APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-445/92-34
50-446/92-34

Operating License: NPF-87
Construction Permit: CPPR-127
Expiration Date: August 1, 1995

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

Facility Name: Comanche Peak Steam Electric Station, Units 1 and 2

Inspection At: Glen Rose, Texas

Inspection Conducted: August 2 through September 12, 1992

Inspectors: D. N. Graves, Senior Resident Inspector
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Reviewed by: L A Yandell 10/2/92
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Division of Reactor Projects

Inspection Summary

Inspection Conducted August 2 through September 12, 1992 (Report 50-446/92-34)

Areas Inspected: Routine, unannounced inspection of preoperational test program implementation, preoperational test procedure review, preoperational test witnessing, followup on previously identified violations, followup on other inspection findings, and followup on construction deficiencies.

Results:

- General plant conditions and housekeeping observed during tours were good (paragraph 2.1).

- Maintenance activities observed were effectively controlled and executed with the exception of the blind flange left installed in the No. 2-02 emergency diesel generator which was identified as an example of a violation (paragraph 2.5.1).

- The licensee did not effectively utilize information obtained from industry operating experience (paragraph 2.5.1).

- The preoperational test procedure reviewed was of high quality (paragraph 3.1).

- Control, coordination, and execution of testing activities was excellent (paragraph 4).

- Performance of the shift operating crews during hot functional testing, and especially the remote shutdown capability test demonstration, was excellent, with the exception of an instance of system misalignment identified as a second example of a violation (paragraph 4).

Summary of Inspection Findings:

- Violation 446/9234-01 was opened (paragraphs 2.5.1 and 4.1).

- Violations 446/9129-01, 445/91202-02; 446/91201-02, 445/9208-01, 446/9208-01, and 446/9216-02 were closed (paragraphs 5.1, 5.2, 5.3, and 5.4).

- Inspection Followup Item 446/9009-03 was reviewed but not closed (paragraph 6.1).

- Unresolved Item 446/9225-02 was closed (paragraph 6.2).

- Construction Deficiencies CP-88-38, CP-89-008, CP-90-001, and CP-91-006 were closed (paragraphs 7.1, 7.2, 7.3 and 7.4).

Inspection Summary

Inspection Conducted August 2 through September 12, 1992 (Report 50-445/92-34)

Areas Inspected: No inspection activites were conducted on Unit 1.

Results: Not applicable.

Summary of Inspection Findings: Not applicable.

Attachments:

- Attachment 1 - Persons Contacted and Exit Meeting

DETAILS

1 PLANT STATUS (71302)

At the beginning of this inspection period, the plant was at normal operating pressure and temperature of 2235 psig and 557°F. Hot functional testing (HFT) was in progress. Numerous preoperational and acceptance tests were performed and HFT was concluded on September 4, 1992. The reactor coolant system was subsequently cooled down, partially drained, and vented to the containment atmosphere in preparation for the containment structural integrity test and integrated leak rate test. The structural integrity test/integrated leak rate test sequence was commenced on September 11, 1992, and was in progress at the end of this inspection period. As of the end of this inspection period, 72 of 151 preoperational and acceptance tests had been completed. Fifteen out of 77 total systems have been accepted by operations. Various preoperational and acceptance tests were in progress at the conclusion of this inspection period, with emergency diesel generator and reactor protection system testing being the critical path to the integrated protection system testing which is currently scheduled for late October 1992.

2 PREOPERATIONAL TEST PROGRAM IMPLEMENTATION (71302, 92701)

The inspectors evaluated the licensee's management control program to determine if jurisdictional controls were observed for system turnovers, that systems and components undergoing testing were properly controlled, that maintenance activities and preoperational tests were adequately performed, that test discrepancies were properly identified, and that test procedures and operational verifications were satisfactorily conducted.

2.1 Unit 2 Tours

Routine tours of the Unit 2 facility were conducted in order to assess equipment conditions, access controls, and adherence to regulatory requirements. Additionally, the plant was inspected for fire hazards and general housekeeping.

Areas of the plant that contained systems related to HFT were identified and posted as HFT rooms to heighten the awareness of individuals that may have been working in those rooms. The administrative access control system was effective in controlling construction activities in the rooms/areas under access control. At the end of this inspection period, 163 out of 211 rooms/areas were under administrative access control.

Transient combustibles were adequately controlled, and hot work activities such as welding and grinding were controlled in accordance with site procedures.

Housekeeping was generally good, with the containment building being exceptionally clean. Although an improving trend was noted in the safeguards

building, piping penetration Rooms 77 and 80, were below the level of cleanliness exhibited in the majority of the plant.

2.2 Turbine Driven Auxiliary Feedwater Pump Maintenance

The inspectors observed the activities associated with the replacement of the packing on the turbine-driven auxiliary feedwater pump. The work was performed under Startup Work Package Z-21368. All observed activities were performed in accordance with the work document and good work practices were utilized regarding system cleanliness. The craft foreman was present at the job site throughout the activity and the level of quality control involvement was appropriate.

2.3 Nuclear Instrumentation System Troubleshooting

The inspectors observed troubleshooting of the source and intermediate range nuclear instrumentation systems, which was performed in accordance with Startup Work Permit Z-20934. The troubleshooting was performed in an attempt to identify the source of electrical noise present in the instrumentation systems that exceeded the acceptance criteria. The troubleshooting activities included inspecting the cables for insulation damage, cleaning all terminal lugs and mounting surfaces, determining a temperature profile of the detector ventilation system, installing a new source range detector if required, testing power supplies for ripple and stability, and inspecting junction boxes for integrity and temporary power cable proximity.

The licensee could not determine the source of the electrical noise and was discussing with Westinghouse additional methods to identify and correct the condition.

2.4 Thermo-Lag Installation

The inspectors observed the installation of prepared sections of Thermo-Lag conduit fireproofing material. The material was installed in accordance with Installation Specification CQP-CV-107, Revision 0, "Application of Fire Barriers and Fireproofing Materials." The installation activities were well-controlled and good work practices were utilized by the craftsmen. Quality control involvement in the installation process included the contractor's (Peak Seal) internal quality control inspectors, as well as monitoring by the licensee's quality control organization. The licensee's construction quality assurance organization also provided monitoring of the installation activities.

At the time of the observed installation, approximately 8,000 square feet of Thermo-Lag had been installed out of a total anticipated installation of approximately 29,000 square feet.

2.5 Emergency Diesel Generator (EDG) Issues

2.5.1 Previous EDG Damage

As discussed in NRC Inspection Report 50-445/92-25; 50-446/92-25, the Train B EDG sustained damage as a result of a blank flange that was inadvertently left installed in a lubricating oil header. The licensee performed an investigation of the event which included a root cause analysis and an extensive document review in an attempt to determine when the flange was installed and why it was not removed. Licensee interviews with various startup, construction, and maintenance personnel indicated that blank flanges were installed and removed several times during the performance of oil line flushing. The documentation that controlled those activities, Construction Work Document M2-0215-70958, did not document multiple installations and/or removals. The flush plan, FP2-3000-07, Step 4.1.11, documented the installation of a flange in the subject oil line and was signed as completed on May 20, 1991, but the construction work document that controlled the installation was signed September 30, 1991. The construction work document signoff was for the entire checklist included in the document, not for a specific step. The construction work document did not specifically include signoff steps for blank flange installation and removal. Step 8.3 of the flush plan, which was signed on May 18, 1992, documented the reconnection of the oil supply header blanked off in Step 4.1.11. The construction work document was signed as complete on May 14, 1992. The licensee's root cause analysis concluded that the root cause was a less than adequate procedure to control blank flanges.

The task team included in it's documentation package, information regarding Industry Operating Experience Report 4438, dated March 19, 1991, which discussed a blind flange inadvertently left installed in a lubricating oil line at another facility. The event was reviewed by the licensee's coordinator for industry experience who recommended that a method should be devised to control the use of blind flanges. The industry operating experience report was sent to the startup and maintenance departments for review and action. Startup department's final response in April of 1991 was that adequate controls were already established programmatically in the startup administrative procedures governing prerequisite and preoperational testing. The response also indicated that Comanche Peak Steam Electric Station (CPSES) would not utilize blank flanges to stop oil flow to bearings during startup.

Maintenance's response, dated May 15, 1991, stated that adequate controls were established by Procedure STA-606, "Work Controls." In addition, the industry operating experience report would be distributed to mechanical maintenance planners and supervisors as a "lessons learned."

Corrective actions proposed by the licensee's task team included:

- Revise Procedure CDP-ME-101, "Installation of RWMS Piping, ANSI B31.1 Piping and Associated Components to require enhancement and accountability of blind flanges."
- Revise the appropriate startup administrative procedure to require accountability of blank flanges.
- Provide training and lessons learned to applicable startup, maintenance, and construction personnel on the need for thorough work documentation.
- Revise startup's response to the industry operating experience report to incorporate lessons learned from the task team associated with the EDG blind flange event.

The inspectors' review of this event determined that the licensee performed an indepth and thorough investigation of the event and the associated documentation. Although the investigation was extensive and comprehensive, the failure to provide work documents and procedures adequate to prevent the observed EDG damage is an example of a violation of 10 CFR Part 50, Appendix B, Criterion V (446/9234-01). Additionally, the licensee had information in the form of the industry operating experience report that recommended that the controls associated with blank flanges should be reviewed and improved if necessary. The failure to improve blank flange control following internal recommendations is regarded as a weakness.

2.5.2 Performance of EDG Prerequisite/Special Testing

On August 12, 1992, the inspectors witnessed a portion of the licensee's testing of the Train B EDG. The testing was performed according to special Test Procedure 2CP-ST-30-04B, Revision 0, "Initial Diesel Generator Run, Train B." The observed testing was performed appropriately and included testing of the overspeed trip device, which had been replaced following the event described in Section 2.5.1 of this report. Communications between the EDG room and the control room were good. One poor work practice was observed in that a worker was observed standing on small diameter safety-related pneumatic tubing. Another worker indicated to the individual that he should move off the tubing, which he did. However, later the same individual was observed again standing on the same tubing but at a different location. The inspectors brought this matter to the attention of a startup supervisor who promptly informed the worker's supervisor. No damage to the tubing was observed and the worker was counseled by his supervisor.

2.5.3 Closure of Train B EDG Output Breaker Out of Phase

On September 2, 1992, while performing a portion of Procedure 2CP-ST-30-04B, a reactor operator closed the generator output breaker approximately 170°F out of phase. The engine had been started at 2:37 p.m., with the output breaker

racked out so that testing personnel could perform electrical checks on the generator. The generator was prepared for synchronizing by matching the generator's frequency and voltage with the bus parameters. According to the operator, he had reviewed the procedure several times and was comfortable with the procedure. There was a delay between establishing the initial generator conditions and attempting to close the breaker while the electrical checks were completed and the breaker was racked in. At approximately 3:15 p.m., according to the operator, he performed a self-verification on the machine's governor and voltage controls and on the breaker handswitch, and then closed the breaker, but did not look at the synchroscope. The breaker closed, and operators in the EDG room heard what was described as a loud "pop" near the generator. The generator breaker and the engine were tripped by the operator in the control room. The EDG was placed in the maintenance mode and the breaker was racked out.

Operations Notification and Evaluation (ONE) Form 92-866, was generated to document the event. An inspection plan for the EDG engine, generator, excitation circuit, breaker, and anchor bolts was generated and performed. The inspections were performed under several work documents: Construction Work Order C91-391 and Startup Work Permits 21409, 21524, 21547, 21575, and 21577.

The inspectors witnessed selected aspects of the engine and generator inspections performed by the licensee. Specifically, the inspectors witnessed:

- The visual inspection of the generator starter coils, air gap, and rotor windings,
- Generator resistance checks,
- Retorquing of six anchor bolts on each side of the EDG closest to the generator, and
- Visual inspection of the No. 6 main bearing oil flow path.

The inspectors determined that the safety tagging for the task was properly performed in accordance with Clearance No. S92-2625. Prerequisites for the inspection were properly performed, and the Unit 2 Impact Sheets were properly completed and included in the work documents. Good work practices were utilized by the craftsmen including proper material control and maintaining the required cleanliness level.

The licensee's inspection plan was determined to be comprehensive in scope; and no engine, generator, or breaker damage was found.

2.5.4 Additional EDG Testing

On September 7, 1992, during performance of the special test, the No. 2-02

diesel engine was being shut down. When the operator opened the generator output breaker, the engine accelerated to approximately 600 rpm, and then returned to approximately 450 rpm. The overspeed alarm actuated, and the trip setpoint of approximately 520 rpm was exceeded. The engine failed to trip automatically, and the operators attempted to shut the engine down from the control room, but the fuel racks failed to completely close and the engine did not shut down. The test engineer unsuccessfully attempted to trip the EDG locally. An auxiliary operator was dispatched to close the fuel oil day tank outlet valve to shut off the fuel supply to the engine. The engine ran for approximately 10 additional minutes before it finally shut down from lack of fuel. The licensee's investigation determined that a jam nut on the threaded idle stop was missing which had allowed the idle stop to back out of the fuel rack operating arm and prevent full closure movement of the fuel racks. The investigation determined that the initial overspeed was due to the unloading of the engine by opening the output breaker. This would normally cause the governor to reposition the fuel racks to the idle position. With the idle stop not allowing full movement of the fuel racks, fuel rack movement was physically stopped prior to reaching the idle position, thus providing more fuel than required for the unloaded condition. The initial surge due to suddenly unloading the engine resulted in the temporary overspeed condition.

ONE Form 92-884 was initiated to document the event and to request that engineering evaluate the condition for Unit 1. No conclusive reason for the missing jam nut could be determined by the licensee. The Unit 2 Train A engine and both Unit 1 engines were inspected and the jam nuts were verified to be properly installed. A vendor representative was on site at the time, was consulted regarding the condition, and recommended reinstalling the jam nut and sealing it in place. This activity was witnessed by the inspectors and was satisfactorily completed. The vendor also indicated to the licensee that no abnormal wear on engine parts should occur below 625 rpm.

The inspectors witnessed the testing of the engine subsequent to the repair described above. Proper operation of the governor and mechanical overspeed trip device were verified.

2.6 Technical Evaluation Review

The NRC reviewed the licensee's program developed to meet the requirements of Generic Letter 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." This inspection was documented in NRC Inspection Report 50-445/91-51; 50-446/91-51. During that inspection, the inspectors noted that the reactor coolant pump thermal barrier component cooling water return isolation valves (TV-4691, -4692, -4693, and -4694), were not included in the scope of the program. The licensee stated at the time of the inspection that the valves would be included in the program if the NRC concluded that mispositioning of the valves was a valid concern. Subsequent to that inspection, the licensee performed an evaluation of the subject valves on each unit to determine the safety significance of mispositioning the valves.

During this inspection, the licensee provided the evaluation, Technical Evaluation 92-1130, to the NRC for review. The inspector's review of the evaluation concluded that the licensee's position to not include the reactor coolant pump thermal barrier component cooling water isolation valves in the program was acceptable. These valves had been previously identified and questioned by the NRC, and discussed in the Safety Evaluation Report, Supplement 17. In that supplement, the NRC found that the licensee's corrective actions to install additional check valves upstream of the reactor coolant pump thermal barrier, to install safety-related instrumentation to provide a means of positively sensing a thermal barrier rupture, and the replacement of a flow orifice plate with an orifice plate that could withstand the resulting pressure from a thermal barrier rupture were acceptable. The evaluation also addressed the effects of mispositioning the valves and concluded that no safety significant concerns existed. Additionally, the inspectors reviewed emergency and abnormal operating procedures related to these valves and determined that no problems would have resulted from inadvertent closure of the subject valves.

2.7 Material Controls During Preoperational Phase

During this reporting period, the inspectors evaluated selected aspects of the licensee's materials control program. Specifically, the inspectors examined the programmatic controls associated with the use of "picking tickets" as defined in Materials Management Organization Procedure MMO 4.03, Revision 4, "Issues And Returns." As described in this procedure, picking tickets are purchasing and materials management system computer generated forms which are used by warehouse personnel to issue materials, parts, components and supplies from the warehouse.

Personnel requesting stock items from the warehouse are required to process a material request for issue form. The description and material attributes are then delineated on the associated picking ticket. As determined by the inspectors, the picking tickets nominally contain information relating to the utility's stock number, the quantity desired, material description, code and class information, work order number, vendor catalog number, serial number, heat number/code, and purchase order number. Additionally, this process directs that picking tickets specify the appropriate procurement level for the material (i.e., safety-related, augmented quality, or nonsafety-related). Thus, the material, which is specified on the picking ticket, is uniquely identified to the associated work item.

The inspectors also ascertained that procedural barriers, which would prohibit the misapplication of material drawn from the warehouse with picking tickets, were provided in the following procedures:

- ACP-11.1, Revision 13, "Pipe Fabrication And Installation"
- ACP-11.5, Revision 11, "Component Support Fabrication And Installation"

- CQP-CV-105, Revision 1, "Fabrication And Erection of Structural And Miscellaneous Steel"

- CQP-ME-102-4, Revision 1, "Fabrication, Installation, Rework, Repair And Replacement of Pipe Whip Restraints And Support Structures"

Specifically, these procedures required that material identification be maintained on all items during the fabrication and installation activities and that the material identification be maintained between the item and its associated documentation. Furthermore, these procedures directed that a material requisition/issue form (picking ticket/quality assurance tag) be verified by quality control to indicate that the specific materials issued matched the description specified on the material requisition/issue form.

Within this area, the inspectors also reviewed the following quality assurance surveillances which evaluated the use of picking tickets:

- QAS-91-098, Material Control
- QAS-91-202, Material Control, Housekeeping, and Combustibles
- QAS-91-238, Material Control, Housekeeping, Rigging, and Combustibles

Based on the review of these quality assurance surveillances and the previously referenced quality procedures, no deficiencies were identified relative to the use of picking tickets and the programmatic controls governing materials issuance were determined to be acceptable.

2.8 Conclusions

The observed work and inspection activities performed by the licensee were excellent. One violation was identified relative to the EDG flushing activities which were actually performed several months ago. The failure to fully evaluate and implement the recommendations of the industry operating experience report related to the blank flange issue indicate a potential weakness in the use of industry experience to prevent the failure of safety-related equipment.

3 PREOPERATIONAL TEST PROCEDURE REVIEW (70300, 70305)

The inspectors reviewed selected preoperational test procedures to determine if they conformed to the licensee's administrative requirements for format and content, and to ascertain whether the procedures incorporated the requisite test criteria. The procedures were also reviewed to determine if the stated test objectives satisfied the appropriate Regulatory Guides, Final Safety Analysis Report (FSAR), Safety Evaluation Report, and licensing commitments; that the prerequisite test conditions were delineated; that human factor considerations were incorporated, that the test methodology would produce the desired acceptance criteria; and that the appropriate qualitative and quantitative acceptance criteria were identified.

3.1 Preoperational Test Procedure 2CP-PT-64-11

Based on the inspector's review of Procedure 2CP-PT-64-11, Revision 0, "Anticipated Transient Without Scram Mitigation System Actuation Circuitry Operational Test," it was determined that the procedure was developed and formatted in accordance with the licensee's startup administrative procedures. The test procedure contained the appropriate provisions for the verification of test prerequisites. The functional requirements of the FSAR and the design basis documents were reviewed and found to be incorporated into the test procedure. Acceptance criteria were clearly defined and identified in the test procedure. Several of the test objectives referenced other preoperational or acceptance tests to satisfy the test objectives. Specifically, the auxiliary feedwater pumps starting logic and main turbine trip logic were verified to be contained in their respective test procedures. The procedure was determined to be well written, and contained the required elements to demonstrate that the system would perform its intended function.

3.2 Conclusions

The test procedure reviewed was well written, incorporated all of the reviewed requirements, and was formatted in accordance with the appropriate administrative requirements.

4 PREOPERATIONAL TEST WITNESSING (63050, 70313, 70314, 70315, 70316, 70317, 70438, 70452, 70441, 71302)

The inspectors witnessed the performance of portions of various preoperational testing activities to verify that the testing was conducted in accordance with approved procedures, and to verify the adequacy of test program records including the preliminary evaluation of test results.

4.1 Hot Functional Testing

HFT was in progress at the beginning of this inspection period and was completed on September 4, 1992. During this period, the inspectors observed various testing activities associated with HFT, in addition to the conduct of operating crew and test personnel during maintenance and testing activities. The HFT procedure, 2CP-PT-55-02, Revision 1, "Hot Functional Test," established plant conditions and indicated which tests should be performed at various plant conditions. The field support supervisor was responsible for coordinating the test scheduling and interfacing with the unit supervisor to provide operations support. This coordination of testing activities was well controlled and executed during the periods observed by the inspectors.

The inspectors observed the performance of the shift operators during testing activities and periods of inactivity. Activities performed by the operators to support testing were under the direct supervision of the unit supervisor. Good operational control of the evolutions was displayed by the unit supervisor as well as the reactor operators. Briefings held before each observed testing activity typically included the test engineer, test

technicians, the unit supervisor, the reactor operators involved, the field support supervisor, the participating auxiliary operators, and a quality assurance representative. The scope of the tests was discussed as well as expected operator actions, plant responses, and required hold or data recording points. The operators typically exhibited a good knowledge of the test expectations and occasionally asked for clarification or additional information on specific actions required by the test procedure. Shift staffing was observed and found to be satisfactory. No instances of shift staffing dropping below licensee management's expectations were observed by the inspectors. Provisions were made in the daily shift orders to notify licensee management if shift staffing levels dropped below expectations.

On September 3, 1992, during a static fill and vent of the Train B of the residual heat removal system, the licensee determined that the residual heat removal system pump discharge Valve (2-8724B) was closed when it was expected to have been open. The Unit 2 shift supervisor was immediately notified and directed that a complete valve lineup be performed on both trains of residual heat removal. No additional valves were identified out of position in the B train. Four valves in Train A were found to be out of their expected position. Valve 2RH-0026, the Train A residual heat removal pump to the post accident sampling system isolation valve, was found open when it should have been closed per the residual heat removal valve lineup. This valve was determined to have been repositioned during the performance of and in accordance with Procedure 2CP-PT-59-01, "Post Accident Sample System," Revision 0. The other three valves identified out of position (2SI-0028, 2SI-0026-9, and 2SI-0134), were valves associated with the valve tank enclosure for Valve 2-8811A, the Train A containment sump to residual heat removal suction valve, and were not directly connected to the residual heat removal system.

The licensee conducted interviews with the operators, test personnel, and supervisors that may have had cause to reposition the subject valves or may have had the opportunity to misposition the valves during the performance of other activities. A review was performed of other activities or testing that may have required repositioning the subject valves. No cause for the valves being out of their expected position could be determined.

ONE Form 92-879 was written to document the event and the licensee indicated that a "lessons learned" memorandum would be issued to emphasize the importance of maintaining and verifying valve lineups, and that changes in valve status not specifically controlled by a specific procedure should be logged in the unit log. The licensee indicated that, although not formally proceduralized, operators routinely verify the major flow path; i.e., suction and discharge valve positions prior to starting major pumps. The inspectors' review of the ONE form determined that one of the valves listed on the original form was numbered incorrectly. This was brought to the licensee's attention and the ONE form was corrected.

Step 6.1.3 of Operations Department Administration Procedure ODA-410, Revision 4, states that the position of components not controlled by a

specific procedure or clearance should be logged in the unit log or shift-turnover sheet. The failure to maintain knowledge of the residual heat removal system status is a second example of a violation of 10 CFR Part 50, Appendix B, Criterion V (446/9234-01).

4.2 Remote Shutdown Demonstration

The inspectors observed the activities associated with the performance of test Procedure ISU-223B, Revision 0, "Remote Shutdown Capability Tests." The pre-test briefing, conducted by the test engineer, was thorough and covered the criteria and plant conditions that would require termination of the test. Control room personnel remained on station and monitored plant parameters during the duration of the test, but were prohibited from communicating with the remote shutdown panel personnel for successful performance of the test.

Upon commencement of the test, the plant was placed in a stable, hot standby condition in accordance with Procedure SOI-HFT-ABN-905B, "Loss of Control Room Habitability." This stable condition was maintained for a minimum of 30 minutes at which point a 50-degree cooldown was performed. The inspectors observed an auxiliary operator performing the local actions necessary to transfer control of the steam generator atmospheric relief valves, Reactor Coolant System Loop 4 pressurizer spray valve, and the Train A residual heat removal heat exchanger outlet and bypass valves, from the control room to the remote shutdown panel. These actions were well executed in accordance with Attachments 8 and 9 of the above referenced SOI. Following the demonstrated 50-degree cooldown, communications were allowed between the control room and the remote shutdown panel. The operators took this opportunity to compare parameter indications and confirm plant conditions. Near 400°F reactor coolant system temperature, communications were again closed between the control room and the remote shutdown panel. The cooldown was continued and the remote operating crew demonstrated the capability to establish cooling using the residual heat removal system. Once the demonstration was complete, control of the reactor was transferred back to the control room.

All facets of test performance were excellent, including test briefing, performance, communications, and equipment manipulations. The operations crew's performance at the remote shutdown panel was excellent. The operators were well prepared and knowledgeable regarding remote shutdown panel procedures and operations.

4.3 Emergency Diesel Generator Testing

The inspectors observed a portion of the 24-hour endurance test of the Train B EDG performed per Procedure 2CP-PT-30-01B, "Emergency Diesel Generator, 'Train B'," Revision 1. Additionally, several of the required 35 consecutive starts were witnessed by the inspectors. The testing activities were performed in accordance with the subject test procedure. Appropriate communications were established and utilized between the EDG room local control station and the control room. Data was recorded as required by the

procedure, and the observed EDG starts were performed appropriately. Diesel generator synchronizing, loading, and unloading activities were observed on several occasions during the testing and were determined to be well-performed. The operators and test personnel were determined to be knowledgeable regarding the test procedure and its requirements, precautions, and limitations.

4.4 Pressurizer Pressure Control System Testing

The inspectors witnessed various portions of Procedure 2CP-[illegible]-55-08, Revision 0, "Pressurizer Pressure Control System." Specifically, the observation included testing of the power-operated relief valves, pressurizer transient response, power-operated relief valves dynamic testing, and pressure relief functional test. Test procedure changes incorporated into the test procedure were reviewed to ensure that they were properly authorized.

The inspectors also witnessed the retest of the power-operated relief valves (2-PCV-0455A and -0456) subsequent to modification of the nitrogen supply lines associated with those valves. Opening times for the valves were acceptable. The closing times, however, exceeded the times specified in the test procedure and in the design basis document, DBD-ME-250, "Reactor Coolant System." The discrepancies in closing times were documented on TU Evaluation (TUE) Forms 92-6030 and 92-6033 for the two valves. Inspector review of the subsequent technical disposition of these documents determined that the acceptance criteria had been revised based on licensee correspondence with Westinghouse. The closing times were determined to be acceptable based on the revised acceptance criteria.

The observed testing was performed in accordance with the referenced test procedure and administrative requirements. The test procedure changes were properly authorized. Test deficiencies were properly documented. Test equipment utilized was found to be in calibration. Operations and test personnel coordinated well during the observed testing. Shift briefings were held prior to each of the observed test sections regarding required operator actions, the expected equipment response, test equipment requirements, and contingency actions should the equipment not respond as expected. No deficiencies in test performance were observed.

4.5 Safety Injection Accumulator Check Valve Testing

The inspectors observed the performance of Section 7.31 of test Procedure 2CP-PT-57-06, Revision 1, "Hot Functional ECCS Check Valve Operability," regarding the testing of the check valves in the accumulator discharge lines to the reactor coolant system. Initial plant conditions were verified to be established. The test engineer conducted a pre-test briefing and described the expected plant response and the actions that the operators needed to perform to conduct the test, which required lowering reactor coolant system pressure until the pressurized accumulators began injecting into the reactor coolant system. The test was performed in a cautious and deliberate manner

with the reactor operator maintaining constant observation of reactor coolant system parameters. The systems responded as required, and no deficiencies were observed by the inspectors.

4.6 Reactor Protection System Operational Checks

The inspectors witnessed various portions of Test Procedure 2CP-PT-64-02, "Reactor Protection System Operational Checks," Revision 1. The sections of the test witnessed by the inspectors were well controlled and performed by the test engineer. The test procedure was reviewed to determine that the appropriate prerequisite were completed and that the test procedure was current. Although no deficiencies were noted by the inspectors, Test Procedure Change No. 2, while appropriately authorized and implemented, was initiated to correct numerous procedure and typographical errors.

4.7 Solid State Safeguard Sequencer Testing

The inspectors observed the performance of Section 7.18 of Procedure 2CP-PT-64-07, Revision 1, "Solid State Safeguard Sequencer Preoperational Test Procedure." The observed testing consisted of actuating numerous master relays and verifying the expected response of the appropriate slave relay contacts. Additional sections of this test were observed to ensure that the test was being performed in accordance with the test procedure, and that procedure changes were appropriately initiated when required. The observed testing and administration were determined to be well executed and documented.

4.8 Anticipated Transient Without Scram Mitigation System Actuation Circuitry Operational Testing

The inspectors observed the performance of portions of Section 7.1 of Procedure 2CP-PT-64-11, Revision 0, "Anticipated Transient Without Scram Mitigation System Actuation Circuitry Operational Test." The witnessed portions of testing included the verification of contact operation following the actuation of various anticipated transient without scram mitigation system actuation circuitry relays. The procedure was also reviewed for changes and their implementation. The observed testing was performed by the test engineer following authorization by control room personnel. No plant equipment was actuated during the observed testing other than the specific relays actuated by the test engineer as part of the test procedure. Test performance results were documented as required by the test procedure.

4.9 Containment Integrated Leak Rate Test and Structural Integrity Test

The inspectors verified portions of the prerequisite valve lineups for the subject testing. One-hundred thirty-four valves inside the containment building were inspected to verify that they were in the positions required by Section 6.0 of Procedure 2CP-PT-75-02, Revision 0, "Containment Integrated Leak Rate Test." The valves were not only verified for position, but were also checked to ensure that they were clearance tagged as specified in the

subject procedure. Test connections, vent and drains were verified to be uncapped where required. No discrepancies were identified during these prerequisite valve lineup verifications.

The inspectors also observed a portion of the crack mapping required by Engineering Assessment Procedure 2-EAP-035, Revision 0, "Structural Integrity Test, Containment Attachments and Crack Mapping," and performed during the structural integrity test. The maps located on the west side of the containment on the 905 feet elevation and the map above the containment personnel airlock were observed. The test personnel were inspecting each grid square and measuring the crack widths using an optical comparator as required by procedure. The test personnel appeared thorough in their inspections of the marked areas, and the cracks were marked on the containment wall as required by the procedure.

4.10 Turbine Driven Auxiliary Feedwater Pump Testing

The inspectors observed the performance of Section 7.13, "Full Flow Testing," of Test Procedure 2C[illegible]37-03, Revision 0, "Auxiliary Feedwater Turbine Driven Pump." All prerequisites were verified and signed off as complete. Communications were established between the control room and the startup engineer observing local pump operation. The test was well coordinated and all collected data satisfied the acceptance criteria.

The inspectors also observed one cold start of the turbine-driven auxiliary feedwater pump in accordance with section 7.14, "Response Time and Cold Quick Start Testing." The inspectors verified that the required time had elapsed since the previous pump operation. The acceptance criteria for pump differential pressure was not satisfied during the test. However, the remaining data was within the required limits. Startup Deficiency Report 2834 was initiated to document the deficiency, and TUE Form 92-6168 was generated to evaluate the low differential pressure. This evaluation concluded that the recorded data did not represent a design or equipment performance deficiency and was due only to the test methodology utilized to acquire the data. The pump design requirement was to be able to deliver greater than 860 gpm to pressurized steam generators in less than 85 seconds. The 860 gpm flow requirement was met in less than 40 seconds.

The inspectors also witnessed portions of the hydraulic performance testing, 48-hour endurance run, and the 2-hour run with no forced ventilation. During these observations, test and operations personnel performance was excellent. Performance problems with the turbine-driven auxiliary feedwater pump were observed during testing and required extensive troubleshooting and evaluation by the licensee as discussed below.

The pump was operated on August 3 and 4, 1992, prior to beginning the preoperational test, and the outboard thrust bearing exceeded the operating alarm setpoint of 165°F and reached 175°F without stabilizing. TUE Form 92-5960 was initiated to obtain resolution of the issue. The oil was drained

from the pump bearing and was found to contain metal shavings. The pump thrust bearing was replaced. The pump was operated again on August 5 and 6, 1992, and again the thrust bearing temperature reached 175°F without stabilizing. The licensee began an onsite inspection of the pump with a vendor representative present to determine the cause of the high bearing temperatures. On August 9, 1992, the pump was operated following reassembly and the thrust bearing temperature rose to approximately 180°F in ten minutes. The licensee subsequently decided to remove the pump and send it back to the vendor for troubleshooting. The pump was operated several times by the vendor and various alignments and tolerance adjustments were made. The pump was shipped back to the site and was installed on August 24, 1992. The pump vendor provided documentation and authorization for the licensee to raise the temperature alarm setpoint to as high as 220°F and to require shutdown of the pump at 230°F. Technical Evaluation 92-1802 was also generated to allow the use of a synthetic lubricant in the thrust bearing instead of the previously utilized lubricant because of the improved lubricating qualities at higher temperatures. A pump acceptance run was performed and the bearing temperature stabilized at 192°F with an initial pump room temperature of approximately 85°F. During the 48-hour endurance run, bearing temperature stabilized at approximately 200°F. The last 2 hours of the endurance run were scheduled to be performed with no forced ventilation in the room to simulate a blackout condition. When the door and the single ventilation damper were closed, the room temperature began to increase to approximately 127°F, while the pump bearing temperature increased to approximately 204°F. The decision was made by the licensee to reestablish ventilation prior to completion of the 2-hour pump run, complete the endurance run, shut down the pump, and then perform the 2-hour test without ventilation in conjunction with a previously scheduled 1-hour run following pump cooldown. When the test was subsequently performed from ambient conditions, the bearing temperature peaked at approximately 199°F and the room temperature was approximately 105°F. The portions of the preoperational test requiring the pump to be operated have been completed. The observed sections were performed in accordance with test and administrative procedures, and test procedure changes were properly processed.

4.11 Conclusions

The performance of testing activities was determined to be exceptional. Operations and test personnel coordination during all facets of the test process was excellent. Test procedure changes and test deficiencies were quickly addressed and resolved with good technical justification. In general, plant operations were good, although one violation was identified regarding the residual heat removal system valve misalignment. Noteworthy, was the performance of operations personnel during the remote shutdown capability demonstration.

5 FOLLOWUP ON CORRECTIVE ACTIONS FOR VIOLATIONS (92702)

5.1 (Closed) Violation 446/9129-01: Commodity Clearance Nonconformance Reports

This violation involved the failure to provide adequate technical justification for the bulk closure of approximately 550 nonconformance reports associated with commodity clearance violations. Specifically, the technical disposition provided on TUE Forms 90-023, 91-463, and 91-464, did not provide objective evidence to indicate that the identified commodity clearance deviations had been evaluated by engineering to preclude potentially adverse interactions due to seismically and thermally induced displacements.

During this reporting period, the inspectors reviewed the licensee's response, which was delineated in TU Electric's letter (TXX-91313) dated August 28, 1992. As indicated in this correspondence, the three previously referenced TUE Forms were closed and transferred to TUE Form 91-1778, Revision 0, in order to document the resolution of each commodity clearance deviation. The inspectors reviewed TUE Form 91-1778 and determined that these deviations had been appropriately resolved by engineering calculations and supporting documentation.

Based on these reviews, the inspectors determined that appropriate corrective actions had been implemented to address the identified violation.

5.2 (Closed) Violation 445/91202-02; 446/91201-02: Instrument air lines to component cooling water control valves installed incorrectly

This violation involved the incorrect installation of the instrument air lines to the air accumulators, which are routed to the Component Cooling Water Control Valves X-PCV-H116A and -H116B for Trains A and B of the uninterruptible power supply air-conditioning system. Specifically, Atwood and Morrill Co. Drawing 18-120-02, "Actuator Bailey Positioner," Revision 1, showed the instrument air line being routed from the middle of the associated air accumulator and a drain coming off the bottom. The inspectors, however, determined that the air lines were connected to the bottom and the drains were routed from the middle of the accumulator. In addition, this installation had been quality control inspected.

The inspectors reviewed the licensee's corresponding corrective actions which involved initiation of ONE Form EX-91-1659 to address the as-found condition and revision of procedures for acceptance of vendor supplied equipment. The ONE Form was dispositioned to correct the condition via work orders, which were completed on January 18, 1992, for both trains. Since early 1989, CPSES monitors vendor supplied equipment via Procurement Procedure MMO-6.02, and Procurement Quality Procedure NQA-6.02. The inspectors also conducted an examination of the design modification in the field, and reviewed the implementing work documents, including drawings and construction work documents.

Based on the above documentation reviews and inspection results, it was determined that the licensee had implemented appropriate corrective actions to address the identified violation.

5.3 (Closed) Violation 445/9208-01; 446/9208-01: Improper removal of Borg-Warner swing check valve clevis arm pins

This violation involved the misapplication of mechanical maintenance procedures during the disassembly of Borg-Warner swing check valves. In particular, during the disassembly of Check Valves 2FW-201 and 2FW-202, the clevis arms on both valves were broken when mechanical maintenance personnel improperly removed the pivot pins by shearing the associated retaining arm pins with dynamic force.

As subsequently determined, this inappropriate work practice, which was not in accordance with the governing maintenance procedure, had been employed during the disassembly of both Units 1 and 2 Borg-Warner check valves.

In response to this violation the licensee initiated deficiency documents for Units 1 and 2, to address both the programmatic aspects of this issue as well as the potential residual hardware effects. Additionally, as documented in TU Electric's letter (TXX-92243), a task team was appointed by CPSES management to resolve the procedural and generic implications of this occurrence.

The inspectors reviewed the results of the task team investigation which were included in the corrective actions documented on TUE Form 92-4142, Revision 0. As described in this document, the practice of employing disassembly methods on Borg-Warner check valves, other than those delineated in Procedure MSM-CO-8801, was prohibited by maintenance and startup personnel through the issuance of project letters. Additionally, as determined by the inspectors, Unit 2 startup mechanical craft and supervision received training relative to compliance with approved work packages. This training emphasized the process to be adhered to when procedural steps cannot be performed in accordance with existing work documents. Mechanical maintenance also promulgated a "lessons learned" to maintenance personnel to provide additional assurance that work activities accurately reflect the steps specified in the work documents.

With respect to the potential detrimental effects associated with the alternate method of driving out the pivot pins which attach the swing arm to the valve bonnet, the inspectors reviewed the safety analysis which was included in the task team investigation. Based on the results of this review, it was determined that the licensee had properly evaluated the mechanical and metallurgical aspects of the failed clevis arms and that the operability conclusions were reasonable. Accordingly, based on the inspectors reviews of the licensee's corrective and preventive actions, it was concluded that appropriate measures had been implemented to address the identified deficiency.

5.4 (Closed) Violation 446/9216-02: Battery Room Exhaust Fan Work Control

This violation involved the lack of coordination and scheduling of battery room exhaust fan work such that an electrician was allowed to begin work on an energized fan motor resulting in a small electrical fire and damage to the fan motor.

The inspectors reviewed the licensee's corrective action related to this event, including the results of the licensee's task team, steps taken by startup and construction to focus responsibility for sequencing of work activities, procedure revisions to the startup procedures governing temporary modifications and safety tagging, and verification of the generation of training material regarding temporary modifications and safe work practices. The inspectors also reviewed the results of a licensee review of work activities in the field at the time of the event. The licensee's review was to ensure that all work ongoing in the field was proper with respect to existing system configurations. Based on the inspectors' review, the licensee had satisfactorily completed the required corrective actions.

6. FOLLOWUP (92701)

6.1 (Open) Inspection Followup Item 446/9009-03: Inspect Reactor Vessel During or After HFT

In a memorandum dated April 14, 1987, the NRC Executive Director for Operations identified recommendations of the Comanche Peak Report Review Group for followup. During this inspection and during the inspection discussed in NRC Inspection Report 50-445/92-27; 50-446/92-27, the inspectors conducted a visual inspection of the reactor vessel, reactor coolant system piping, metal and concrete supports, and associated components. The inspections were performed during HFT at various temperatures up to and including normal reactor coolant system operating temperature of 557°F. The inspection of the reactor vessel cavity, Room 103, verified that the area was free of debris, that the reactor vessel insulation was affixed, and that there were no obvious indications of structural interference or damage. The inspectors also witnessed clearance measurements performed by the licensee pursuant to Preoperational Test Procedures 2CP-PT-90-03, Revision 0, "Hot Functional Piping Systems Thermal Expansion Test," and 2CP-PT-55-09, Revision 0, "RCS Equipment Supports Thermal Expansion Test." The identified clearance deficiencies were appropriately resolved. This item will remain open pending inspection of the accessible reactor vessel area subsequent to the completion of HFT.

6.2 (Closed) Unresolved Item 446/9225-02: EDG Blind Flange

This item was discussed in paragraph 2.5.1 of this report and will be tracked as a violation identified in the subject paragraph.

7 FOLLOWUP ON LICENSEE ACTION ON 10 CFR PART 50.55(e) DEFICIENCIES (92700)

7.1 (Closed) Construction Deficiency Significant Deficiency Analysis Report (SDAR) CP-88-38: "SG Relief Capacity - SGTR"

This deficiency involved the relief capacities of the steam generator power-operated relief valve in the analysis of the design basis steam generator tube rupture event presented in Section 15 of the FSAR. Specifically, the calculated relief capacities of the steam generator power-operated relief valves were higher than previous estimates, resulting in higher calculated offsite radiological doses, which were conservatively assumed to exceed allowable limits. However, the previous analysis assumed the power-operated relief valve failed to close during the steam generator tube rupture event and the power-operated relief valve block valve could not be closed to isolate the stuck-open power-operated relief valve. This was assumed because the manual operator for the power operated relief valve block valve is in close proximity to the steam discharge stacks, making this closure a hazardous procedure for an auxiliary operator. As previously documented in NRC Inspection Report 50-445/89-65; 50-446/89-65, this construction deficiency was reviewed and closed for Unit 1 based on a design modification which permitted manual operation of the power-operated relief valve block valve via a 20-foot valve stem extension that was installed to relocate the manual operator to a position outside the doorway of Valve Rooms 109A, B, C, and D.

With respect to Unit 2, the inspectors reviewed the licensee's corresponding corrective actions which involved the above design modification per DMRC-88-1-195 in accordance with Design Change Authorizations DCA-100708, -100737, and -101054, which provided instructions for construction of valve stem extensions. The inspectors also conducted an examination of the design modification in the field; reviewed Calculation No. RXE-TA-CP2/0-014, Revision 1, which evaluated the applicability of the Unit 1 steam generator tube rupture evaluation to Unit 2; and reviewed a sample of the implementing work documents, including drawings and construction work documents.

Based on the above documentation reviews and inspection results, it was determined that the licensee had implemented appropriate corrective actions to address the identified deficiency.

7.2 (Closed) Construction Deficiency SDAR CP-89-008: Fisher Control Valve Actuators

This reportable deficiency involved various deficiencies regarding several Fisher valve actuators. This issue was reviewed and closed for Unit 1 in NRC Inspection Report 50-445/90-03; 50-446/90-03. Corrective actions for Unit 2 included replacement of the motor actuators on eight component cooling water valves, and the replacement of the stem assemblies and adjustment of the operating air regulator pressure on two main steam valves.

The inspectors reviewed the Design Change Authorizations associated with this activity (DCAs -93703, -93839, -93843, -93936, and -93455). Additionally, the

inspector reviewed the work packages to implement the design change authorizations, Startup Work Packages 7549 through 7556, and Work Orders C92-3025 and C92-3027. The inspectors performed a partial field walkdown to verify that the corrective actions had been implemented.

Based on the above documentation reviews and field inspection it was determined that the licensee had implemented appropriate corrective action to address the identified deficiency.

7.3 (Closed) Construction Deficiency SDAR CP-90-001: "Feedwater Isolation Valve Impact Testing"

This reportable deficiency involved the failure to test the feedwater isolation valves material for impact resistance per the ASME Boiler and Pressure Vessel Code as originally committed to in the FSAR. Supplemental testing was performed and pressure-temperature limitations were established for operation of the feedwater isolation valves. This issue was reviewed and closed for Unit 1 in NRC Inspection Report 50-445/90-19; 50-446/90-19.

The inspectors reviewed the results of the supplemental testing performed on the Unit 2 feedwater isolation valves. This testing determined that the Unit 2 feedwater isolation valves exhibited the same metallurgical properties as the Unit 1 valves. The same pressure-temperature limitations imposed on the Unit 1 valves were implemented regarding the Unit 2 valves. The inspectors reviewed the latest draft of the Technical Requirements Manual incorporating Unit 2 components, the Unit 2 integrated plant operating procedures, and the Unit 2 shift surveillance procedure and determined that the temperature-pressure limit requirement had been incorporated and was consistent with the corrective actions implemented for Unit 1.

Based on the acceptability of the Unit 1 corrective actions, and the implementation of similar actions on Unit 2 and the inspectors' review of the Unit 2 implementation, it was determined that appropriate corrective actions had been taken to address this deficiency.

7.4 (Closed) Construction Deficiency SDAR CP-91-006: Potential Failure of Limitorque Motor Operator During Design Basis Conditions

This reportable deficiency involved the potential failure of Limitorque 80 ft-lb motors to meet rated capacity during maximum expected differential pressure valve operation. The exact cause of the motor failures could not be determined but was believed to be related to the testing methodology in that manual control of the test loading and data recording phase extended the length of time that the motor was exposed to high amperages. Corrective actions included replacing the damaged motors with new, tested motors, revising the dynamometer test procedure to prevent excessive durations at overcurrent conditions, and performing a review to determine where additional valves using these motors are located in the plant. Two additional safety-related valves were identified in Unit 2. The test results for these two additional valves were reviewed by the licensee with no deficiencies being

identified. The licensee also stated that the two valve motors on Unit 1 similar to the failed Unit 2 motors had been tested using the revised test procedure during the Unit 1 refueling outage in 1991, and no problems were encountered. The inspectors reviewed dispositioned TUE Forms 91-1945 and 91-1946, which addressed the two motor failures, the revised test procedure, and the work documents for replacing the two motors (C92-934 and C92-942).

Based on the inspectors' review of the documentation associated with this deficiency, it was determined that appropriate corrective action had been implemented.

ATTACHMENT 1

1 PERSONS CONTACTED

1.1 TU ELECTRIC

H. D. Bruner, Senior Vice President
W. J. Cahill, Jr., Group Vice President
D. F. Davis, Manager, Plant Analysis
E. P. Gully, Unit 2 Engineering Management
S. W. Harrison, Manager Unit 2 Project Overview
T. L. Heatherly, Licensing Engineer
D. M. McAfee, Manager, Quality Assurance
S. S. Palmer, Stipulation Manager
C. W. Rau, Unit 2 Project Manager
J. Snyder, Startup
C. Wells, Unit 2 Operations
J. E. Wren, Construction Quality Assurance Manager

1.2 CITIZENS ASSOCIATION FOR SOUND ENERGY (CASE)

O. L. Thero, Consultant

1.3 NRC Personnel

The personnel listed above attended the exit meeting. In addition to the above personnel, the inspectors contacted other personnel during this inspection period.

2 EXIT MEETING

An exit meeting was conducted on September 10, 1992. During this meeting, the inspectors reviewed the scope and findings of the report. The licensee did not identify as proprietary, any information provided to, or reviewed by the inspectors.