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TUELECTRIC

March 27, 1992

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U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES) - UNITS 1 AND 2
DOCKET NOS. 50-445 AND 50-446
NRC INSPECTION REPORT NOS. 50-445/91-202;50-446/91-201
RESPONSE TO DEFICIENCY AND UNRESOLVED ITEMS

Gentlemen:

TU Electric has reviewed the NRC's letter dated January 27, 1992, concerning the Configuration Management Inspection (CMI) conducted by the NRC staff from November 18 through December 13, 1991. This inspection covered activities authorized by the NRC operating license NPF-87 and construction permit CPPR-127. The January 27, 1992, letter requested that TU Electric respond to the Office of Nuclear Reactor Regulation within 60 days regarding actions taken related to deficiency 50-445/91-202-01; 50-446/91-201-01 and both unresolved items identified within the report. The letter also expressed a concern about the number of examples of failure to verify or to check the adequacy of the design and requested that TU Electric review this matter and advise the NRC as to what, if any, additional corrective actions are planned. The response to this con[illegible] and to the individual findings is addressed in the enclosed attachment.

Sincerely,

William J. Cahill, Jr.

William J. Cahill, Jr.

RHS/tg
Attachment

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JE01

Deficiency

445/91-202-01
446/91-201-01

Finding Title:

Failure to verify or check the adequacy of design.

Description of Condition:

The licensee's design-basis documents (DBDs) and supporting design calculations contained a number of false assumptions and erroneous calculations and computations. Some of these findings are discussed below.

[See below for detailed description of findings.]

Requirement:

Criterion III of Appendix B to 10 CFR Part 50, requires that design control measures be established for verifying or checking the adequacy of design, and for assuring that applicable regulatory requirements and the design basis are correctly translated into applicable specifications, drawings, procedures, and instructions.

Overall Response to 445/91-202-01, 446/91-201-01

Background:

The Project approach to resolve the deficiency included addressing each finding for cause, extent of condition, significance, actions to correct the finding, and actions to prec le ecurrence. Secondly, the individual findings were reviewed collec ively to determine underlying causes to develop preventive actions.

Although the findings varied by discipline, type, and nature, an underlying trend existed throughout in that the findings, in most cases, could have been prevented had the preparers been more careful in developing the calculations and the reviewers or design verifiers been more thorough in their review of calculations and applicable design inputs.

In addition to the actions taken in the past to enhance the quality of calculations (including monitoring programs, technical training, training on attention to detail, and responsibility of calculation preparers and reviewers), the Project is instituting a training program which discusses the design verification provisions in N45.2.11. This training focuses on the purpose, methods, and importance of complete and thorough verification of design using actual examples to reenforce design concepts. CPSES

training began March 16, 1992, and includes site engineers involved in calculation review, verification, and approval. In addition, the results of future TU Electric QA audits and surveillances will be closely monitored by Unit 2 Engineering Assurance to evaluate the effectiveness of these and other actions being taken to enhance calculation quality.

In addition to training, a number of reviews and procedure changes have been or will be performed for the individual findings. These actions are discussed below. Where corrective actions are identified, the results of these activities will be available for onsite review by the noted due dates.

Response to 445/91-202-01 and 446/91-201-01 Finding #1

Description of Condition:

Incorrect design temperature and pressure values were used in vendor-provided Class 1 piping analyses for the emergency core cooling system (ECCS). Westinghouse Calculation ID 2-0152 for pipe stress contained inconsistent values for the design temperature and pressure in different sections of the calculation. Westinghouse had issued revised temperature and pressure values that had not been entered into the Unit 2 "ACCESS" data base until after portions of the calculation had been completed. Vendor Calculation 2-0152 used design temperature and pressure values (2735 psig and 300°F) that differed from the correct values listed in the licensee's "ACCESS" data base (2485 psig and 650°F) and provided by Westinghouse in its letter WPT-12394. These revised values were also applicable to the equivalent Unit 1 systems. Therefore, Westinghouse had failed to reconcile the latest available design temperature and pressure values in some of its Unit 1 final piping calculations. The licensee issued Operation Notification and Evaluation (ONE) Form FX-91-1660 to formally identify and resolve this issue. Westinghouse subsequently identified an additional 14 Unit 1 piping calculations with problems that resulted from the revised design temperature and pressure values. All 14 calculations were evaluated by the licensee and found to have sufficient margin to accommodate the revised values. The team concurred with the licensee's determination that sufficient margin to accommodate the revised value were present.

Reason for Finding:

The following paragraphs summarize the reasons for the finding concerning Unit 1.

- o Training of piping and support personnel to the Westinghouse program and implementing procedures was evident. However, training to the specific project procedures for design change control was considered inadequate.

- o Specific Westinghouse CPSES Unit 1 procedures describing methods for piping analysis and the procedure describing final reconciliation referenced the Piping Designation List (CPES-M-1017), but did not reference possible applicable Design Change Authorizations (DCAs).

- o On September 11, 1991, the CPSES Piping and Support Group was placed on controlled distribution for the Piping Designation List (PDL), Specification CPES-M-1017. Prior to that, the PDL, (Revision 0) was referenced in specific CPSES procedures, and DCAs were transmitted to the Westinghouse Piping and Support Group from Westinghouse projects. Revisions to the PDL and DCAs were received and filed with the revised list. The users of the list were required to review each DCA to ensure the information (input) was current. However, this process involved numerous DCAs and their content was sometimes detailed. Consequently this process was cumbersome.

- o The temperature and pressure changes made by the Westinghouse Fluid System group to the line list were transmitted to CPSES using the correspondence procedure. These changes were incorporated into CPES-M-1017 by the DCA process. The DCAs were transmitted to Westinghouse projects, and projects forwarded the documents to the Westinghouse Piping and Support group. However, DCAs pertaining to the fourteen (14) piping analysis problems were not incorporated into the original analysis.

<u>Corrective Action</u>:

Unit 1 Line List Reconciliation

ONE form, FX-91-1660 was issued, to identify and resolve this finding. A summary of the actions associated with the Unit 1 Class 1 piping calculations is discussed below.

- o Westinghouse reviewed CPES-M-1017, Revision 4, for the Westinghouse Unit 1 scope Class 1 lines to identify differences between specification and analysis design pressures and temperatures. The review was performed on a stress problem basis. Fourteen (14) piping analysis problems were impacted by temperatures and pressures changes. The design calculations have been revised to reflect the correct design pressures and temperatures. The revised calculations do not reflect any significant increase in pipe stress, and the design loading requirements are still met.

- o A review of other correspondence including WPT-12394, -8946 and MED-AEE-6911 was also completed. Inconsistencies were identified but were determined by Westinghouse Fluid Systems to be insignificant.

- o A review will be conducted to compare CPES-M-1017, the Westinghouse line list, ACCESS, and the equipment functional design requirements, with respect to temperatures and pressures to ensure that these documents are in agreement. This review will be completed by May 31, 1992.

- o Unit 1 Westinghouse internal procedures governing the appropriate source and use of design temperatures and pressure have been revised to reflect that CPES-M-1017, Revision 4 with DCAs is the source of the Unit 1 design temperatures and pressures. The procedure tables were corrected to be consistent with CPES-M-1017, Rev. 4.

Resolution of Unit 2 Line List Discrepancies

Westinghouse did not use the correct design pressures and temperatures in some of the Unit 2 piping analyses because ACCESS was being validated when the analysis was being made. The database has subsequently been validated. Westinghouse will use ACCESS to define the appropriate design temperatures and pressures. The intent was always for Westinghouse to use ACCESS; however, it was not employed because the needed information had not yet been incorporated into the database at the time the design analyses were performed. The As-Built Reconciliation program will provide for a single verified source of design inputs and the means to identify and reconcile discrepancies related to the subject design inputs.

Piping and Support Specification and Design Basis Document Review

Programs and procedures for Unit 2 are in place between CPSES and Westinghouse for processing, distributing and incorporating design changes. Design changes, initiated by Westinghouse, are documented and controlled in accordance with the CPSES program. These design change documents are being transmitted to affected groups on a controlled distribution list. These same design change documents, along with the design document, are controlled by ACCESS. Westinghouse personnel performing work for CPSES have access to the database.

To ensure other errors related to DCAs were not made, the following Specifications and Design Basis Documents (DBDs) were reviewed and were all related to the piping analysis.

- o Floor Response Spectra, Rev. 0,
- o Pipeline Designation List, Rev. 0 to Rev. 4
- o Reflection Insulation, R.v. 2,
- o Valve Weight List, Rev. 0
- o Design Basis Document, Building and Secondary Wall Displacements, Rev. 2
- o Piping and Equipment Insulation - Non-Nuclear Safety Related, Rev. 1
- o Penetration Seal Schedule

No additional findings that may have affected the integrity of CPSES piping analysis were found.

Training

DCA training had been given, but not documented, during the Westinghouse Unit 1 piping analysis effort. Since the error occurred, the importance of adequately reviewing DCAs has been re-emphasized in the Unit 2 Westinghouse Piping and Support Group bi-weekly meetings. In these meetings the engineers are made aware of changes that are occurring in the specifications and design documents that are important to the analysts and designers.

Onsite Westinghouse personnel have received training to ensure that the Equipment Qualification and Testing group (EQ&T) is provided with DCAs and TUEs (corrective action documents) that affect Westinghouse supplied equipment. Training has been provided to personnel in the Fluid System group working on the Comanche Peak Project. This training included a discussion of the controls used for system parameter changes transmitted to CPSES, that system parameters be compatible with the Westinghouse Functional Requirements Document, and notification of any system parameter change to the applicable unit(s).

Response 445/91-202-01, 446/91-201-01 Finding #2

Description of Condition:

The Class 1E 125 Vdc short circuit calculations and associated protective device coordination failed to consider the contribution of the battery charger which resulted in a lack of coordination and the replacement of 125 Vdc distribution panel protective fuses. The short circuit and protective device coordination calculations for Units 1 and 2 failed to consider short-circuit test data of the battery vendor to determine internal cell resistances and voltages. The calculation incorrectly used a Thevenin-equivalent representation based on the 140 Vdc equalizing charge voltage, which resulted in using an unrealistically high internal battery cell resistance in the calculation. In addition, the short-circuit current contribution for the battery charger was incorrectly assumed to be limited to 375 A by internal electronic control during the initial fault current surge. However, because the battery charger control elements are silicon-controlled rectifiers, current limiting control would not be effective until the first zero crossing of the ac supply current waveform is reached. This might take more than half a cycle depending on the ac supply circuit time constant (X/R ratio). There was a concern that the small-frame molded-case feeder circuit breakers and feeder protection fuses would attempt to interrupt bolted fault currents in a comparable time lapse. Thus, the higher initial battery charger short-circuit contribution, combined with the battery contribution, could result in excessively high short circuit duty and/or loss of coordination between protective devices. The licensee implemented timely actions to avoid affecting Unit 1 restart. The licensee prepared new short-circuit and protective device coordination calculations and replaced the 200 A distribution panelboard supply circuit fuses with a type having slower blowing characteristics in the high-current region. The new short-circuit calculation correctly used the vendor's short-circuit test

data together with the applicable criteria of ANSI C37.14-1979 to determine the battery cell internal resistance. The team concurred with the licensee actions.

Reason For Finding:

The preparer and reviewer followed the guidelines in IEEE-946-1985 Section 7.92 for calculating the short circuit contribution from the battery chargers. According to IEEE-946-1985, the maximum short circuit current that a charger will deliver will typically not exceed 150% of the charger ampere rating. However, the preparer and reviewer did not recognize that the battery charger current limiting feature does not start until after the short circuit current wave crosses the first zero into the waveform.

The DC battery short circuit current calculation used Thevenin's model of the battery source using 140V DC equalizing voltage because it was assumed to be a more conservative voltage. However, it was not recognized that this model would result in higher internal battery resistance.

Corrective Actions:

The following DC short circuit and coordination calculations were revised to reflect the correct short circuit currents based on the manufacturer's data and industry standard ANSI C37.14-1979.

- Short Circuit Study for Class 1E 125VDC System-Unit 1 Rev. 2
- Short Circuit Study for Class 1E 125 VDC Systems - Unit 2 125 VDC Coordination

The 200A distribution panel board supply circuit fuses were replaced with slow-blow type fuses to accomplish coordination. Additionally, DBD-EE-044, "DC System" will be revised to incorporate the criteria for calculating the DC short circuit currents from batteries based on 125VDC potential, the manufacturer's supplied internal resistance, and ANSI Std. C37.14-1979 for battery charger fault current contribution. This action will be completed by August 30, 1992.

This finding could be applicable to any equipment that has a current limiting feature, such as battery charger and inverters. This equipment has been evaluated for both Units and any similar errors have been determined to have no impact on the existing design.

Response to 445/91-202-01, 446/91-201-01 Finding #3

Description of Condition:

Analyses to ensure that electrical components or cables met the design basis requirements of DBDs EE-03., -052 and 10 CFR 50.49.d had not been performed. The calculation or analysis that demonstrated that the voltage drop margin was adequate for equipment required to mitigate a main steam line break (MSLB) outside containment. The licensee stated that no documentation existed to demonstrate that there was adequate voltage margin. Licensee engineering staff performed a preliminary analysis that the resistance of the cable had increased by 30 percent, which suggested the safety margin had changed. The preliminary analysis and supporting documentation revealed that components met the containment pressure transmitter equipment qualifications and the voltage loop criteria for the transmitters to operate properly under accident conditions. The licensee agreed to formalize the calculational results. The team determined that the licensee actions were appropriate.

Reason for Finding:

The preparer and reviewer believed the differences were negligible and therefore, did not address the impact of the higher ambient temperature on the resistance of the cable lengths routed in areas of postulated Main Steam Line Break (MSLB). Since the duration of this temperature is high enough to increase the cable resistance by approximately 24 % (for power cables - based on 90°C) to 30 % (for instrument and control cables - based on 75°C) from its non-accident value, a potential for not having adequate voltage at the safety devices existed.

Corrective Action:

Safety-related equipment in rooms subject to an MSLB temperature of 334°F outside containment was evaluated. The power equipment in these rooms that operate during an MSLB consist of sixteen motor operated valves. Calculations show that even at the higher temperature of 334°F, a margin of more than 100% is available between the calculated and acceptable cable lengths.

Also, safety-related equipment inside containment subject to an MSLB temperature of 345°F was evaluated. Eighteen containment isolation valves are required to operate upon receipt of a safety injection signal within the first 60 seconds. The margin between the actual length and the acceptable cable length for the valves was found to range from 380% to 1700% based on the minimum bus voltage of 428 volts (i.e., during the largest motor starting and a minimum MOV starting voltage of 368 volts).

Additionally, four other in-containment MOVs provide isolation between the high and low pressure piping of the Reactor Coolant System and Residual Heat Removal (RHR) system. These MOVs are normally closed and remain closed under MSLB conditions. If required to operate under any accident scenario, coincident with the start of the largest motors and minimum system voltage conditions, the voltage at the MOV terminals could be less than 80% or 368V (calculation 2-EE-0008 Rev. 3). This condition was determined to last for no more than 0.5 seconds, which is the maximum recovery time of the voltage when starting the largest load off a diesel generator (Diesel Generator Test Report CP1-MEDGEE-01). During the 0.5 seconds, either the contactor of the MOV will not pickup or the motor will stall until adequate voltage is available at its terminal. The maximum stroke time of these MOVs is 120 seconds. A delay of 0.5 seconds, for completely closing or opening these valves, would have a negligible affect on the safety function of these valves.

The electrical loads in the High Energy Line Break (HELB) areas were also evaluated. Calculation 2-EE-0008 Rev. 3 indicated that a minimum of 500% margin exists between the permissible and the design cable lengths. Therefore, the impact of higher design resistance due to the HELB temperatures on the available voltage at the loads can be neglected.

For Class 1E control and instrumentation circuits, the following Unit 2 calculations were revised to address the effect of the higher ambient temperature of 334°F. Although the bounding ambient temperature due to an MSLB is 345°F inside containment, the conductor temperature will not exceed 334°F. The same temperatures can be applied to the following in-containment devices:

125 VDC Control Circuits
MCC (120 VAC) Control Circuits
Miscellaneous 120 VAC Control Circuits

In calculating the minimum voltages available at the device, 75°C cable resistances were multiplied by a factor of 1.3 to account for the higher MSLB temperature. The new minimum required voltages were compared against the available voltages for acceptability. The minimum required voltages were below the available voltages and were, therefore, acceptable. Changes to the above Unit 2 calculations are underway to evaluate the impact of Unit 1/Unit 2 interface cables. These actions will be completed by August 30, 1992. Similar changes will be reflected on Unit 1 calculations by September 30, 1992. DBD-EE-052 will be revised to require the temperature effect on cable resistance under DBA conditions be considered when calculating the minimum voltage at the equipment. This action will be completed by September 1, 1992.

The CPSES design engineering group has been advised of the requirement to use the appropriate temperature when calculating the voltage drop due to the length of cable which is routed in an MSLB or LOCA environment.

Response to 445/91-202-01, 446/91-201-01 Finding #4

Description of Condition:

An incorrect service water temperature was used in a vendor performed RHR cooldown analysis. Westinghouse Calculation FRSS/SS-TEX-1076, "Comanche Peak 1 & 2 Train Cooldown Times," assumed a constant service water temperature of 102°F over the 24 to 30 hours of the cooldown, rather than assuming an increasing temperature in response to heat rejection to the heatsink. However, technical specifications (TS) required the units to be in a cold shutdown condition within 36 hours if the maximum service water temperature was exceeded. The licensee performed Calculation FSE/SS-TEX-1678, Revision 0, which assumed a worst-case scenario of one unit experiencing a design basis loss-of-coolant accident (LOCA) and the other unit being shut down. The licensee predicted the temperature increase on the basis of Table 4-4 of the study of J. E. Edinger Associates, Inc., entitled, "Hydrothermal Simulations of Comanche Peak Safe Shutdown Impoundment." The licensee performed a new analysis that showed that two-train cooldown of the nonaccident unit could be achieved. The team reviewed the new calculation and agrees with the licensee's conclusion.

Reason For The Finding:

The finding occurred because of inadequate communications between organizations concerning details regarding the time dependence of the Safe Shutdown Impoundment (SSI) temperature. In addition, an erroneous constant SSI temperature value was assumed.

Corrective Action:

In addition to the new analysis noted in the finding, Engineering will determine the SSI temperature as a function of time. A dual unit normal cooldown, which maximizes the heat rejected to the SSI, will be assumed. Westinghouse will determine via formal calculation the cooldown capability of the RHR system using the above results. The calculation will be added to DBD-ME-260. These actions will be completed by April 30, 1992. The RHR Design Basis Document and FSAR will be reviewed for potential impact. Changes to these documents will be made, as necessary, by April 30, 1992.

Project personnel will be instructed to review requests for information from other contractors for completeness and to communicate with the contractor any perceived incompleteness as well as to request complete boundary condition information, when necessary. It will be emphasized that assumptions regarding critical analysis parameters cannot be made. This action will be accomplished through the quality accountability process.

Response to 445/91-202-01, 446/91-201-01 Item #5

Description of Condition:

During the design review, the team found eight calculations that contained nonconservative assumptions, inconsistent information with other calculations, incomplete information, or errors. Although these calculation deficiencies were not safety significant, reanalysis was required in several instances to confirm design adequacy. In the case of the residual heat removal (RHR) cooldown analyses and the diesel generator intake temperature stress analyses, previous design margins were reduced.

Reason For Finding:

Each identified discrepancy, responsible organization, and individual was different. However, the common trend was that each error, although not impacting the calculation results, could have been prevented through a more detailed preparation and rigorous review and verification process. Although similar minor errors may exist in other mechanical calculations, further review is not warranted, based on the type and nature of the findings.

Corrective Action:

As a result of the findings from the NRC and those by QA via an audit, the Unit 2 mechanical engineering discipline reevaluated the group of personnel performing calculation reviews and limited the group based on experience and performance. This group received refresher training on review requirements. No additional mechanical calculations were issued until the reviewers had been trained. Additional training was conducted on the responsibilities of calculation preparers and reviewers.

As described in the NRC Inspection Report, identified discrepancies have or will be corrected by April 1, 1992. Additionally, one set of calculations, for fire protection sprinklers, was identified through a TU Electric QA audit as having an unacceptable level of accuracy relative to piping takeoffs. The completed sprinkler calculations were corrected.

Response to 445/91-202-01, 446/91-201-01 Finding #6

Description of Condition:

The team also found an error in the Calculation TNE-EE-CA-0008-267, Revision 1 of the backup protective relay (device 51 V) settings for the EDGs. The computation of the 6.9 kV bus short circuit voltage level (Vb) incorrectly used the 2000 kVA transformer per unit impedance instead of the EDG impedance. This error resulted in improper application of device 51 V characteristics in the associated coordination curves shown in the

calculation. During isolated emergency operation, the EDG protective devices were bypassed, with the exception of differential and overspeed protection. However, the EDG needed adequate protection to support surveillance testing while in parallel with the preferred power sources. In response, the licensee performed a supplementary calculation that showed that in this scenario the fault current contribution of the system would result in shorter fault clearing time. The shorter fault exposure would not exceed the EDG thermal limits, thus resulting in acceptable protection. The licensee agreed to correct the calculation. The team agreed with the licensee's actions and future corrections.

Reason For Finding:

The finding is attributed to inadequate attention to detail on the part of the calculation preparer, reviewer, and approver.

Corrective Action:

Calculation TNE-EE-CA-0008-267 will be revised to correct the 6.9KV bus voltage computation, and the correct characteristic curve for relay 51V will be utilized in calculations TNE-EE-CA-0008-267 and TNE-EE-CA-0008-157. This action will be completed by August 30, 1992.

In addition to the training planned for design verification, engineers who prepare, review, and approve Electrical Engineering calculations have been advised to pay more attention to details.

Response to 445/91-202-01, 446/91-201-01 Finding #7

Description of Condition:

The licensee's seismic support calculation (Ebasco Calculation No. Vol IV, Book 52) for the battery room explosion proof heater used an incorrect heater assembly weight. The licensee used a weight of 900 pounds for the seismic support of the heater assembly in the computer analysis rather than the weight of 1160 pounds as indicated in vendor Drawing 66L. No justification for the use of the 900-pound weight was noted in the calculation. The licensee generated a ONE Form FX-91-1661 to address the issue for both units and to correct the calculation. There was sufficient margin in the calculation to accommodate the increased weight and this type of heater was not used elsewhere in either unit. The team reviewed the licensee action and agreed that sufficient margin in the calculation was present.

Reason For Finding:

Review of the finding following the NRC inspection revealed that during the copying process of the calculation, a second book in the calculation package was inadvertently omitted. This was not readily apparent to the HVAC engineer during review of the calculation. When the calculation was requested for revision and the calculation package provided (including the second book) it was found that the original calculation had considered the appropriate weight of the heater and the condition was not a deficiency.

Corrective Action:

Calculation Change Notice (CCN) Number 1 was issued to clarify the calculation table of contents to preclude recurrence of this situation.

Response to 445/91-202-01, 46/91-201-01 Finding #8

Description of Condition:

Another potentially adverse effect of the high primary transformer protective device setting was the extended (approximately 4.5 seconds) EDG exposure to a fault in the transformer secondary terminals. Such a fault could result in EDG loss of excitation due to low output voltage (approximately 60%) with attendant loss of the 6.9 kV bus. The team considered this an unanalyzed condition of the Class 1E emergency power supplies of the generating station, requiring resolution in support of continued plant operations. The licensee consulted with the EDG exciter vendor who stated that the excitation system would not collapse under the extended low voltage exposure caused by the postulated fault condition. This was attributed to the EDG time constant of five seconds and the vector summing design of the excitation system. The licensee then determined that adequate design margin was present. The team agreed with their determination.

Reason For Finding:

The unanalyzed condition in the calculation is attributed to the preparer's and reviewer's inadequate attention to details.

Corrective Action:

Calculation TNE-EE-CA-0008-267 will be revised to address the effect of the power center transformer overcurrent relay setting on EDG performance/availability by August 30, 1992.

Additionally, preparers, reviewers, and approvers, working on calculations have been advised to pay more attention to details in regard to the protective device settings and their potential effects on the overall Electrical System Protection.

Unresolved Item 445/91-202-01, 446/91-201-01

Description of Condition:

FSAR Section 3.1.1.5 contained a commitment by the licensee to comply with 10 CFR 50, General Design Criteria 5. Structures, systems, and components important to safety shall not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units. The team requested documentation from the licensee to show compliance with GDC 5. The licensee's evaluation of GDC 5 compliance was in the process at the time of the inspection, with no firm completion date established. However, the automatic transfer system for the six 480 V MCCs shared between Units 1 and 2 (i.e., XEB1-1 & 2, XEB2-1 & 2, XEB3-2 and XEB4-2) were energized and available for connection to Unit 2.

The team reviewed the automatic transfer scheme and found that there was no provision to prevent an automatic transfer of a faulted 480 V MCC from occurring upon loss of the preferred power supply due to a fault on the affected shared 480 V MCC. The lack of interlocks to prevent the automatic transfer of a faulted 480 V MCC from Unit 1 to Unit 2, or vice versa, could potentially impact the operation of other safety equipment.

The licensee stated the fault would only affect one safety train (A or B) and that the other train would be available to perform the required safety functions. The team remained concerned that the design allowed the automatic transfer of a faulted MCC from one unit to the other without a full evaluation having been performed by the licensee to address the potential consequences. The licensee agreed to further review the automatic transfer scheme to determine whether it is satisfactory or if design modifications are required.

Response to 445/91-202-01, 446/91-201-01

Compliance to GDC 5 has been addressed in DBD-EE-057, Rev. 8, Attachment 20, entitled "Separation Evaluation Report." Sections 1.3, 4.0, 5.1.2 and 5.4 of the DBD describe general commitments and the program methodology for Unit 1/Unit 2 interfaces through shared systems, while Section 3.14 identifies requirements for shared circuits.

As discussed with the inspection team, analysis of the shared mechanical system is scheduled to be completed as part of the Unit 2 overall program for shared systems. A modification which would prevent the automatic transfer of a faulted 480V common MCC from Unit 1 and Unit 2, or vice versa, is being evaluated for implementation prior to Unit 2 fuel load.

Unresolved Item 445/91-202-02, 446/91-201-02

Description of Condition:

The licensee's Class 1E 125 VDC short circuit calculations indicated that, under fault conditions with initial current surges in excess of 5600 amperes, a potential for damage to the battery chargers existed. IEEE standard 279-1971 states that class 1E systems should be protected. This item requires further evaluation by the licensee and the battery charger vendor.

Response to 445/91-202-02, 446/91-201-02

Battery charger vendor, Power Conversion Products (PCP), conducted a test at its facility on a battery charger model which is the same as the type used at CPSES. The vendor has provided the results of that test to CPSES and has confirmed that the fusos provided to protect the Silicon Controlled Rectifiers (SCRs) blew almost instantaneously upon a dead short on the DC side of the battery charger. PCP battery charger test report TU P.O. #C0000163-701 indicated that there was no damage to the SCRs after the test.

Dead short circuits on buses of electrical equipment manufactured and tested in accordance with proven industry standards, qualified to IEEE qualification and seismic requirements and operated in a controlled mild environment, are less likely to occur. However, if postulated, the fault would be cleared by the protective fuses as demonstrated by the vendor's test. The resulting temporary loss and isolation of the charger meets the intent of IEEE-279 and 308 because of the following features provided in the CPSES design:

1. The loss of AC input to the battery charger is alarmed in the control room.

2. A readily connectable backup battery charger is provided for each safety train.

It is therefore concluded that the Class 1E DC Power Supply System supported by dual battery chargers provides a reliable power supply source and is adequately protected and monitored against postulated faults in the system.