APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-445/92-47
50-446/92-47

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

Licensee: TU Electric
Skyway Tower
400 North Olive Street
L. B. 81
Dallas, Texas 75201

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

Inspection At: Glen Rose, Texas

Inspection Conducted: October 11 through November 25, 1992

Inspectors: W. B. Jones, Senior Resident Inspector
G. E. Werner, Resident Inspector
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P. A. Goldberg, Reactor Engineer

Reviewed by: LA Yandell 12/24/92
L. A. Yandell, Chief, Project Section B Date
Division of Reactor Projects

Inspection Summary

Inspection Conducted October 11 through November 25, 1992
(Report 50-445/92-47)

Areas Inspected: Routine, unannounced inspection of onsite followup of plant events, refueling activities, operational safety verification, maintenance and surveillance observations, engineered safety features walkdown, a temporary instruction (2515/113, Reliable Decay Heat Removal), and previously identified items.

Results:

- The operators response to the reduction in feedwater flow, with the reactor at full power, was excellent (paragraph 2.1). The subsequent startup and shutdown for the refueling outage were well controlled (paragraphs 4.1 and 4.2).

- Communications between the reactor operators was generally good. However, an instance was noted where the operator assuming licensed duties was not fully cognizant of plant status. It was also noted that managements' expectations were not met for self-verification while placing an instrument air system purge into service (paragraph 4.3).

- The operations shift supervisor responded very well to the security compromise and appropriately classified the event. The licensee effectively communicated between the different organizations to establish the conditions which were to be met prior to exiting from the NOUE (paragraph 2.2).

- Several configuration control issues were identified which impacted the design modification process and work control implementation (paragraph 2.3).

- Two radiological uptake events and several personnel contaminations resulted from contract personnel not being fully cognizant of radiation work requirements and not utilizing good work practices. Additional poor work practices were observed for permanent plant personnel. Remedial radiation worker training, and enhanced supervisory and radiation protection technician oversight, was required to ensure adequate contractor radiological work practices were utilized (paragraph 2.4).

- The ALARA program was well implemented for refueling outage work activities. One instance of improper control of radioactive materials was noted. General area housekeeping within the radiologically controlled area was good (paragraphs 4.4 and 4.5).

- Heavy loads were not adequately controlled in the area of the reactor vessel head. A violation was identified for the inadequate rigging activities (paragraph 3.1).

- Excellent communications were noted between the reactor operators and contract personnel during the reactor core offload (paragraph 3.2).

- Appropriate measures were established to identify the fuel assemblies with failed rodlets and to assure they were not returned to the core for Cycle 3 operation (paragraph 3.3).

- Maintenance activities were generally performed in accordance with procedure requirements. A violation was identified for inadequate control of tools used on stainless steel safety-related components (paragraph 5.1).

- Surveillance activities were performed in accordance with the procedure requirements (paragraph 6).

- The design modification process was effectively utilized and should provide enhancement of the radiation monitoring system (paragraph 7).
- The licensee implemented appropriate measures to assure reliable decay heat removal (paragraph 8.1).

Summary of Inspection Findings:

- Violation 445/9247-01 was opened (paragraph 3.1).
- Violation 445/9247-02 was opened (paragraph 5.1).
- Unresolved Item 445/9247-03 was opened (paragraph 2.3).
- Unresolved Item 445/9247-04 was opened (paragraph 2.4).
- Inspection Followup Item 445/9019-05 was closed (paragraph 9.1).
- Unresolved Item 445/9220-07 was closed (paragraph 9.2).
- Unresolved Item 445/9240-01 was closed (paragraph 9.3).
- Unresolved Item 445/9231-02 was closed (paragraph 9.4).

Inspection Summary (Report 50-446/92-47)

Inspection Conducted October 11 through November 25, 1992 (Report 50-446/92-47)

Areas Inspected: A previous unresolved item and inspection followup item were evaluated and closed.

Results: Not applicable.

Summary of Inspection Findings:

- Inspection Followup Item 446/9019-05 was closed (paragraph 9.1).
- Unresolved Item 446/9220-07 was closed (paragraph 9.2).

Attachments:

- Attachment 1 - Persons Contacted and Exit Meeting

DETAILS

1 PLANT STATUS (71707)

At the beginning of this inspection period, the plant was at 100 percent power. On October 12, 1992, a manual reactor trip was initiated because of the Steam Generator 4 feedwater regulating valve going closed. It was found that the spring within the associated pressure regulator had failed, causing the flow control valve to close. On October 14 a plant startup was commenced and the unit returned to full power.

On October 22 the licensee began reducing reactor power in preparation for the second refueling outage. The main generator output breakers were opened on October 23. The reactor was placed in a subcritical condition by inserting the control rod control banks. Later that morning a control rod urgent failure alarm was received and four Control Bank B Group 1 control rods dropped. The reactor operator initiated a manual reactor trip and verified all the shutdown and control rod banks were inserted. The licensee is currently investigating the cause of the control rod urgent failure alarm. The unit entered Mode 5 on October 26 and Mode 6 was entered on November 3. The core was completely off-loaded November 9 and Mode 6 exited. The core remained off-loaded through the remainder of this inspection period.

2 ONSITE FOLLOWUP OF EVENTS (93702)

2.1 Reactor Trip

On October 12, 1992, an annunciator was received which identified a Steam Generator 4 feedwater/steam flow mismatch. The operator took immediate action to recover feedwater flow by placing the feedwater flow controller in manual and input a 100 percent demand signal to the respective feedwater flow control valve. The bypass valve around the feedwater flow control valve was also opened to provide additional feedwater flow. The operators were not able to provide sufficient flow to the steam generator and the unit was manually tripped prior to the steam generator level reaching the LO-LO reactor trip setpoint. The auxiliary feedwater system started and the unit was stabilized in Mode 3.

The inspectors were promptly notified of the manual reactor trip and the expected safety features activations. The required 10 CFR Part 50.72(b)(2)(ii) notification was made to the NRC Operations Center within the 4-hour period following the event. Later that day, the inspectors met with the licensee to ascertain the cause for the feedwater regulating valve failing closed and independently reviewed the plant response. The inspectors verified that the plant response was consistent with the accident analysis in Final Safety Analysis Report 15.2.7, "Loss of Normal Feedwater." The reactor operators' activities were appropriate and appreciably mitigated the transient.

The inspectors met with maintenance personnel to discuss the feedwater regulating valve failure. The licensee identified that a spring in the associated feedwater regulating valve had broken causing a loss-of-air pressure to the feedwater regulating valve. During the assessment of the failure, it was determined that an incorrect pressure regulator had been installed for the feedwater regulating valve. A pressure regulator with a range of 0-60 psig was installed where a 0-125 psig regulator was required. The pressure regulator was replaced with the 0-125 psig pressure regulator.

The licensee submitted Licensee Event Report (LER) 92-22, "Manual Reactor Trip Due to Feedwater Flow Control Valve Failure," on November 11. This report identified that the root cause for the event was a lack of self-verification in 1990 when the pressure regulator was replaced. An error in the master parts list was found which identified the 0-60 psig pressure regulator as acceptable. The inspectors will review the licensee's corrective action as identified in the LER and Operations Notification and Evaluation (ONE) Form 92-972 during the LER followup.

2.2 Declaration of Notification of Unusual Event (NOUE)

On October 21 the inspectors were notified that a security officer had been physically assaulted and that a plant security compromise existed. Based on this information, the operations shift supervisor declared a NOUE at 4:51 a.m.

The inspectors met with senior licensee management personnel in the technical support center and observed the shift supervisor's actions in the control room. Based on the information provided, the inspectors found that the NOUE declaration was appropriate. The licensee continued to assess the security compromise. The NOUE was exited at 8:47 a.m. after certain predetermined conditions were met.

The licensee submitted LER 92-23, "Physical Assault of Security Officer Results in Security Compromise," on November 20. A special inspection was in progress during this inspection period to assess the licensee's actions. The results of this inspection will be documented in NRC Inspection Report 50-445/92-50; 50-446/92-50.

2.3 Configuration Control

The licensee has identified several configuration control issues since the beginning of the second refueling outage. The principle areas identified were discrepancies between design and as-built plant conditions, plant status including temporary modifications, temporary jumpers not installed in accordance with design, and plant evolutions resulting in unanticipated alarms. The licensee conducted a daily review of each ONE form, which included discussing any configuration control issues. An overall assessment was scheduled each week to determine if an apparent configuration control problem trend existed. The inspectors noted that this review was not always conducted even though configuration control issues had emerged since the last meeting.

The inspectors reviewed several of the configuration control issues and categorized the incidents into two general areas. These areas were electrical design modification and work control.

The inspectors found that the licensee had taken prompt action to evaluate the electrical design modification configuration control issues. This included assessing the potential impact these issues may have on the unit and whether the design modification implementation process and postmodification testing was adequate to identify similar issues. The licensee noted that the design modification packages which contained errors had been performed by contractors. The contractors were notified of the configuration control problems. The licensee is requiring that each contractor respond to these concerns. In addition, the licensee will be sampling as-built electrical cabinets to assess the accuracy of the electrical drawings. The inspectors will continue to review the licensee's program for reviewing and accepting contractor initiated design documents.

The inspectors reviewed the configuration control ONE forms which identified concerns with the work control process. Three events were selected to determine the adequacy of the licensee's corrective actions. The three events reviewed were: (1) a loss of component cooling water flow to both control room heating, ventilation, and air conditioning units rendering them inoperable (FX 92-1223); (2) a clearance issued to electrical maintenance for transformer work with the transformer still energized (FX 92-1214); and (3) the partial draining of the nonsafety chilled water system surge tank to the component cooling water system drain tank (FX 92-1287).

The inspectors noted that the licensee did not appear to adequately assess the events for the corrective actions which should have been promptly implemented. An example of this concern involved the control room heating, ventilation, and air conditioning system event, with the reactor vessel defueled, where a Units 1 and 2 interface concern appeared to have not been addressed. A second example involved the energized transformer and the need to assure that temporary modifications be properly reviewed for impact from the outage system configurations. The last event appeared to have occurred, in part, because the order in which the clearance was lifted may not have been appropriate. This concern was presented to the licensee's senior management at the end of the inspection period. These examples are considered an unresolved item pending further review in conjunction with other related issues that will be evaluated during the subsequent inspection period (445/9247-03). The inspectors will continue to evaluate the licensee's immediate and long-term corrective actions taken for the identified configuration control problems.

2.4 Radiological Worker Practices

On November 16 and 17 two radiological contamination events occurred which resulted in uptakes to contract employees. The licensee initiated an investigation into the two events. Both uptakes were found to have occurred because of poor radiological work practices. The first uptake event occurred while eight maintenance personnel were reinstalling and tensioning the man-way

cover to Steam Generator 3. The second uptake event occurred while work was being performed on a chemical and volume control system valve. Both events occurred in high radiation/contamination areas.

The licensee's investigation of the first event identified that the steam generator platform area was extensively decontaminated by radiation protection personnel prior to the work beginning. The radiation work permit for this work activity required full protective clothing, plastics, and bubble hoods for respirator use. These dress requirements were later altered by the cognizant radiation protection technicians because of communication difficulties between personnel at the platform and control point and because of the extensive decontamination that had been performed. The new dress requirements were protective clothing, paper suits, and face shields. Throughout the course of the work activity, continuous radiation protection coverage was provided.

At the completion of the work activity and after removing all protective clothing, three individuals set off the portal monitors while attempting to exit the radiologically controlled area. Two workers were found to have facial (skin) contamination, one of which resulted in an uptake. Both skin contaminations and the subsequent uptake were caused by workers reaching under face shields to reposition their safety glasses and making contact with their skin. The radiation protection technician present during the work activity witnessed this on one occasion. The third worker had contaminated the modesty clothing when he tore his paper suit during the work activity. Radiation protection personnel indicated that the contamination entered through the tear in the paper suit and soaked through the protective clothing, contaminating the individual's modesty clothing.

The second radiological uptake event occurred in the Safeguards Building, Room 80. The room was posted as a high-radiation area and contamination area. Three contract workers were performing maintenance activities on a chemical and volume control system valve. After the valve was removed from the system, one worker standing approximately 1 foot from the valve used demineralized water and Scotch-Brite pads to clean the valve internals. Two other contract workers also used Scotch-Brite pads on the valve. After completing the work activity, the workers proceeded to the portal monitors at the radiological control point exit. The workers were determined to be contaminated. Subsequent examination revealed one worker was contaminated on the face, around the mouth area. A nasal swipe was taken which verified an uptake. A whole-body count was subsequently conducted. After the whole-body count, the individual was interviewed by the licensee. It was determined that the worker's face had touched the valve while reaching around a pipe to loosen the flange bolts. The individual also stated his face was close to the flange because of poor eyesight. The individual was not wearing corrective lenses.

The inspectors discussed the uptake events with the radiation protection manager. An apparent trend was indicated involving poor radiological practices by contract workers. Based on this indication, the licensee mandated that the radiation protection technicians provide continuous coverage

of specified contractor work activities in contaminated areas. Incidents of poor radiological practices were to be reported to the radiation protection manager. Based on these observations, the licensee determined that remedial radiological protection training was needed.

The following day, the licensee implemented a radiological safety training session for the contract workers' supervisors and held a refresher of "Radiation Worker Training" for the workers. On November 19 the inspectors attended one of these training sessions. The training stressed the importance of radiation safety and covered topics such as radioactive material, dosimetry and exposure control, contamination and contamination control, and radiation work permit and general access permit training. Following the formal classroom presentation, each worker had to pass a written examination covering the content of the course. In addition, each worker had to demonstrate the proper donning and removal of protective clothing and follow the instructions delineated on a mock radiation work permit to complete the training exercise. All workers adequately demonstrated the proper donning and removal of protective clothing. However, almost all workers, when questioned by the inspectors and licensee training personnel, were not aware of the requirements delineated in the mockup radiation work permit. Some workers were not aware of the definition of a high-radiation area, some were not aware of the number of simulated high-radiation areas they would progress through to complete the exercise, and some were also not aware of appropriate actions needed to be taken if conditions in the work area changed. At the completion of the exercise and after removal of protective clothing, the inspectors observed several workers frisk out using inoperable survey instruments. These observations were discussed with licensee management. The licensee concluded that additional radiation protection technician oversight would be required for that contractor group.

The inspectors witnessed maintenance activities conducted by noncontract personnel inside contaminated areas. Several poor radiological worker practices were observed. These observations included workers using their gloved hands to adjust safety glasses. A worker in a high-radiation/contamination area was observed to unzip his protective clothing and place his gloved hand into his modesty clothing pocket to retrieve dosimetry. The inspectors also noted that a worker placed his gloved hand under a leaky residual heat removal drain valve while attempting to reinstall the valve. This was contrary to the directions of the radiation protection technician overseeing the job.

The inspectors also discussed the amount of oversight provided by supervisory personnel in contaminated areas with maintenance workers. In general, it was found that managements' expectation that supervisors observe workers was not being met for activities in contaminated areas.

These issues were referred to the Region-based health physics inspectors for further evaluation and followup. These items are considered an unresolved item pending further review by Regional staff (445/9247-04).

2.5 Conclusions

The operators responded very well to the reduction in feedwater flow to one steam generator. The operator's prompt actions mitigated the severity of the event and prevented the plant from challenging safety setpoints.

The shift supervisor responded appropriately to the potential security compromise. The basis for declaring a NOUE was well founded and required compensatory posts be established. The event was assessed by licensee senior management from the technical support center. The conditions needed to assure the security of the facility were clearly established and met before the NOUE was exited.

The configuration control issues adversely impacted the design modification process and work control implementation. An unresolved item was identified for further review by the resident office staff.

The radiological uptake events and several personnel contaminations resulted from contract personnel not being cognizant of radiation worker requirements and good practices. A minimal assurance that contract personnel could work safely in contaminated areas was provided through remedial training, supervisor awareness, and enhanced radiation protection technician oversight. Permanent plant personnel performance in contaminated areas was good. However, several poor work practices were noted where personnel could easily become contaminated. An unresolved item was identified for further review by Regional staff.

3 REFUELING ACTIVITIES (60710)

3.1 Crane Operations

On November 4 with the unit in Mode 6, the inspectors were observing the work associated with the Unit 1 reactor vessel head stud removal. Contractor personnel were using the polar crane to lower and raise the stud removal holder and track assembly. During the lowering of the track, the inspectors noted that the "C" clamp assemblies attaching the track to the polar crane were allowed to swing freely and had bumped lightly into the reactor vessel head assembly. On one occasion, as the track assembly was being lowered into its final position, the inspectors noted that a "C" clamp assembly had hooked a power cable attached to one of the head's electric hoists. Neither the crane operator stationed at the 905-foot elevation, nor the rigger at the bottom of the refueling cavity directing the crane operator noticed the clearance problem. The inspectors made multiple attempts to gain the attention of the crane operator to stop lowering the lifting rig. Prior to any damage occurring, the crane operator noticed the inspectors and stopped the crane from damaging the electric hoist.

Later, the lifting rig was repositioned to pick up a track containing removed reactor studs. As the rig was being repositioned, one of the "C" clamps hung up below an I-beam extending from the cavity liner. The crane operator

continued repositioning the lifting rig instead of lowering the load and clearing the obstacle. As the load was repositioned, it suddenly became detached from the I-beam and swung about in an uncontrolled manner. The lifting rig again bumped into the upper head assembly at one of the electrical junction boxes. The inspectors also noted that, during the removal of the stud filled track, the guide ropes (tag lines) were not long enough to control the load while in the vicinity of the reactor head. Although no visible damage occurred, the inspector concluded that damage to the refueling cavity liner and the reactor vessel upper head components could have occurred because of the weight and momentum of the uncontrolled load.

The licensee was immediately informed of these observations and the licensee temporarily suspended lifting operations in the reactor cavity. ONE Form 92-1149 was written by the licensee to document and evaluate the crane and rigging problems. The licensee immediately initiated the following corrective actions:

- Installed longer tag lines,
- Reviewed licensee's expectations with the contractors involved (i.e., adhere to onsite procedures), and
- Stationed a containment coordinator to observe the remaining crane operations in the refueling cavity.

Maintenance Department Procedure MDA-308, Revision 6, "Crane and Electrical Hoist Operator Certification Program," Attachment B requires that tag lines shall be provided and used to control freely swinging loads whenever manual guidance is required to protect personnel or equipment. The procedure also requires care to ensure that rigging equipment clears all obstacles. Additionally, the procedure requires care to be taken while lifting loads to ensure the load does not contact obstructions or suddenly accelerate or decelerate. The inspectors identified the failure to follow the procedures as a violation of Technical Specification 6.8.1 and Procedure MDA-308 (445/9247-01).

3.2 Fuel Movement Observations

The inspectors observed reactor core offload activities from the refueling bridge and the fuel transfer canal. It was noted that the offload activities were properly coordinated with the control room. A licensed senior reactor operator was stationed on the refueling bridge during all activities involving fuel movement. The individual at the transfer canal, operating the upender, maintained communications with the personnel at the spent fuel pool.

3.3 Fuel Failures

The licensee estimated that between 6-8 fuel rodlets had failed during Cycle 2 operation. To determine which fuel assemblies had experienced failed fuel rodlets and to assure they were not returned to the core during Cycle 3, the

licensee performed IN-CAN and IN-MAST sipping inspections on each fuel assembly. Based on the results of these inspections, five fuel assemblies were identified with a total of nine failed rodlets. Four of these assemblies had been identified to be returned to the core for Cycle 3. Five of the failures appeared to have resulted from fretting. One upper end cap failure occurred below the weld. The cause for the end cap failure and remaining three rodlets had not been determined.

The core reload will consist of approximately 40 percent of the older generation Westinghouse fuel assemblies. The newer generation fuel assemblies contain debris filter bottom nozzles. A revised core reload analysis (Core Operating Limit Analysis Report) has been approved to permit the core reload with alternate fuel assemblies in place of the four damaged assemblies.

3.4 Conclusions

A violation was identified for the failure to properly control heavy loads around the reactor vessel head. Personnel involved with the activity did not demonstrate the expected safety awareness and protect against possible damage to the reactor vessel and/or refueling cavity wall.

The licensee effectively monitored core off-load activities. Good communications were demonstrated between contract personnel, the control room, and the refueling bridge senior reactor operator.

The licensee took appropriate measures to determine which fuel assemblies contained failed rodlets. On the basis of this information, the licensee initiated a conservative approach and redesigned the core without the affected fuel assemblies.

4 OPERATIONAL SAFETY VERIFICATION (71707)

The objectives of this inspection were to ensure that this facility was being operated safely and in conformance with regulatory requirements, to ensure that the licensee's management controls were effectively discharging the licensee's responsibilities for continued safe operation, to assure that selected activities of the licensee's radiological protection programs were implemented in conformance with plant policies and procedures and in compliance with regulatory requirements, and to inspect the licensee's compliance with the approved physical security plan.

The inspectors conducted control room observations and plant inspection tours and reviewed logs and licensee documentation of equipment problems. Through in-plant observations and attendance of the licensee's plan-of-the-day meetings, the inspectors maintained cognizance over plant status and Technical Specifications action statements in effect.

4.1 Reactor Startup

On October 14, 1992, the inspectors observed the reactor startup until the reactor was critical and stable in the intermediate range. Plant recovery was initiated with the plant in Mode 3. Procedure IPO-2A, Revision 8, "Plant Startup From Hot Standby," was followed throughout the observed portion of the startup. Supervisory oversight was provided the entire time by a senior reactor operator. Communications between the reactor operator and the reactor engineer performing the inverse count ratio were good, thereby allowing close coordination between the two to ensure criticality was achieved close to the calculated critical rod position. The inspectors noted that the reactor startup was conducted in an excellent manner.

4.2 Plant Shutdown

Control room observations were performed during the plant shutdown for Refueling Outage 2. The inspectors noted that interruptions of the control board operators and unit supervisors were limited to evolutions being conducted in accordance with the shutdown. Tag-out reviews were being completed by an off-shift crew located in an office outside the control room.

The inspectors observed the shutdown of Feedwater Pump A in conjunction with the plant shutdown for Refueling Outage 2. The pump was secured by the turbine building auxiliary operator and the field support supervisor. Procedure SOP-302A, Revision 5, "Feedwater System," was referenced during the shutdown. Step 5.2.1.5 required that motor-driven Feedwater Pump A Suction Valve 1-HS-2321 be closed; however, problems with the motor and manual operator prevented the operators from completing this activity. In accordance with operations department administration procedures, the field support supervisor obtained permission from the shift supervisor to close an upstream condensate supply valve (1CO-0254) in order to isolate the Feedwater Pump A suction. Good teamwork and coordination by the on-shift crew was observed.

The inspectors observed the addition of hydrogen peroxide to the primary system. Procedure CHM-506, Revision 5, "Chemistry Control of the Primary System," indicated that the initial hydrogen peroxide addition would normally be approximately 5 gallons; however, the chemistry shift orders had been modified to add 1/2 gallon of the chemical for the initial addition. A chemistry technician stated that the quantity was changed since guidance supplied by Electrical Power Research Institute was based on solid plant operation. The addition to Unit 1 was performed prior to collapsing the pressurizer steam bubble. Chemistry personnel were concerned that, with a steam space in the pressurizer, hydrogen levels could be exceeded with the addition of a large quantity of hydrogen peroxide; therefore, a conservative approach was taken to ensure hydrogen levels were maintained within a safe range.

During the addition of the hydrogen peroxide to the chemical mixing tank, the inspectors noted that the chemistry technicians spilled a small amount of chemical on the floor. Procedure SOP-104A, Revision 5, "Reactor Make-Up and

Chemical Control System," has a caution statement not to allow the funnel or vent to overflow while filling the chemical mixing tank. The inspectors found that the funnel arrangement was poorly designed. The fill arrangement consisted of a tygon tube slipped over the tank fill piping and a plastic funnel installed in the other end of the tubing. Because of the proximity of the funnel to the overhead, the personnel adding the chemicals were required to partially bend the tubing and lift the addition bottle to shoulder height while pouring the chemicals. This arrangement made overflowing the funnel very likely while, at the same time, exposing one or more individuals to skin or facial contamination from hazardous chemicals. The chemistry technicians indicated that previous requests for a design change were not approved.

The inspectors reviewed Material Safety Data Sheets 4766 (hydrogen peroxide) and 5585 (lithium hydroxide monohydrate) which detail the health hazards associated with the chemicals. The exposure to lithium hydroxide and hydrogen peroxide poses health hazards to personnel if the chemicals were to contact skin or eyes or were taken internally. Acute exposure of the chemicals to the eyes may cause blindness. The inspectors identified this concern of the chemical addition arrangement to licensee senior management.

The addition of the hydrogen peroxide to the reactor coolant system was performed by an auxiliary operator. The operator performed the addition in accordance with Procedure SOP-104A in a cautious manner. The field support supervisor observed the job performance.

4.3 Observation of Licensed and Unlicensed Operators

During the period of November 16-19, the inspectors observed licensed and nonlicensed operators during the conduct of shift turnovers, while performing assigned activities, and assessed communications between operators and with supervisory personnel.

The following observations were made:

- Several auxiliary operators were observed performing various evolutions in the field. All evolutions were conducted formally with the appropriate procedure, and communication with the control room was observed to be timely, clear, and effective. The field support supervisor was effective in ensuring safe operation of the systems observed. The inspectors noted, however, that the operators did not always anticipate and verify that their actions resulted in the expected system performance. One instance involved establishing a purge lineup on the Unit 1 Instrument Air Compressor 1-02. When the activity was finished, the auxiliary operator stated that he had completed the lineup and, therefore, was purging. When asked to verify the correct flow path, neither the auxiliary operator nor the field support supervisor could successfully describe the flow path. A purge flow path was verified later in the control room using system drawings.

- Crew turnover briefings, in general, were effective in presenting the oncoming crew with pertinent information; however, interviews with several operators revealed that the oncoming operator relies heavily on a thorough one-on-one turnover from the offgoing operator.

- Individual turnovers were observed, in general, to be very professional and thorough. The offgoing operators were very conscientious in providing a detailed relief and ensuring that the oncoming operator was ready to accept the shift. In most cases, the oncoming operator was attentive and questioned system statuses he did not fully understand. However, one instance was noted, with the reactor core offloaded, where the oncoming licensed reactor operator was not attentive during the one-on-one shift turnover. The relieving reactor operator was observed to simultaneously perform annunciator lamp tests and replace bulbs while the offgoing reactor operator explained the main control board system's status. Immediately after turnover was complete, the inspector questioned the reactor operator about the status of several systems covered during the turnover. The reactor operator was not sure of the status of some systems which were not specifically relied on for "No Mode" operation.

- In general, when questioned as to the meaning of lit annunciators in the control room, operators were knowledgeable and could explain the cause of the annunciator. There were some instances where the operator was not sure, but the safety significance of the alarm was very low and inconsequential.

- The routine interaction between unit supervisors was observed to be frequent and sufficiently detailed to keep each other informed of evolutions affecting the other unit.

4.4 As Low As Reasonably Achievable (ALARA) Review

The inspectors reviewed the licensee's approach to keeping radiation exposure ALARA. The review consisted of evaluating Procedures STA-651, Revision 4, "ALARA Program,"; STA-657, Revision 4, "ALARA Job Planning/Debriefing"; and RPI-607, Revision 2, "ALARA Planning"; and comparing the requirements of these procedures to a refueling outage ALARA package. Radiation Work Permit (RWP) 92-1600, "Refueling"; and RWP 92-1400, "SG Eddy Current Testing," were verified to conform to the requirements of the above procedures.

The ALARA package for the refueling activity was discussed with an ALARA technician to determine the effectiveness of the planning. The inspectors ascertained that the ALARA planning had been effectively accomplished as evidenced by the following:

- Department ALARA contacts' meeting notes;

- Review of Refueling Outage 1 exposure history;

- Licensee's discussion with the Callaway Nuclear Station personnel who recently removed a stuck reactor stud;

- An ALARA technician visited Babcock and Wilcox Company to observe the stud removal equipment, interview the contractors involved in the operation, and determine placement of equipment and personnel; and

- Licensee's discussions with Westinghouse personnel and onsite representative to estimate time and equipment needed to complete each refueling task.

The inspectors noted that no "ALARA Concerns/Suggestion" forms had been filled out during Refueling Outage 1 for the refueling activity. The ALARA technician did indicate that several suggestions from radiological protection technicians did factor into the present RWP (i.e., combine all the refueling activities into one RWP versus several, due to past confusion on which task certain activities would be tracked).

Overall, the inspectors found the ALARA package preparation to be thorough, with excellent foresight and preplanning.

4.5 Plant Housekeeping

On November 21 while performing a walkdown of the radiological controlled area, the inspectors found a bag of potentially contaminated protective clothing inside of Unit 1 Room 1-088 that was not controlled in accordance with Procedure STA-652, Revision 4, "Radioactive Material Control." The used clothing was contained in a radioactive material bag outside of any contamination area and was unsealed and not marked as to the radioactive contents. Radiation protection personnel were immediately notified and a survey of the contents indicated less than 100 counts above background. The bag was then sealed and removed from the area. Conversations with the area radiation protection technicians indicated that no work was ongoing in Room 1-088 that required protective clothing. The onshift radiation protection supervisor was contacted and he indicated that no other deficiencies with radioactive material control had been identified and that the issue would be discussed with radiation protection technicians to verify that their areas were properly controlled.

4.6 Conclusions

The operators performed very well during plant startup and shutdown for the refueling outage. Communications between the reactor operators was generally good. However, an instance was noted where the operator assuming licensed activities was not fully cognizant of plant status. It was also noted that managements' expectations were not met for self-verification while placing an instrument air system in purge.

The ALAPA program was well implemented for refueling outage work activities. One instance of improper control of radioactive materials was noted. General area housekeeping within the radiologically controlled area was good.

5 MAINTENANCE OBSERVATION (62703)

5.1 Control of Tools Used on Stainless Steel

During a tour of the radiological controlled area on November 2, the inspectors observed work on two containment spray valves (CT-0026 and CT-0028). The maintenance technicians were removing body-to-bonnet studs and nuts to inspect for boron induced corrosion and to remove the deposits from the hardware. The technicians were using wire brushes that appeared to be carbon steel. A quality control inspector was observed allowing the technicians to use the carbon steel brushes.

The next day the inspector talked to the quality control inspector, involved in the previous day's work, about the use of carbon steel brushes on stainless steel components. He stated that the use of the brushes was acceptable as long as they were color coated orange to indicate for use on stainless steel only.

On November 4 the inspectors identified that the maintenance department administrative procedures precluded the use of carbon steel brushes on austenitic and/or nickel alloy steels. Procedure STA-612, Revision 2, "System Cleanliness Control and Cleaning," Section 6.7.2, requires austenitic stainless and/or nickel alloy steels be wire brushed with stainless steel brushes. The use of carbon steel tools can cause contamination of the stainless steel components by imbedding carbon steel in the stainless steel and, thereby, causing accelerated corrosion due to galvanic action.

After the requirements were identified, the inspectors returned to the same work area and found maintenance technicians using what appeared to be carbon steel wire brushes. Conversations with the craft personnel and maintenance supervisor indicated that they understood the use of carbon steel brushes was acceptable as long as appropriately color coded. An operations manager was immediately contacted and the licensee suspended work on those components pending resolution of the inspectors findings. The licensee initiated ONE Form 92-1140 to evaluate the affects of stainless steel contamination. The licensee verified that the brushes being used were carbon steel. The licensee immediately removed all carbon steel brushes color coded as stainless from the work area and the Unit 1 radiological controlled area tool issue room. The inspectors identified the failure to control carbon steel brushes in accordance with Procedure STA-612 as a violation of Technical Specification 6.8.1 (445/9247-02).

On November 4 the inspectors noted that tools used on stainless and carbon steels were not segregated in the Unit 2 radiological controlled area tool issue room. Maintenance Department Procedures MDA-405, Revision 3, "Control of Tools in the Radiological Controlled Area"; and MDA-401, Revision 1,

"Control of Tools," requires tools used on stainless steel shall be kept segregated from tools used on carbon steel. These tools include wire brushes, files, grinding discs, polishing wheels, etc. The licensee was promptly informed of the tool segregation issue. However, on November 9, the inspectors identified files improperly segregated in the Unit 1 containment tool issue room. The inspectors identified the failure to properly segregate tools used on stainless steel and carbon steel, in accordance with Procedures MDA-401 and MDA-405, as a second example of violation 445/9247-02.

The inspectors were informed by the mechanical maintenance manager that the contract supervisor for the Unit 1 containment tool room was aware of the tool issue and segregation requirements. However, the requirements were not known by the tool room attendants. The licensee immediately stopped issuance of tools and trained all contractor personnel on the requirements for tool control. The licensee removed all nonsegregated tools from the tool room and restocked with new tools. The inspectors were concerned with the failure of numerous organizations to recognize the improper use and control of tools on stainless steel components.

5.2 Diesel Generator Maintenance

The inspectors observed two maintenance work activities on the Unit 1 Train A diesel generator. Contractor personnel and licensee quality control technicians were observed performing the disassembly of Cylinder Heads 7R and 8R using Work Order 3-92-318428-01 (nondestructive examination of cylinder blocks and liner). The inspectors also observed the boroscopic inspection of various diesel generator and cylinder liners conducted in accordance with Work Order 3-92-322179-01.

The work was conducted in accordance with the applicable maintenance procedures. Contractor and licensee personnel were observed using procedures throughout the maintenance. Each work step was signed-off after completion of the work activity. Good work practices were used by the craft personnel.

5.3 Chemical and Volume Control System Drain Line

The inspectors observed the work activity associated with a chemical and volume control system drain valve. This activity was conducted inside the reactor containment building, in an area designated as a high radiation/contaminated area. The activity was performed in accordance with the work order instructions. During the performance of the maintenance activity, the inspectors noted several poor radiological work practices. These included positioning the safety glasses with the palm of the glove and reaching inside the anticontamination clothing while inside the contaminated area. A review of the radiation work practice concerns is provided in paragraph 2.4.

5.4 Conclusions

One violation was identified for the use of carbon steel brushes on stainless steel components and the failure to segregate tools used on stainless steel from those used on carbon steel. This reflected a lack of awareness by plant personnel to control materials used on safety-related components.

The work activities performed on the diesel generator and chemical and volume control system were conducted in accordance with the work instructions.

6 SURVEILLANCE OBSERVATIONS (61726)

The inspectors observed the surveillance testing of safety-related systems and components listed below to verify that the activities were being performed in accordance with the Technical Specifications. The applicable procedures were reviewed for adequacy, test instrumentation was verified to be in calibration, and test data was reviewed for accuracy and completeness. The inspectors ascertained that any deficiencies identified were properly reviewed and resolved.

The inspector witnessed portions of the following surveillance test activities:

6.1 Diesel Generator Reverse Power Relay Calibration

The inspectors observed two technicians performing the calibration of the Unit 1 Train A diesel generator reverse power relay. The calibration was authorized by Work Order 3-92-318811-01 and conducted using Procedure MSE-GO-0020, Revision 1, "Relay Calibration," Attachment 10.1. The inspectors noted that the technician assisting in the calibration was an instructor from the training department and was being trained on meter and relay calibration techniques. Excellent coordination between the two technicians was exhibited throughout the inspectors' observation. The supervising technician ensured that the other technician understood the importance of each check and adjustment. Good self-verification and work practices were employed by the craft personnel.

6.2 Train B Centrifugal Charging Pump Test

The inspectors observed portions of surveillance testing of the Train B centrifugal charging pump. The surveillance was conducted in accordance with Procedure OPT-201A, Section 8.2.2, and Work Order 5-92-501811-AC. The inspectors noted that the pressure gauge installed to measure the charging pump discharge pressure was leaking water. A swipe of the water was taken by a radiation protection technician and it indicated no activities above background. The leaky gauge was investigated by instrumentation and control personnel. The investigation revealed the gauge was cleaned prior to the test and the water had not properly dried during the cleaning process. The licensee concluded that the fluid did not affect the operability of the gauge. The water was removed and the test was satisfactorily completed. No other

discrepancies were noted during initial system lineup and procedural testing. The inspectors reviewed all test data from the surveillance. The inspectors verified that the pump vibrational amplitude was acceptable and that the pump charging flow was above the pump curve.

The inspectors noted excellent communication between the control room operator and auxiliary operators. Overall, the surveillance was conducted with good coordination and control.

6.3 Conclusions

The licensee effectively implemented the surveillance program in accordance with procedures. Briefings were conducted prior to the performance of each surveillance test. Excellent communications were noted between the control room and auxiliary operators.

7 ENGINEERED SAFETY FEATURES (ESF) SYSTEM WALKDOWN (71710)

The inspectors conducted an ESF walkdown of the radiation monitoring system during the previous inspection period. The results of the ESF walkdown are documented in NRC Inspection Report 50-445/92-40; 50-446/92-40, paragraph 4. Based on the design modifications which are scheduled to be implemented, the inspectors determined that a review of these design modifications was needed.

7.1 Design Modification DM 91-901: "Upgrade of Radiation Monitoring System Central Processor (CPU) and RM-11 Display Generators"

This design modification upgraded the radiation monitoring systems computer. The license had determined that the present system was essentially obsolete. This was based on replacement parts not being available. The system was also deemed unreliable causing loss of data and loss of communication with approximately 90 radiation monitors. Finally, the addition of the Unit 2 radiation monitors would have added to the communication problem.

The upgrade will require a change to the facility as described in the licensing basis document. A 10 CFR Part 50.59 safety evaluation was performed to evaluate this change. Safety Evaluation 92-144 concluded that no accidents and malfunctions of equipment important to safety, as described in the licensing basis document, would be affected by implementing this modification. It also concluded that no new unreviewed safety questions exist due to the upgrade. The inspector reviewed the safety evaluation and concluded that the licensee had evaluated all concerns pertaining to the new computer system to define the credible potential failure modes.

The inspector reviewed the documentation provided to support the design modification. It was noted that the licensee had identified the applicable station, operating, and abnormal procedures to be revised. The use of operator aids were also identified to clarify operation of the new operator console. Training was also to be given to the operators concerning the major

changes to the system. The applicable sections within the Final Safety Analysis Report were identified that were required to be updated.

7.2 Design Modification DM 91-148: "Containment PIG Pump Replacement"

This design modification provides for replacing Roots AF-22 blowers on radiation monitors:

1-RE-5502/66/03
X-RE-5568A/75A/67A
X-RE-5568B/75B/67B
X-RE-5895A
X-RE-5896B

The design modification authorizes the replacement of the Roots blowers with Thomas pumps. The licensee has concluded that the Roots blowers are obsolete and are no longer supported by the radiation monitor vendor. The Roots blowers also required frequent maintenance.

Since the design modification changed the facility as described in the licensing basis document, a 10 CFR Part 50.59 evaluation was performed. Safety Evaluation 92-153 concluded that the new equipment met the same qualification and installation requirements as the existing equipment and also would be powered from the same source. The evaluation concluded that the operation of the monitors would remain the same and no new failure modes were introduced.

The inspectors reviewed the licensee's safety evaluation and associated documentation to implement the design modification. The inspectors concluded that the licensee had conducted an extensive analysis and the conclusions were well supported. The inspectors verified that the licensee had identified the revisions that were required to the Final Safety Analysis Report, operating procedures, and maintenance procedures, including the preventive maintenance procedures. Based on this review, the inspectors concluded that the licensee had performed an appropriate review to replace the Roots blowers with Thomas pumps.

7.3 Conclusions

The design modification process was appropriately implemented to enhance the radiation monitoring system. The system engineer was fully cognizant of the design changes and was extensively involved with the design change. The affected procedures were identified for revision.

8 REVIEW OF TEMPORARY INSTRUCTION 2515/113

8.1 (Closed) TI 2515/113: "Reliable Decay Heat Removal"

The licensee implemented measures to assure reliable decay heat removal during outages. This assurance was provided through outage risk assessment, procedure controls, and operator training.

During the development of the outage plan, the licensee identified critical systems and power sources which were required to be maintained operable. A risk assessment was performed to evaluate the overall affect equipment outage windows would have on required safety-related systems and power sources. This assessment accounted for decay heat, plant mode, and reactor coolant system inventory. Specific criteria were established, including a formal documented review by the Independent Safety Engineering Group, to modify the equipment outage window ties. This was to assure that the required safety-related components and power sources remained operable. This also assured that equipment which was to be relied on, but was not required to be operable by the Technical Specifications, remained available.

The licensee had implemented Integrated Plant Operating Procedure IPO-010A, "Reactor Coolant System Reduced Inventory Operations." This procedure provided the steps necessary to drain and fill the reactor coolant system for maintenance or maintain steady conditions during reduced reactor coolant system inventory operations. The inspectors reviewed the procedure and found that it provided specific requirements for reduced inventory operations. The procedure also provided appropriate procedure references to transition to other refueling or operating procedures.

The inspectors discussed the procedure implementation with licensed personnel. The individuals were provided specific training on reduced inventory operations and were cognizant of the procedural requirements. The operators demonstrated that they were knowledgeable of the equipment which was required to be operable and the instrumentation to be utilized. They also were cognizant of which abnormal procedures may be required.

8.2 Conclusions

The licensee has implemented an effective program for assessing outage risks. This program was well supported by plant management. Procedural controls for reduced inventory operation were very good. Personnel responsible for implementing the procedure were knowledgeable of the procedure requirements and had received appropriate training to properly control reduced inventory operations.

9 FOLLOWUP (92701)

9.1 (Closed) Inspection Followup Item 445/9019-05; 446/9019-05: Development of acceptable proceduralized strike plans

The licensee has evaluated the need to develop a written strike contingency plan. Based on their review, the licensee does not intend to develop a detailed written contingency. The inspectors will continue to monitor for a future need for the licensee to develop proceduralized strike plans.

9.2 (Closed) Unresolved Item 445/9220-07; 446/9220-07: Sufficient shift manning of licensed senior operators for two-unit operation

The licensee has implemented several permanent steps to provide reasonable confidence that shift manning for dual-unit operation is appropriate. The inspector noted that minimum shift crew composition as defined in Procedure ODA-102, Revision 14, "Conduct of Operation," Attachment 8.A, page 1 of 3, required four senior reactor operators and the field support supervisor when both units are in Mode 4 and above. The additional senior reactor operator was being utilized to reduce the administrative burden on the assigned unit supervisors, especially in the area of work control. The inspectors noted that maintenance administrative activities have been lessened on the day shift by increased maintenance support on the night shift. These initiatives have collectively reduced the administrative burden on the unit supervisor and allowed greater supervisory interface and oversight on the part of the unit supervisor.

9.3 (Closed) Unresolved Item 445/9240-01: Steam generator atmospheric block valve unauthorized repair

The licensee formed an evaluation team to address ONE Form 92-965. This ONE form was written to evaluate and assess the issues involved with the repair to the steam generator atmospheric block valve reach rod as detailed in NRC Inspection Report 50-445/92-40; 50-446/92-40. The reach rod repair was determined not to have been authorized and was in violation of Procedure STA-606, Revision 18, "Work Requests and Work Orders." Section 6.5 requires that a work order be completed prior to commencing maintenance except for emergency or urgent work. No work order was initiated before or after the work was conducted. In response to the NRC concerns, the licensee actions were as follows:

- Technical Evaluation 92-2176 documented that the valve was operable without the duct tape installed. The operations department will issue a lessons learned to address management's expectations for acceptable work practices.

- Based upon Technical Evaluation 92-2176, the priority assigned was consistent with management's expectations; however, a review of the process for reassigning work requests into open work orders will be conducted to ensure correct prioritization.

- Reemphasize that each manager who is responsible for verifying programmatic concerns which effect their department is identified on a ONE Form.

This violation was of minor safety significance and the licensee has performed an extensive evaluation and formulated corrective actions. The violation is not being cited because the criteria specified in Section VII.B.1 of the NRC Enforcement Manual were satisfied.

9.4 (Closed) Unresolved Item 445/9231-02: Testing of the centrifugal charging pump alternate miniflow relief valve

The inspectors, along with a Region-based inspector and an NRR representative, witnessed a test of the centrifugal charging pump alternate miniflow relief valve for Unit 2. The test was performed in response to the problems identified during the Shearon-Harris testing of the charging pump alternate miniflow relief valve. Shearon-Harris had conducted a test of the alternate miniflow system in September 1992 to examine relief valve performance due to concerns that the NRC had expressed with the reliability of the safety injection alternate miniflow system. The Shearon-Harris "B" charging pump miniflow system exhibited significant relief valve chatter which resulted in rupture of the relief valve bellows. It appeared that the chattering was caused by the throttling of the relief valve inlet flow by the initial opening/closing of the associated isolation valve.

The licensee developed a Unit 2 Startup Test Procedure 2CP-ST-49-09, Revision 0, "Alternate Miniflow Verification." This test performed a functional test of the centrifugal charging pump alternate miniflow relief valve (2-8510A). The procedure specified that the acceptance criteria for the relief valve were that it would not demonstrate any significant vibration or chattering under full-flow conditions.

The centrifugal charging pump suction flow path for this test was established from the refueling water storage tank with the volume control tank path isolated. The charging pump miniflow valves were kept open throughout the test. The pump discharge valve was closed and the pump was started on normal miniflow. After the normal miniflow was stabilized, the alternate miniflow isolation valve was opened from the control room. This provided pump discharge pressure to the alternate miniflow relief valve. During the test both the normal miniflow line and the alternate miniflow line were open.

The inspectors noted that no significant vibration or chattering was observed at the valve or piping throughout the duration of the test. The throttling of the relief valve flow by the opening/closing of the associated isolation valve did not appear to cause any valve chatter. Instrumentation including strain gages and accelerometers were installed on the valve to measure any movement. The inspectors reviewed the Alternate Mini Flow Test Report PTR-45, Revision 0, dated November 23, 1992. The report concluded that no significant valve chatter or water hammer effects occurred. There were no visual changes

to the relief valve or the alternate minimum flow line during the test. Posttest analysis showed that there were no significant pipe strains or vibrations measured at any point. Based on the inspectors' observation of the test and a review of the test data, the inspectors concluded that the licensee's conclusion regarding system performance was well founded.

ATTACHMENT 1

1 PERSONS CONTACTED

1.1 TU ELECTRIC

M. R. Blevins, Director of Nuclear Overview
D. Buschbaum, Supervisor, Compliance
W. J. Cahill, Group Vice President, Nuclear Engineering and Operations
R. Carter, Assistant to Manager, Maintenance
D. L. Davis, Manager of Technical Support
N. Harris, Licensing Engineer
T. Hope, Site Licensing
J. J. Kelley, Plant Manager
D. McAfee, Manager, Quality Assurance
J. W. Muffett, Manager of Design Engineering
S. S. Palmer, Stipulation Manager
B. Prince, Radiation Protection Manager
S. Smith, Unit 1 Work Control Center Manager
J. E. Thompson, Senior Engineer, Licensing

1.2 CITIZENS ASSOCIATION FOR SOUND ENERGY (CASE)

O. L. Thero, Consultant

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

2 EXIT MEETING

An exit meeting was conducted on November 23, 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.