October 22, 1987.

7. "CPSES Fire Protection Program - Advance Submittal of FSAR Update" - Sections 7.4 (Systems Required for Safe Shutdown), 9.5.1 (Fire Protection Program) and miscellaneous, transmittal letter October 9, 1987 to U.S. NRC Document Control Desk from W. G. Counsil, TU Electric.

8. Thermalag Amp Schedule ECE - M1 - 1700, Revision CP1.

9. Letter from D.P. Barry to Steven D. Einbinder, "Thermalag Cable Ampacity Study."

10. Design Change Authorization No. 61441, "Coordination of Breakers on Panels 1 ED1-2 & 1ED2-2", October 22, 1987.

11. Letter from P.B. Stevens to S. Einbinder "CPSES High Impendance Fault Study."

12. Design Change Authorization No. 42381 Regarding "Change of 480 V Swgr (1B1 & 1B2) Solid State Trip Devices to Westinghouse Amptector Type IIA" dated June 30, 1987. Letter from O.W. Lowe to S.L. Stann.

13. Letter from O. W. Lowe to S. L. Stamm, "DC. Emergency Lighting for The Control Room," dated October 13, 1987.

14. Coordination Study - 118, 120, 120/240 & 208/120 the Non-Class IE AC Panel Board Buses - Calculation The-EE. CA-0008-574 Dase-2/26/8 Non Class IE Buses.

15. Coordination Study - Bus IEA1 - Calculation EE - CA - 0008 - M15.

16. Coordination Study - 6.9 Kv System - Bus 1EA1 - Calculation The - EE-CA-0008 - 15M.7 Date 10/7/86.

17. Coordination Study - 6.9 Kv Power Distribution System - Ground Fault - Calculation The-EE-CA - 0008 157 Rev. 0 Fig. 9 Date 10/7/86.

18. EFM Calc. - Analysis and Resolution of FSSA Associated Circuits of Concern by Common Power supplies, EPM - P257-165-000, dated 10/22/87.

19. Coordination Study - 118; 120 & 208/120 VAC Class IE Panel Board Buses. - The -EE-CA-0008-183 Rev. 0 Fig. #3 Date 10/3/86.

20. Coordination Study - 118, 120 & 208/120 VAC Class IE Panelboard Buses - The-EE-CA-0008 - 183. Rev. 0 Fig. 5.

B. Procedures

Abnormal Conditions Procedures

1. ABN-803A "Response to a Fire in the Control Room or Cable Spreading Room" Rev-0, June 16, 1987 with PCN ABN-803A-R0-1, July 30, 1987, PCN ABN-803A-R0-2, October 9, 1987, PCN ABN-803A-R0-3, October 21, 1987.

2. ABN-804A "Response to Fire in the Safeguards Building," Rev-0, July 15, 1987.

3. ABN-805A "Response to Fire in the Auxiliary Building or the Fuel Building or the Fuel Building", Rev-0, July 15, 1987 with PCN ABN-805A-R0-1, October 13, 1987.

4. ABN-807A "Response to Fire in the Electrical and Control Building," Rev-0, July 15, 1987.

5. ABN -807A "Response to Fire in the Containment Building," Rev-0, July 15, 1987.

6. ABN-808A "Response to Fire in Service Water Intake Structure," Rev-0, July 15, 1987.

7. ABN-809A "Response to Fire in the Turbine Building," Rev-0, July 15, 1987.

8. ABN-301A "Instrument Air System Malfunction" Rev. 2, September 23, 1987 with PCN ABN-301A-R2-1, October 13, 1987.

9. ABN-601A "Response to a 138/345 KV System Malfunction," Rev. 2, September 11, 1985.

C. Drawings

Mechanical

(Note FDE Flow Diagram)

Number	Title	Sheet.	Rev.
2323-M1-0202	FD-Main Reheat & Steam Dump System	-9	CP-9
2323-M1-0206	FD-Auxiliary Feedwater-System		CP-7
2323-M1-0206	FD- Type "In Pump Trains	01	CP-2
2323-M1-0202	FD-Main Reheat & Steam Dump System	-9	CP-9
2323-M1-0203	F" Type In " "	1	CP-6
2323-M1-0216	FD-Compressed Air System	A	CP-1
ECE-M1-0216	Instrument Air Supply Electrical & Control	01	CP-3
2323-M1-0233	FD-Station Service Water System Sheet 1 of 3	-	CP-11
2323-M1-0233	"Type In Sheet 2 of 3	A	CP-1
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